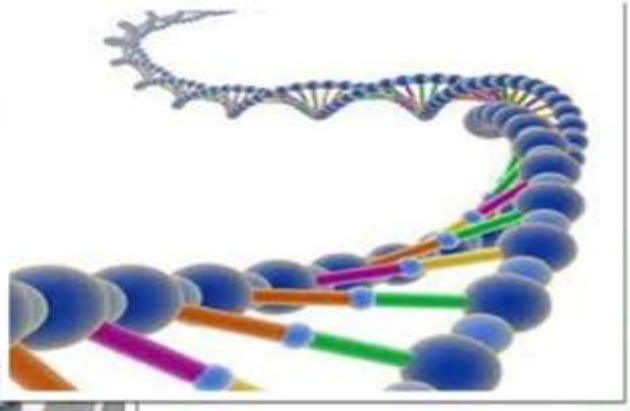
32nd Annual Research Bulletin

Theme II Human Health, Nutrition, and Welfare



Volume II

April 2015
Haramaya University

Office of the Vice President for Research Affairs

32nd Annual Research and Extension Workshop 2015

Edited and Compiled by:

Tesfaye Gobena (PhD)

Prof. Nigussie Dechassa (PhD)

Nega Assefa (PhD)

Mengistu Ketema (PhD)

Kidesena Sebesibe (MSc)

Printed in Addis Ababa, Ethiopia

Inquiriesshould be addressed to:

Office of Research Affairs

P. O. Box 116, Haramaya University, Ethiopia

Tel: (+251) 25 553 0324 / (+251) 25 553 0329

Fax: (+251) 25 553 0106 / (+251) 25 553 0325

Table of Contents

		Page No
1.	**Awareness and Attitude of Female Students in Harar Higher Educational Institutions towards Legalization of Safe Abortion, Harari Region, Eastern Ethiopia : a cross sectional study** Jote Markos, Ayele Geleto	1
2.	**Prevalence and Factors Associated with Depression, Suicidal Ideation and Attemptamong Haramaya UniversityStudents** Andualem Derese, Gezahegn Tesfaye, Mitiku Teshome	11
3.	**Knowledge and Practice on Integrated Diseases Prevention and Control among Households in East Hararghe Zone, Ethiopia** Ayichew Seyoum, Kedir Urgessa, Tesfaye Gobena	20
4.	**Trend Analysis of Causes of Admissions and Mortality at Hiwot Fana Specialized University Hospital** Bekele Belayihun , Negga Baraki , Yadeta Dessise	35
5.	**Factors Affecting Utilization of Maternal Health Care Services in Kombolcha District, Eastern Hararghe Zone, Oromia Regional State, Eastern Ethiopia** Desalew Zelalem Ayele, Bekele Belayihun, Kedir Teji, Desalegn Admasu Ayana	41
6.	**Prevalence and Intensity of Soil Transmitted Helminthes among Elementary Students of Babile Town, Eastern Ethiopia** Ephrem Tefera, Jemal Mohammed, Habtamu Mitiku	48
7.	**Feeding Practice, Nutritional Status and Sero- Status of Infant and Young Children Born From HIV Infected Women in Harar and Dire Dawa Public Health Institutions, Eastern Ethiopia** Firehiwot Mesfin, Bekele Belayihun	55
8.	**Pneumonia Morbidity among Under Two Years Children with the Implementation of PCV Vaccination: The case of Gursum District, Eastern Ethiopia** Gari Hunduma, MitikuTeshome, Yadeta Dessie	62
9.	**Sexual Explicit Materials (SEM) Exposures and their Association with Sexual Behavior of School Youth in Dire Dawa, Eastern Ethiopia** Gari Hunduma, Yadeta Dessie, Merga Deressa, Mitiku Teshome	70
10.	**Anaemia and Nutritional Status of Adolescent Girls in Babile District, Eastern Ethiopia** Kedir Teji, Yadeta Dessie, Tesfaye Assebe, Meyrema Abdo	76
11.	**HIV Prevalence and Sexual Behaviours of Haramaya University's Students: Implication for Prevention** Merga Dheresa, Negussie Bussa, Yadata Dassie, Lemessa Oljira	83
12.	**Quality of Life among HIV-Positive Attending ART Clinic in Public Health Facility of Dire Dawa Administration** Merga Dheresa	96
13.	**Risk Factors for Unsuccessful Tuberculosis Treatment Outcome (Failure, Default and Death) in Selected Public Health Institutions, Eastern Ethiopia, 2012** Tariku Dingeta, Tekabe Abdosh	106
14.	**Barriers' of Mothers' Awareness about Obstetric Danger Signs and Health Care Seeking Practice at Haramaya District, Eastern Ethiopia** Tesfaye Assebe, Fekede Asefa	116
15.	**Drop Out of Newly Diagnosed HIV-Infected Adults From Routine Pre-ART Care in Public Hospitals, Harar Town, Eastern Ethiopia.A Retrospective Cohort Study**	123

Tesfaye Digaffe

16. **Assessment of Health and Socio-Demographic Problems of Early Marriage among Ever Married Women in Kersa District, Eastern Ethiopia** 135
Wondimye Ashenafi

17. **Epidemiological Study on Soil Transmitted Helminthes and Albendazole Efficacy among Elementary School children at Selected Weredas and Town Administrations of Eastern Hararghe Administrative Zone of Oromiya Regional State, Ethiopia** 143
Zelalem Tekelemariam, Desalegn Admassu, Abrahm Nigusse, Habitamu Mitiku

18. **Smear-Positive Pulmonary Tuberculosis and Quality of Sputum Smear Microscopy in three Selected Governmental Hospitals, Eastern Ethiopia** 152
Abiyu Mekonnen

19. **Type-2 Diabetes Mellitus among Government Employeesin Harar Town, Eastern Ethiopia: A cross-sectional study** 159
Desalegn Admassu, Yadeta Dessie, Kedir Teji, and Dawit Ayele

1. Awareness and Attitude of Female Students in Harar Higher Educational Institutions towards Legalization of Safe Abortion, Harari Region, Eastern Ethiopia: A Cross Sectional Study

Jote Markos[1] and Ayele Geleto[2]

[1]School of Nursing and Midwifery, College of Health and Medical Science, Haramaya University, Haramaya, Ethiopia
[2]Department of Public Health, College of Health and Medical Science, Haramaya University, Haramaya, Ethiopia

Abstract

Unsafe abortion has been recognized as an important public health problem, especially in developing countries. Unsafe abortion accounted for 14% of all maternal deaths in sub-Saharan Africa, where half of the world maternal deaths occurred. Unsafe abortion was estimated to account for 32% of all maternal deaths in Ethiopia In 2005, the penal code was amended to permit safe abortion under a set of circumstances, but lack of awareness of the revised 2005 Criminal Code is the major problem The objective of this study was to assess the attitude and awareness of female students in higher institution. to legalized safe abortion in Harar, from January to March 2012.

Institutional based descriptive cross-sectional study design was conducted on 762 female college students selected from five higher education institutions. Systematic sampling method was used to collect study participants from randomly selected colleges. Data was collected by self-administered questionnaire and analyzed by SPSS version 17.0 Windows for statistical packages. Frequency, rate, ratio, measure of central tendency and measure of desperations were used to describe variables. Multivariable logistic regression was used to analyze the data and odds ratiowith 95% CI was used to identify factors that were associated with female college students' awareness to legalization of abortion.

Out of 845 proposed study participants, 762 completed the survey questionnaire making the response rate 90.2%. Only 97(12.7%) of the respondents had awareness about legalization of safe abortion for all types of pregnancy. Regarding attitude of the respondents, 436(57.2%) of them strongly agreed that abortion is not accepted by the religion in their community.*Birth order,* having a boy friend, resident and having sexual intercourse were some significantly associated factors to awareness of female students to legalization of safe abortion. Awareness of female college students to legal grounds of safe abortion was very low (12.7%) Majority of the abortions were performed through traditional methods, i.e. using traditional drugs and instruments. So Harari Regional Health Bureau and the colleges should strengthen information dissemination on the circumferences for which abortion is allowed by law.

Keywords: Abortion; Legalization; awareness; attitude; female college students

1 Introduction

Abortion is termination of pregnancy by removal or expulsion of a conception tissue (fetus, f*et al* membranes and placenta) from the uterus resulting in its death. Abortion can occur spontaneously due to complications during pregnancy or can be induced.(1). According to World Health Organization (WHO), safe abortion means providing services for termination of a viable early pregnancy as well as managing other clinical types of abortion.Unsafe abortion is defined as a procedure for terminating unwanted pregnancy that is performed by persons lacking the necessary skills or in an environment lacking minimal medical standards or both(2).

Unsafe abortion is a significant cause of maternal mortality and morbidity in the world especially in developing countries where 95% of unsafe abortions take place. Globally, unsafe abortion claims the lives of about 68,000 women each year; 43% of these women are Africans. Unsafe abortion accounts for an estimated 14% of maternal deaths in Africa (2) and 32% in Ethiopia (11). Despite the global effort to improve post abortion care, rising contraceptive use and easing abortion restrictions, unsafe abortion continues to be common in Africa (3, 4)

In Ethiopian, wherein premarital sex is a taboo, unmarried adolescents are discouraged from using any kind of contraceptives. Lack of awareness of legalization of safe abortion services coupled with socio-cultural barriers to use contraceptives resulted in unwanted teenage pregnancy which forces them to seek unsafe abortion in a secret places (5).

Before 2005, in Ethiopia, abortion wass permitted only to save the life of a pregnant woman or to preserve her health from grave danger, and to do so required diagnosis and confirmation by an obstetrician/gynecologist. In 2005, the penal code was amended to permit abortion under a much broader set of circumstances which includes: i) If the pregnancy is a result of rape or incest, ii) If continuation of the pregnancy endangers the life of the mother, iii) If the fetus has an incurable and serious deformity, iv) If the pregnant woman, owing to a physical or mental deficiency,she suffers from or her minority, or if she is physically as well as mentally unfit to bring up the child v) In the case of grave and

imminent danger which can be averted only by an immediate intervention, an act of terminating pregnancy is not punishable [6]

As in most developing countries, access to safe abortion in Ethiopia continues to depend on women's awareness of the law. Although the new 2005 Ethiopian abortion law is relatively liberal, women still go to unsafe abortion service. [7]. This is mainly due to lack of knowledge of legal rights among most women, shortage of safe abortion services provision and significant amount of socio-cultural pressures, In Ethiopia, currently both medical abortion (Mifepristone/Misoprostol) and surgical abortion (MVA) are used to safely end a pregnancy. [8] But limited awareness of clients on the revised 2005 penal code of the Federal Democratic Republic of Ethiopia (FDRE) as well as problem of attitude against abortion is one of the major obstacles that hindered women from attaining Comprehensive Abortion Care (CAC). So, the main aim of this research was to assess the attitude and awareness of female students in higher education institution so as to legalized safe abortion from January to March 2012.

2. Methods

2.1. Study Design and Setting

Institutional based quantitative cross-sectional study was conducted among 762 female students in higher educational institutions in Harari Region. Harar is the regional capital and it is found at a distance of 525km to the south east of Addis Ababa, the capital city of Ethiopia.The region is divided into nine woreda administrative units, with three rural woredas and six urban woredas. The urban woredas are sub-divided into nineteen kebeles, whereas the rural woredas are sub-divided into seventeen peasant associations.The total population of the region was 205,000, of which the urban population accounted for 111,052 (548%). Female in reproductive age group was 43,050. There are three public and five private higher educationa institutions in Harari Region. Public colleges include College of Health and Medical Science of Haramaya University, Harar Teacher's Training College and Harar College of Health Sciences, whereas the private higher educationa institutions comprise Rift Valley University College, Afran Qallo College, Lucy College, Horn International College and East Africa College of Health Sciences.The study was conducted among female students in two public and three private higher educational institutions from January to March 2012.

2.2. Study Participants

Randomly selected day time female students in higher educational institution in Harari region who were willing to complete the survey questionnaire were included in the . Female students with a mental problem who c
ould not provide appropriate information were excluded from the study.

2.3. Sample Size and Sampling Techniques

To calculate the sample size, a single population proportion formula [$n = (Z\ \alpha/2)^2\ p\ (1-p)\ /\ d2$], was used.The following assumptions were made to use the formula. First, it was assumed that the expected proportion of awareness of female students to legalization of safe abortion in higher educational institution in Ethiopia is not yet known up to researchers' updated knowledge and search. Therefore, maximum sample size P=50% was used in this study. In addition, 95% confidence level with a margin of error 5% (d = 005), design effect 2 and non-response of 10% was assumed.With the above assumptions, the final sample size was 845. To obtain the required sample size, first, the colleges were stratified into governmental and private higher educational institutions.Then, two governmental educational institutions (College of Health and Medical Science of Haramaya University and Harar Teacher's Training College) and three private colleges (Rift Valley University College, Afran Qallo College and Horn International College) were randomly selected to be included in the study.The sample size was proportionally allocated to all the departments in the institutions based on the number of female students in each department.Female students from all classes were included. Sample was collected from all departments of selected colleges by systematic sampling method from list of female students in ascending order.

2.4. Data Collection

Self-administered pre-tested structured-questionnaire was used for data collection.For data collection, close-ended questionnaire was developed in English, and it was translated into two local languages, *Amharic and Afaan Oromoo*. The filled out questionnaire was again translated into English language for analysis.The questionnaires was developed based different literature reviewed to assess awareness of female college students about legalization of safe abortion.The questionnaire was pretested on 40 female college students (5% of sample size), at different colleges that is not part of the study. All tools were revised and finalized after pretesting. Data collectors were selected from health professionals teaching at College of Health and Medical Science, Haramaya University. They were given training before actual data collection was commenced. The Completed questionnaire was checked every day by investigators and supervisors.

2.5. Data Analysis

Data was entered to Epi Info Version 604, and it was analyzed by SPSS version 17 statistical packages for Windows.Descriptive statistics was used to summarize the data and the results were presented using frequency, tables and percentages. A multivariate logistic regression analysis was employed to control confounders between variables. Crude Odds ratio with 95% CI was used to determine presence of association between explanatory variables and level of awareness of respondents to legalization of safe abortion. The degree of association between dependent and independent variables was measured using adjusted odds ratio with 95% confidence interval at significance level of ≤ 0.05.

2.6. Data Quality Control

The questionnaire was pre-tested and feedback from pre-test was used to make modifications to the questionnaire. Members of field staff (data collectors and supervisors) were selected according to their qualifications, work experience in the field of data collection, and experience in carrying out surveys. They were given extensive training before data collection was started. During the training period, the objectives of the study, methods of data collection, and field supervision were discussed. Furthermore, each question included in the questionnaire was discussed in detail. Field practice (pre-test) was undertaken to check the practicality and applicability of the questionnaire.The data was checked for its completeness each day by supervisors and principal investigator. After it was collected and checked, double data entry was performed. Data was also cleaned and rechecked after entered to the statistical software.

2.7. Ethical Consideration

The study was approved by Institutional Research Ethics Review Committee (IRERC) of College of Health and Medical Science, Haramaya University. Official letter of co-operation was written to each college from college of health and medical Science, Haramaya University. A letter explaining about the purpose, method and anticipated benefit and risk of the study was attached to each questionnaire. Participants were briefed that participation in this study was voluntary and private information would be protected. Written informed consent was obtained from each participants.In order to protect confidentiality of participants their name or ID number wasnot included in the questionnaires.

3. Result

3.1. Socio-demographic Characteristics of the Respondents

A total of 762 out of 845 proposed study participants completed the survey questionnaire making response rate of 90.2% The majority, 72%, of the respondents were in the age group between 20-25 years.Students from Amhara ethnic group accounted for nearly half of the study participants (47.2%). Again, the majority of the respondents, 71.1%, were Christians.Slightly over 80% of the respondents were single. More than two fifth, 43.2%, of the respondents were middle children in their birth order, while 28% were the only child to their families. For 76.8% of the respondents their fathers and motherswere alive, and only 1.7% of participants' parents were dead.

3.2.Reproductive Health of the Respondents

Three hundred twenty seven (42.9%) of the respondents in thestudy had boyfriends, but 184 (24.1%) of participants reportedthat they ever had sexual intercourse. Among those who performed sexual intercourse 17% of them had sex at the age of less than 15years, while majority of them (75.3%) did it in the age range of 15-18years. Five hundred thirty three of the respondents knew about emergency contraceptive.

Table 1. Socio-demographic characteristics of respondents (n=762), Harari Region, Eastern Ethiopia, 2012.

Characteristics	Frequency	Percent
Age		
25 years and less	682	89.5
More than 25years	80	10.5
Ethnicity		
Oromo	272	35.7
Amhara	360	47.2
Others	130	17.1
Religion		
Christian	542	71.1
Muslim	220	28.9
Marital status		
Single	620	81.4
Married	142	18.6
Resident of respondent's family		
Urban	606	79.4
Rural	156	20.6
Respondent's resident		
In the campus	279	36,6
Out of the campus	483	63.4
Department of the respondent		
Health and medicine	563	73.8
Other field of study	199	26.2
Year of study of the respondents		
Two years and less	319	41,8
More than two years	443	58.2
Birth order		
First	270	35.4
Middle	329	43.2
Last	142	18.6
The only child	21	28
Life status of respondents' family		
Both are alive	585	76.8
Only mother alive	146	19.2
Only father alive	18	2.4
Both are died	13	1.7

Sixty-eight of the study participants had ever got pregnant, of whom only three of them were currently pregnant. Forty-seven of the pregnancies ended in life birth while eighteen of the pregnancies were terminated by abortion.Twelve of the abortion was unsafe which was induced by traditional practitioners, and only 33% of the abortions had been conducted in health institutions, public and private, under safe condition and by trained health professionals. To induce abortion, 30.7% of the respondents reported that they were given traditional leafs and roots to drink under unsafe procedures. For 34.7% and 34.6% of the respondents unknown tablet was given to swallow and plastic material was inserted into their cervix by traditional practitioners to induce the abortion, respectively.Twenty-nine of the respondents reported they wererape victims and nine of them got pregnant as a result of the rape (Table 2).

From those who had performed sexual intercourse, 82.6%, had used a contraceptive method to prevent pregnancy. Forty-seven (30.9%) of them used Depo-Provera while only 9.2% of the respondents used natural family planning method (Figure 1). From 138 artificial family planning users 64 (46.4%) of them got the method from public health institutions Twenty-six percent of them got the method from private pharmacies while 23.2% and 4.4% got family planning methods from private clinics and shops, respectively.

Table 2. Reproductive health of the respondents, Harari Region, Eastern Ethiopia 2012.

Characteristics	Frequency	Percent
Have boyfriend(n=762)		
Yes	327	42.9
No	435	57.1
Ever had sexual intercourse(n=762)		
Yes	184	24.1
No	578	75.9
Age at first sexual intercourse(n=184)		
<15	32	17.4
15-20	137	74.4
>20	15	8.2
Family planning use (n=184)		
Yes	152	82.6
No	32	17.4
Type of family planning used (n=152)		
Artificial contraceptives	138	90.7
Natural family planning methods	14	9.3
Knowledge of emergency contraceptive (n=762)		
Yes	533	69.9
No	229	30.1
Have ever got pregnant (n=184)		
Yes	68	36.9
No	116	63.1
Outcome of the pregnancy(n=68)		
Aborted	18	26.5
Delivered	47	69.1
Know pregnant	3	4.4
History of rape victim (n=762)		
Yes	29	3.8
No	733	96.2
Result of rape victim (n=29)		
Got pregnant	9	3.1
Develop genital swelling	2	6.9
Develop genital ulcer	3	10.3
Develop vaginal discharge	15	51.8

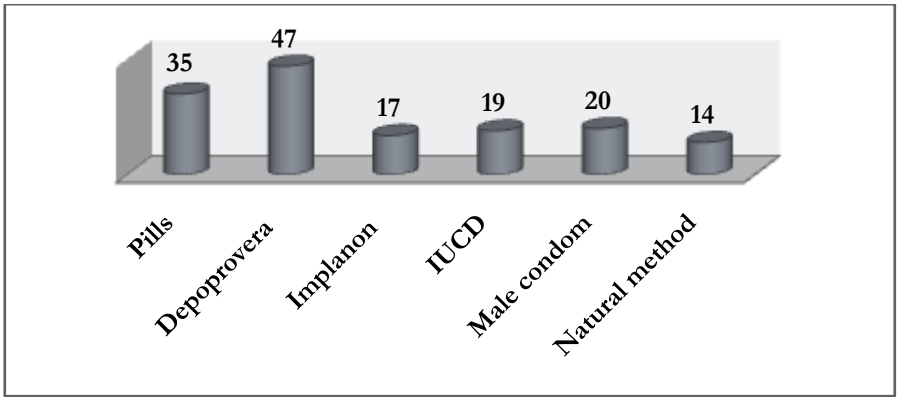


Figure 1. Types of family planning methods utilized by participants, Harari Region, Eastern Ethiopia 2012.

3.3.Awareness of Respondents about Legalization of Safe Abortion

Only 272 (35.7%) of the respondents had good awareness about legal background of safe abortion. Nearly thirteen percent of the study participants responded that safe abortion is legally allowed for all types of pregnancy. Slightly more than half, 52%, of the respondents reported that safe abortion is legally allowed if the pregnancy is the result of incest, and 49.1% of them said safe abortion is legally allowed if the pregnancy is the result of rape. Four hundred thirteen participants (54.2%)

reported that safe abortion is legally allowed if the continuation of the pregnancy endangers the life of the mother or the child or the health of the mother or where the birth of the child is a risk to the life or health of the mother. Only 2.7% of them had awareness that safe abortion is legally allowed if the fetus has an incurable illness and serious deformity. About a fifth of study participants responded that safe abortion is legally allowed if the pregnant woman, owing to a physical or mental deficiency she suffers from, or her minority is physically as well as mentally unfit to bring up the child (Table 3). Twenty five percent of the respondents had got information about criteria, under which abortion is legally allowed, from health workers, while only 4% reported their family as a source of information.

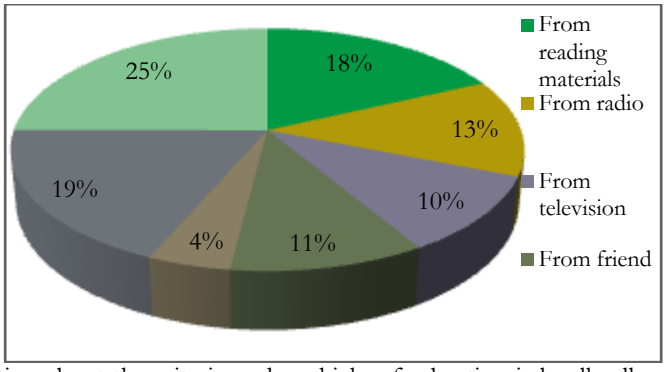


Figure 2. Sources of information about the criteria under which safe abortion is legally allowed among female students of higher educational institutions, Harari Region, Eastern Ethiopia, 2012

Table 3. Attitude of respondents towards legalization of abortion, Eastern Ethiopia, Harar, 2012

Abortion is not accepted by religion	Freq.	Perce
Agree	542	71.1
Disagree	220	28.9
Abortion is not acceptable in community		
Agree	311	40.8
Disagree	451	59.2
Abortion is women's reproductive health right		
Yes	229	30.1
No	533	69.9
Will you go to health institution if you need abortion service		
Yes	428	56.2
No	334	43.8
Will you advice your friend to go to legalized health institution when she need abortion services		
Yes	613	80.4
No	149	19.6

3.4. Attitude of Respondents about Legalization of Safe Abortion

Slightly more than half of the respondents (56%) had positive attitude about legalization of safe abortion. Four hundred thirty six (57.2%) of the respondents strongly agreed that abortion is not accepted by the religions in the country. Only nine percent of the respondents strongly disagreed that religion should not resist acceptance of legalization of abortion. When asked if abortion should be accepted by religion, 70% of the respondents agreed,. Only 41% of the respondents said abortion should not be accepted in our community. Seventy percent of female students responded that abortion is not the women's reproductive health right. More than half of the respondents (56.2%) said they will go to health institution if they needed abortion services. Similarly, the majority of the respondents (80%) indicated thay they would advice their friends to go to legalized health institution if their friends needed abortion services.

Table 4. Level of awareness of the respondents to the criteria under which safe abortion is legally allowed in Ethiopia, Harari Region, Eastern Ethiopia 2012

Characteristics	Frequency	Percent
Safe abortion is legally allowed for all type of pregnancy		
Yes	97	12.7
No	665	87.3
Safe abortion is allowed if pregnancy is the result of incest		
Yes	396	52.0
No	366	48.0
Safe abortion is allowed if pregnancy is the result of rape		
Yes	374	49.1
No	388	50.9
Safe abortion is allowed if the continuation of the pregnancy endangers the life of the mother or the child		
Yes	413	54.2
No	349	45.8
Safe abortion is allowed if the fetus has an incurable and serious deformity		
Yes	206	27.0
No	556	73.0
Safe abortion is allowed if the pregnant woman has physical or mental deficiency or she is physically and mentally unfit to bring up the child		
Ye	150	19.7
No	612	80.3
Average		
Yes	272	35.7
No	490	64.3

3.5. Factors Associated with Awareness of Legalization of Safe Abortion

After possible confounders were controlled multivariate analysis showed that *age, birth order*, *having boyfriend, field of study and years of study* are some of the factors that were significantly associated with awareness of female students about legalization of safe abortion.. *Female students who were learning learning in field of study other than health sciences [AOR 048; 95%CI (023, 085)]* and those who were the only child for their family [AOR 028; 95%CI (013, 086)] were less likely to have good awareness about legalization of safe abortion than health and medical science students and those who were first child in their families. Those who had no boyfriend [AOR 034; 95%CI (012, 074)] and who used family planning method during sexual intercourse [AOR 050; 95%CI (013, 086)] were less likely to have good awareness about legalization of safe abortion than those students who had boyfriends and those who didnot use family planning method. Those female students who were aged 25 year or older were 16 times more likely to have good awareness about legalization of safe abortion compared with those students who were under 25years, [AOR 164; 95%CI(133,280)]. Married students [AOR 182; 95%CI9112, 352)], those studied for more than two years [AOR 234; 95%CI (118, 597)] and those students whose both families were dead [AOR 170; 95%CI (9123, 566)] were more likely to have good awareness about legalization of safe abortion than single female students, students whos tudied for two years or less and those students whose both families were alive.

Table 5. Association of respondents' characteristics with level of awareness to legalization of safe abortion, Harari Region, Eastern Ethiopia 2012

Characteristics	Awareness to legal abortion		COR(95%CI)	AOR(95%CI)
Age	Good N (%)	Poor N (%)		
25 years and less	252	430	100	100
More than 25years	20	60	175(125,261)*	164(133,280)*
Ethnicity				
Oromo	91	181	100	100
Amhara	124	236	095(066,192)	042(012,181)
Others	57	73	064(031,112)	067(022,099)
Religion				
Christian	219	323	100	100
Muslim	53	167	213(129,458)*	146(098,580)
Marital status				
Single	225	395	100	100
Married	47	95	115(104,321)*	182(112,352)*
Resident of respondent's family				
Urban	172	434	100	100
Rural	100	56	022(015,068)*	053(011,110)
Respondent's resident				
In the campus	137	142	100	100
Out of the campus	135	348	248(128,477)*	188(073,342)
Department of the respondent				
Health and medicine	137	426	100	100
Other field of study	135	64	015(010,073)*	048(023,085)*
Year of study of the respondents				
Two years and less	121	198	100	100
More than two years	151	292	118(098,291)	234(118,597)*
Birth order				
First	99	171	100	100
Middle	139	190	079(052,173)	043(011,123)
Last	18	124	398(162,810)*	118(099,621)
The only child	16	5	018(010,088)*	028(013,086)*
Life status of respondents' family				
Both are alive	212	373	100	100
Only mother alive	48	98	116(087,397)	119(078,544)
Only father alive	8	10	071(075,231)	079(056,265)
Both are died	4	9	127(104,384)*	17(123,566)*
Have boy friend(n=762)				
Yes	101	226	100	100
No	171	264	068(014,089)*	034(012,074)*
Ever had sexual intercourse(n=762)				
Yes	61	123	100	100
No	211	367	086(023,102)	183(076,357)
Family planning use (n=184)				
Yes	38	114	100	100
No	234	376	053(013,082)*	050(013,086)*
Have ever got pregnant (n=184)				
Yes	26	42	100	100
No	246	448	112(059,201)	036(019,086)*

** = $p \leq 005$*

4. Discussion

Increasing legal access to abortion is associated with improvement in sexual and reproductive health. Conversely, unsafe abortion and related mortality are both highest in countries with narrow grounds for legal abortion [9]. Twenty six percent

of the world's population lives where abortion is prohibited altogether or allowed only to save the woman's life. Between 1995 and 2005, 12 countries including Ethiopia increased access to legal abortion [10].

The finding of this study indicated that less than half,,i.e. 35.7%, of the respondents had good awareness about legal background of safe abortion in Ethiopia. A similar finding, but with a little bit lower percentage, was reported in the study conducted in Nepal. The baseline survey conducted in Nepal in 2003 showed that only 15% of the 1,100 rural married women of reproductive age (MWRA) were aware of the new abortion law, and 56% of the women still believed that abortion was illegal in the country [11]. But the pesent finding is inconsistence with a study conducted in Latin America where over 60 percent of all women surveyed were aware of medications to induce abortion [12]. It is also inconsistence with the study findings in South Africa wherein only 264(32%) from 831 study participants did not know that the law in South Africa allows for legal abortion [13]. This could be due to poor information dissemination strategies to concerned bodies and poor information seeking behavior of adolescents living in the developing world compared to adolescents in developed world.

Although abortion has been legalized in Ethiopia since 2005 under some circumstances, 18 respondents in this study revealed that they had performed abortion. Besides, 67% of the abortion made by these respondents were unsafe, performed through traditional methods outside of health institutions. The result of this study is consistent with the report of a study conducted in India, where nearly 40 years after India legalized abortion, Indian women are still unaware of the availability of safe abortion services, or they are unable to access them. Although abortion had been legal in India for decades, unsafe abortions far out number legal the practices. An estimated 90 % of abortions performed in India are unsafe ([14])This study shows that policy alone will only have a limited effect on the health and lives of women. Supporting access to safe abortion services and improving women's awareness on abortion services, when it is legal, will necessary to reduce deaths and injuries associated with unsafe abortions. Stigma and the erroneous belief that abortion services are not legal often lead women to choose secrecy over safety.

The finding of our study indicated that 30.7% of the respondents were given juices of leaves and roots to induce abortion . On the other hand, 34.7% of the participants stated that they were given unidentified tablets to swallow while 34.6% of them said plastic material was inserted into their cervix. This finding is consistent with the result of the study conducted in northwest Ethiopia where 54.7% and 35.4 % of the respondents stated plastic tube and different oral drugs,respectively, were used to induce the abortion [15].

In our study, age of respondents, birth order, place of residence, contraceptive use, type of education, and years of study were some of the factors that were significantly associated with awareness of female students to legalization of safe abortion. Similar factors were reported in a study done in northwestern Ethiopia where place of residence, marital status, contraceptive use, number of pregnancies, and level of education attained by the women were reported as determinant factors of unsafe abortion([15]).

5. Conclusion

Only 116 (15.2%) of the respondents had awareness about legal background under which safe abortion is legally practiced in Ethiopia. The result indicated that awareness of the respondents to legalization of safe abortion is very low. This requires massive interventions to improve female students' awareness about legalized safe abortion in Ethiopia.

Competing interests

The authors declare that they have no competing interests

Authors' contributions

Jote Markos had made substantial contributions from inception of the research idea to proposal development, data collection, analysis and interpretation of dataandpreparation of the manuscript. Ayele Geleto had participated in data collection, analysis of data, and preparation of the manuscript for publication. Both authors read and approved the final version of the manuscript.

6. Acknowledgments

We would like to express our deepest gratitude to Haramaya University for financial support. We would also like to express our deepest appreciation to all individuals who supported and encouraged us during this research work. We would like to extend our appreciation to all individuals who reviewed and gave us technical support to the successful completion of this research work.

7. References

Berer,M .2004. National laws and unsafe abortion: the parameters of change.*Reproductive Health Matters* 12: 1 – 8.

Berer, M. 2007. Making abortions safe: A matter of good public health policy and practice, Geneva, Bull World Health Organization, 2000, 78 (5): Print version ISSN 0042 – 9686.

Center for Reproductive Rights.2006 Abortion and the law: ten years of reform.Available at http://www.crlp.org ,Accessed July 5, 2006.

Chelsea, M., Landon, M., and Kemilembe, T. 2006. Knowledge of the abortion legislation among South African women: A cross-sectional study.*Reproductive Health* 3:7.

Elias S, Getu A, Nuru A, and Hailu Y. 2005. Prevalence and associated risk factors of induced abortion in northwest Ethiopia.*Ethiopian Journal of Health Devlopment* 19 (1): 37 – 44.

EMoH (Ethiopian Ministry of Health). 2005. Technical and Procedural Guidelines for Safe Abortion Services in Ethiopia. Addis Ababa, Ethiopia.

Hailemichael G, Tamara F, and Susheela S. 2010. Caring for women with abortion complications in Ethiopia: National estimates and future implications, Addis Ababa, Ethiopia *International Perspectives on Sexual and Reproductive Health* 36 (1): 6 – 15.

IPAS Ethiopia. Abortion in Ethiopia: Fast Fact.Available at www.NotYetRain.org,(Accessed on June 2011).

IPAS. 2006. Protecting Women's Health, Advancing women's Reproductive Right, Profile of Medical Abortion Utilization.

Ojha, N., Sharma, S. and Paudel, J. 2003. Post legalisation challenge: Minimizing complications of abortion.*Nepal, Kathmandu University Medical Journal* 2 (2), Issue 6, 131 – 136.

PIE (Pathfinder International Ethiopia).2008. Feature Stories "Youth in Need of Services in Ethiopia: Pathfinder Working to Ensure Needs Are Met"

Singh S., Fetters T., Gebreselassie H., Abdella A., Gebrehiwot Y., Kumbi S. and Audam S. 2010. The estimated incidence of induced abortion in Ethiopia *International Perspectives on Sexual and Reproductive Health* 36 (1): 16 – 25.

WHO (World Health Organization). 2007. *Unsafe Abortion: Global and* Regional Estimates of the Incidence of Unsafe Abortion and Associated Mortality in 2003,5thedition, Geneva.

.

.

2. Prevalence and Factors Associated with Depression, Suicidal Ideation and Attempt among Haramaya University Students

Andualem Derese, Gezahegn Tesfaye, Mitiku Teshome

Department of Public Health, College of Health and Medical Science, Haramaya University, Haramaya, Ethiopia

Abstract: University students' mental health affects not only their educational achievements, but also their professional future. Depression and other mental health disorders are a significant public health problem in college campuses and suicide is a leading cause of death in college age students. Identification of the magnitude and associated risk factors for depression, suicidal ideation and attempt has important implications on how to prevent and respond to this population; however, only few studies have been conducted in this subject on this group. The purpose of the study was to assess the prevalence and factors associated with depression, suicide ideation and attempt among Haramaya university students.

A cross-sectional survey was carried out using self-administered questionnaire The total sample size was 1,040 and students were selected using systematic sampling after stratifying them by campus and year of study. Logistic regression was used to estimate associations between socio demographic variables, substance use, depression and suicidal behavior, and to control for confounders.

In this study, the prevalence of depressive symptoms were 26.8% of which 9.7% was borderline depression, 11.7% was moderate depression, 4.3% was severe depression and 1.1% of extreme depression. The overall prevalence of suicidal ideation among the students was 20.2% with BSS score higher or equal to six Being depressed had strong association with suicide ideation [AOR (95% CI) =790 (548, 1138)]. The odds of suicide ideation increases with those students smoking cigarette and ever using illicit drugs with [AOR (95% CI) =224 (131, 381)] and [AOR (95% CI) =222 (129, 382)] than their counterparts, respectively.

The overall prevalence of depression and suicide ideation among university students was high. Depression among university students demands special attention, emergency preventive measures and targeted IEC activity Education, counseling and awareness creation on cause and prevention of depression among students should be done.

1. Introduction

The environmental and social factors unique to college students may be characterized as a "transition" period in life. This transition occurs during a brief period of time on many levels including social, academic, psychological, and existential aspects. This major life transition as well as specific risk factors may exacerbate existing psychological difficulties or trigger new ones that can ultimately lead to suicide (Hong L, *et al,* 2008)

Depression and other mental health disorders are a significant public health problem on college campuses. Many students experience their first psychiatric episode at college, and 12%– 18% of students have a diagnosable mental illness (Mowbray C, *etal,* 2006). Epidemiological studies suggest that the 15–21 age category (typical college years) has the highest past-year prevalence rate of mental illness at 39%. A study done by Eisenberg and his colleagues reported that the general prevalence of depression and anxiety is 16% among undergraduate students and 13% among graduate students (Episenber D, *etal,* 2007)

Nearly one million people die annually as a result of suicide, putting it among the top three leading causes of death in men and women aged 15 - 44 years. The rate of suicide in sub-Saharan Africa (32/100 000) is the second-highest worldwide (WHO, 2003). One study reports that 85.7% of those who make a suicide attempt have seriously thought about doing so earlier (Flisher AJ, 1993). Risk factors for suicidal ideation include depression (Galait ER, 2007), cigarette smoking (Parks HS, *etal,* 2006), low parental care (Heider D, *etal,* 2007), experience of bullying (Brunstein A, 2007) and alcohol and drug use (Marhija NJ, 2007A-B).

Suicide, by definition, is fatal. Those who attempt suicide and survive may have serious injuries like broken bones, brain damage, or organ failure. Also, people who survive often have depression and other mental health problems. Suicide also affects the health of the community.

Family and friends of people who commit suicide may feel shock, anger, guilt, and depression. The medical costs and lost wages associated with suicide also take their toll on the community (CDC, 2010). Suicidal behavior ranges in degree from merely thinking about ending one's life, through developing a plan to commit suicide and obtaining the means to do so, attempting to kill oneself, to finally carrying out the act ("completed suicide") (Krug EG, *etal,* 2002).

Suicidal behavior has a large number of underlying causes. The factors that place individuals at risk for suicide are complex and interact with one another. Identifying these factors and understanding their roles in both fatal and non-fatal suicidal behavior are central to preventing suicides. Epidemiologists and experts in suicide have described a number of specific characteristics that are closely associated with a heightened risk for suicidal behavior. Apart from demographic factors, such as age and sex, these characteristics include psychiatric, biological, social and environmental factors, as well as factors related to an individual's life history (Krug EG, *etal,* 2002).

Little is known about the prevalence of and factors associated with depression, suicide ideation and attempts among university students in Ethiopia. The findings of this study , thereof, may assist to raise awareness of the problem of depression, suicidal behavior, and promote research, resources and prevention efforts in the mental health area in the university. It is important to use the findings of this research to bring attention to the need for suicide prevention programs, surveillance systems, and additional research on this topic in this university with ever growing student number. Given the unique psychosocial environment and high rates of suicide ideation and attempts among college students, a better understanding of the magnitude and risk factors associated with depression, suicide and suicide ideation is needed to provide the appropriate interventions to prevent suicide in this group of young adults. Therefore, the objective of the study was to assess the prevalence and associated factors of depression, suicide ideation and attempt among Haramaya university students

2 Methods

2.1. Study Area and Period

Institution based cross-sectional study was conducted in Haramaya University, which is located 510 Km away from Addis Ababa in the East Hararghe Zone between Harar and Dire Dawa towns. It is one of the oldest Universities in the country, next to Addis Ababa University.. There are three campuses in the University (main campus, Harar campus and Chiro campus). The study included main campus and Harar campus. During the time of the study, the University had 12 Colleges and 55 departments with 15,183 undergraduate students. The study was conducted from April 15-30, 2013.

2.2. Source and Study Population

All undergraduate students at Haramaya University were the source of population for the study. Participates of the study were randomly selected by multistage sampling from source population. Those regular undergraduate students, who were not blind and not critically sick (to the extent of unable to read and write) during the time of data collection were included. Those students who were enrolled in the extension, summer and distance education were excluded from the study.

2.3. Sample Size and Sampling Technique

The sample size (n=1040) was primarily determined by taking the prevalence of suicidal ideation among Zambian university students (31.9%) (Makhija NJ, *et al,* 2007), 95% confidence level, marginal error of = 4% and 10% non-response rate. Using single population proportion formula, the sample size become 520 Since the sampling was multistage, design effect of two was taken and the final total sample size became 1,040.

Multistage sampling technique was used to select the study participants. First, students were divided in to two by campuses (Main campus and Harar Campus). Then, further stratification was done based on the year of study. Finally, systematic sampling technique was applied to select students in each year of study from the list of students' name in their respective batch. Students from each year of study were allocated proportionally to their class size.

2.4. Data Collection Procedure and Tools

The questionnaire used was Beck Scale for Suicidal Ideation (BSS). The BSS is a self-report 19-item scale. The BSS and its screening items were intended to assess a patient's thoughts, plans and intent to commit suicide. All 19 items were rated on a three-point scale (0 to 2). We also used an adopted questionnaire to assess the substance use behavior of the participants. The data collectors who have guided the students to complete the questionnaire were masters degree holders. The data collectors explain each question to the students to help them understand the questions well and fill their own response on questionnaire. The facilitators were academic staff who were familiar with the specific college, this facilitated the smooth running of data collection process. The principal investigators followed and controlled the overall data collection process, trained data collectors, and facilitators and performed pre-test. The data were collected using self- administered questionnaire which was prepared in English and then translated to local language (Amharic) so as to help most students understand understand the questions.

3. Data Analysis

Descriptive statistics was used to describe the study population. Bivaraite and multivariate analysis were employed to identify factors associated with the outcome variable. Odds ratio with 95% confidence interval was computed to assess the level of association and statistical significance. Those variables which were found to be significant in the bivaraite analysis were retained for further multivariate analysis. Then, logistic regression analysis was done to control confounding variables and to predict independent factors associated with substance use.

3.1 Data Quality Assurance

The questionnaire was pretested on students of the nearby Dire Dawa University. Data collectors (facilitators) were trained and proper instruction was given before the survey. The collected data were reviewed and checked for completeness before data entry. Five percent of the data was double-entered in order to compare and assure the quality of the data, but no error was detected

3.2. Ethical Considerations

Ethical approval was obtained from College of Health and Medical Sciences Institutional Research Ethics Review Committee of Haramaya University. Participation was voluntary and participants were told that they can withdraw from the study at any time without explanation and without penalty or loss of benefit. Confidentiality was assured and no personal details were recorded or produced on any documentation related to the study. Written informed consent was also obtained from all participants.

3. Results

3.1. Socio-demographic Characteristics

Out of the total 1,040 students participated in the survey, questionnaire from 1,022 respondents were completed and considered for analysis. This made the response rate 98.3% . Of the total 1,022 respondents, 828 (81%) were at the age ranged from 20 to 24 years with a mean age of 20.9 (SDb= ± 217 years). From the total participants, 777 (76.0%) were males, 420(41.1%) were Oromo in their ethnicity, 518 (50.7%) were Orthodox Christians, 928(90.8%), were never married, 352 (34.4%) were first year students, 703 (68.8%) were originally from urban areas, 874 (85.5%) of the attended public high schools, and 430(42.1%) got a monthly pocket money of 300-499 Ethiopian birr (Table 1)

3.2. Depression and Suicidal Ideation

The BDI is a 21-item self-report inventory that is used to assess the presence of depressive symptoms. Participants were asked to indicate which statement best describes the way they were feeling over the past two weeks. In this study, the prevalence of depressive symptoms were 268%, of which 97% was borderline depression, 11.7% was moderate depression, 43% was severe depression and 11% of extreme depression (Table 2)

Regarding suicide ideation, Beck's suicide scale was used. Beck suicide scale (Beck & Steer, 1991) is a 21-item measure that assesses current suicide intent. The overall prevalence of suicidal ideation among the students was 20.2% with BSS score higher or equal to six (Table 2).

Table 1.Socio-demographic characteristics of students in Haramaya University, 2013.

Variables		Frequency(n=1022)	Percent
Sex	Male	777	76.0
	Female	245	24.0
Age group in years	<=19	165	16.1
	20-24	828	81.0
	>=25	29	2.8
Ethnicity	Oromo	420	41.1
	Amhara	304	29.7
	Guraghe	81	7.9
	Tigre	67	6.6
	Wolayita	29	2.8
	Somali	15	1.5
	Others*	106	10.4
Religion	Orthodox	518	50.7
	Muslim	245	24.0
	Protestant	214	20.9
	Others**	45	4.4
Marital status	Never married	928	90.8
	Ever married	55	3.9
Year of study	1st year	352	34.4
	2nd year	265	25.9
	3rd year	249	24.4
	4th year and above	156	15.3
Place of residence before	Urban	703	68.8
	Rural	319	31.2
Type of high school attended	Public high school	874	85.5
	Non public high school	148	14.5
Monthly pocket money (Ethiopian Birr)	<=100	221	21.6
	101-299	240	23.5
	300-499	430	42.1
	500-999	105	10.3
	>=1000	26	2.5

**Other ethnic groups include Harari, Sidama, Hadiya, etc **other faiths (Catholic, Jehovah Witness, and Traditional)*

Table 2: Suicidal ideation and depressive symptoms of students in Haramaya University, 2013

Variables		Frequency(n=1022)	Percent
Beck Depression Inventory	Borderline	99	9.7
	ModerateSevere Extreme	120	11.7
		44	4.3
		11	11
Beck Suicide Scale	Suicidal symptoms	206	20.2
	No Suicidal symptoms	816	79.8

Out of 1,022 students, 59 (5.8%) had no wish to live, 58 (5.7%) had strong wish to die, and their reason to die outweighs for living. Students were asked about their desire to make active suicide attempt and 45 (4.4%) of them had moderate to strong desire. Regarding passive suicide desire, 43 (4.2%) would avoid steps necessary to save or maintain life.

Time dimension of suicidal ideation had effect on suicide attempt. From the total respondents, 42 (4.1%) responded that duration of suicide ideation/wish was continuous or chronic. Regarding frequency of suicide ideation/wish, 43 (4.2%) said that it was persistent or continuous.

Thirty eight (3.7%) of the students responded that they have no sense of control over suicidal action. Much of them also have suicidal thoughts, the majority did not perform active suicide due to deterrents to active attempt, 882 (86.3%) would not attempt because of a deterrent, 75 (7.3%) have some concern about deterrents, and 65 (6.4%) had minimal or no concern about deterrents. The reasons given by 736 (72.0%) for contemplated attempt were manipulating the environment; getting attention, revenge, and the reasons given by 184 (18.0%) were to escape, surcease or solve problems.

Regarding planning of contemplated attempt, 79 (7.7%) considered contemplated attempt, but details not worked out and the rest 58 (5.7%) said that details were worked out. For availability of opportunity for contemplated attempt, 83 (8.1%) respondents stated that method would take time/effort and for 107 (10.5%) method and opportunity were available.

From the total respondents, 54 (5.3%) had partial and 53 (5.2%) had complete preparation for contemplated attempt and even 47 (4.6) said that they had completed suicide note.

3.3. Magnitude of Substance Use

Among the study participants, 638(62.4%) used at least one substance in their lifetime. The study revealed that 419 (41.0%) of the respondent students chewed *khat* at least once in their lifetime and the current use of *khat* is 241(23.6%). Concerning alcohol drinking habits, 513(50.2%) reported that they drank alcohol at least once in their lifetime while 204(20%) were drinking alcohol over the last 30 days prior to the study. The study showed that 225(22%) of the respondents smoked cigarette at least once in their life time whereas 110(10.8%) of the respondents have smoked cigarette in the past 30 days. Furthermore, 178 (17.4%) of the study participants used illicit drugs like hashish at least once in their lifetime. Seventy six (7.4%) of the participants used illicit drugs in the last 30 days (Table 3).

Table 3. Life time and current use of different substances by sex among students in Haramaya University, 2013.

	Sex		
Substances	Male (%)	Female (%)	Total (%)
Any substance			
Yes	524(674)	114(465)	638(62.4)
No	253(326)	131(535)	384(37.6)
Ever use of khat			
Yes	370(476)	49(200)	419(41.0)
No	407(524)	196(800)	603(59.0)
Current use of khat			
Yes	223(287)	18(73)	241(23.6)
No	554(713)	227(927)	781(76.4)
Ever use of alcohol			
Yes	418(538)	95(388)	513(50.2)
No	359(462)	150(412)	509(49.8)
Current use of alcohol			
Yes	179(231)	25(102)	204(20.0)
No	598(769)	220(898)	818(800)
Ever use of cigarette			
Yes	197(254)	28(114)	225(22.0)
No	580(746)	217(886)	797(88.0)
Current use of cigarette			
Yes	101(130)	9(38)	110(10.8)
No	676(870)	236(962)	912(89.2)
Ever use of illicit drugs			
Yes	160(206)	18(73)	178(17.4)
No	617(794)	227(927)	844(82.6)
Current use of illicit drugs			
Yes	72(93)	4(16)	76(7.4)
No	705(907)	241(984)	946(92.6)

3.4. Factors Affecting Suicide Ideation

There was no association between socio demographic variables and suicide ideation. Bivariate association showed a statistically significant association between suicide ideation and depression, ever smoking cigarette and ever using illicit drugs (See table 4). Variables which were significantly associated in the first model were taken and analyzed together by multivariate logistic regression.

Table 4. Factors associated with suicide ideation among students in Haramaya University, 2013.

Suicide ideation					
Variables	Yes	No	COR, 95% CI	AOR, 95% CI	P value
Importance of religion					
Very important	182	768	1		
Important	18	37	253 (011, 384)	136 (039, 473)	0620
Not important	6	10	205 (022, 894)	246 (060, 1008)	0209
Ever used alcohol					
Yes	145	368	1		
No	61	448	152 (096, 241)	125 (083, 190)	0280
Ever smoked cigarette					
Yes	104	121	1		
No	102	695	269 (151, 476)	224 (131, 381)	0003*
Ever used illicit drugs					
Yes	86	92	1		
No	120	724	195 (109, 347)	222 (129, 382)	0004*
Ever used khat					
Yes	131	288	1		
No	75	528	104 (064, 170)	110 (070, 173)	0661
Depression					
Non depressed	69	679	1		
Depressed	137	137	812 (548, 1203)	790 (548, 1138)	0000*

After controlling for the effects of potentially confounding variables using multivariate logistic regression; depression, ever smoking cigarette and ever using illicit drugs were found to be statistically significant predictors of suicide ideation. Being depressed had strong association with suicide ideation [AOR (95% CI) =790 (548, 1138)]. The odds of suicide ideation increases with those students smoking cigarette and ever using illicit drugs with [AOR (95% CI) =224 (131, 381)] and [AOR (95% CI) = 222 (129, 382)], respectively.

Table 5. Factors associated with depression among students in Haramaya University, 2013.

Depression					
Variables	Yes	No	COR, 95% CI	AOR, 95% CI	P value
Sex					
Female	71	174	1	1	
Male	203	574	115 (083, 158)	169 (119, 241)	
Alcohol use					
No	89	420	1	1	
Yes	185	328	266 (198, 356)	180(130, 250)	000*
Smoking					
No	166	631	1	1	
Yes	108	117	350 (256, 479)	194 (123, 304)	000*
Khat chewing					
No	116	487	1	1	
Yes	158	261	254 (191, 337)	144 (101, 209)	004*
Using illicit drugs					
No	85	655	1	1	
Yes	189	93	316 (226, 443)	130 (082, 208)	026
Importance of religion					
Not impt	10	6	1	1	
Important	18	37	020 (007, 058)	029 (010, 087)	002*
Very impt	245	705	029 (009, 093)	035 (010, 120)	009

4. Discussion

The overall prevalence of suicidal ideation among the students was 202% with BSS score higher or equal to six. The odds of substance use were three times higher with students who had depression compared to those who did not have (AOR (95% CI), 3304(2314, 4715)). This result was similar with a study in Turkey (Coskun B, *etal,* 2013) in which substance use risk was found to be higher in those with higher depression scores. This could be due to the fact that depressed students are more prone to use substances to relief themselves from the stress or depression mood.

Multivariate logistic regression also showed that depression, ever smoking cigarette, and ever using illicit drugs were found to be statistically significant predictors of suicide ideation. Similar studies done in Haryana state, North India (Romeo L, *et al,* 2013) and US (Amelia M, 2010) showed that depression has positive association with suicidal ideation, but smoking & use of illicit drugs were not supported with these studies.

In this study, the prevalence of depression was 26.8% of which 9.7% was borderline depression, 11.7% was moderate depression, 4.3% was severe depression, and 1.1% was extreme depression. This was relatively higher than a study done among Saudi University students where the prevalence of any symptom of depression is 21.6% (Mostafa A, *etal,* 2013) which might be due to difference in study set up.

In the FGD, the participants perceived that depression was common among students but little attention was given to it by the concerned bodies. Furthermore, one of the participants stated that "most of the time, the students with depression did not seek treatment or help for their problem".

Those students who were male, using alcohol, smoking cigarette, chewing *khat* and said religion has no importance were more likely to be depressed than their counter parts. This result is in line with a study conducted among university students in Philippines (Rohtash S, 2008) whereby smoking & drinking alcohol were significantly associated with depressive symptoms but sex and religion have no association. Implicating that working on awareness creation and behavioral communication programs on substance abuse have strong input for the reduction of depression among university students.

The overall prevalence of substance use for at least one substance was 62.4%. The most commonly used substances in descending order were: alcohol 50.2%, *khat* (4.1%), cigarette (2.2%), and other illicit drugs (17.4%). This was slightly lower than a similar study in Kenyan universities which was 698% [Atwoli *etal,* 2011] but higher than a study in Axum University, Northern Ethiopia where the life time prevalence of substance use was 45.9% [Measho G, *etal,* 2013]. The difference in magnitude from that of Axum University might be due to the difference in the study area because, in this part of the country, there is easy availability and accessibility of substances especially *khat* and alcohol, which are frequently taken by students, and relatively socially acceptable due to different socio-cultural environment.

The lifetime prevalence of *khat* chewing was 41%. This result is higher than the result of study done among high school students in Eastern Ethiopia, 24.3% [Ayalu A, *etal,* 2012], a study done in college students in North West Ethiopia, 26.7 % [Kebede Y, 2002], and Jazan district of Saudi Arabia, 21.4% (Hussein M, 2009). This may be again due to the abandunt availability of *khat* in the study area where *khat* is produced for domestic consumption and foreign export. Due to this, students would have easy access to *khat* with cheap costs. The main reasons given by the study participants for chewing *khat* were to increase academic performance, to get personal pleasure, to get relief from tension, and to stay awake. This is in line with other research done in Jimma and Butajira (Alem A, *etal,* 1999).

The prevalence rate of lifetime alcohol use in this study was 50.2%, which is similar to a study in Kenya 51.9% (Atwoli L, *etal,* 2011) and is much higher than Addis Ababa university medical students 31.4% [Wakgari D & Haile A, 2011]. The difference from the result of the study conducted in Addis Ababa University may be due to the fact that the study conducted in Addis Ababa University involved only medical students whereas ours involved large number of students selected from all fields of studies.

. Moreover, the study attempted to see the presence of any association between depression status of students and substance use behavior. It had also limitations in that it involved only undergraduate students. Because of the cross-sectional nature of the study, it was impossible to establish temporal relationship. The study used self administered questionnaire which need students to give self reported use of substances which in turn may tend to underestimate substance use.

4. Conclusions and Recommendations

The overall prevalence of depression and suicide ideation among university students was high. Depression among university students demands special attention, emergency preventive measures, and targeted IEC activity. Education, counseling and awareness creation on cause and prevention of depression among students should be done. There should be a unit in the university that is responsible for counseling of depressed patients and strategies should be designed to prevent depression among university students.

5. Acknowledgments

We are grateful to Haramaya University for funding the research. Our special thanks and sincere appreciation also go to the university administration for cooperating with us during the data collection. Last but not least, we would like to thank study facilitators and participants.

6 References

Alem A, Kebede D, Kullgren G. 1999. The prevalence and socio-demographic correlates of khat chewing in Butajira, Ethiopia *Acta Psychiatrica Scand* 100: 84 - 91

Amelia, M. 2010. Prevalence and predictors of persistent suicide ideation, plans, and attempts during college, J Affect Disord, 127 (1-3): 287 - 294 doi:101016/jjad20100401

Atwoli L, A, Mungla P, N Ndung'u M, C Kinoti K, Ogot E. 2011. Prevalence of substance use among college students in Eldoret, western Kenya. *BMC Psychiatry* 11 (34)

Ayalu A Reda, Asmamaw Moges, Sibhatu Biadgilign, Berhanu Y Wondmagegn. Prevalence and Determinants of Khat (Catha edulis) Chewing among High School Students in Eastern Ethiopia: A Cross-Sectional Study

Brunstein Klomek A, Marrocco F, Kleinman M, Schonfeld IS, MS G. 2007. Bullying, depression, and suicidality in adolescents *J Am Acad Child Adolesc Psychiatry* 46: 40 – 45.

Centers for Disease Control and Prevention Suicide facts at a glance 2010.

Coşkun B., Duru G., Handan K., nIsil, 2013. Prevalence and related risk factors of tobacco, alcohol and illicit substance use among university students. *Eur J Psychiat*, , 27 (2): 97 - 110

Eisenberg D, Gollust SE, Golberstein SE, & , Hefner JL Prevalence and correlates of depression, anxiety and suicidality among university students *American Journal of Orthopsychiatry* 2007; 77: 534 - 42

Flisher AJ, Ziervogel CF, Chalton DO, Leger PH, BA R. 1993. Risk-taking behaviour of Cape Peninsula high-school students *S Afr Med J* 83: 474 - 6

Galaif ER, Sussman S, Newcomb MD, TF L. 2007. Suicidality, depression and alcohol use among adolescents: A review of empirical findings. *J Adolesc Med Health*;19 (1) : 27 - 35

Gelaw Y, Haile-Amlak A. 2004. Khat chewing and its socio-demographic correlates among the staff of Jimma University *Ethiopian Journal of Health Development* 18 (3): 179 - 84

Heider D, Bernert S, Matschinger H, Haro JM, Alonso J, MC A. *2007*. Parental bonding and suicidality in adulthood *Aust N Z J Psychiatry* 41 : 66 - 73

Hong-Seok Lee, Sukil Kim, Inyoung Choi, Kyuong-Uk Lee. 2008. Prevalence and Risk Factors Associated with Suicide Ideation and Attempts in Korean College Students Psychiatry Invest 5 : 86 - 93

Hussein M, Ageely, : 2009. Prevalence of Khat chewing in college and secondary (high) school students of Jazan region, Saudi Arabia *BMC Harm reduction journal*, , 6 (11)

Kebede Y. *2002*. Cigarette smoking and khat chewing among college students in North West Ethiopia. *Ethiopian Journal of Health Development* 16 (1): 9 - 17

Krug EG, Dahlberg LL, Mercy JA, Zwi AB & Lozano R. 2002. World report on violence and health Geneva: World Health Organization.

Makhija NJ. *2007*. Childhood abuse and adolescent suicidaility: A direct link and an indirect link through alcohol and substance abuse *Int J Adolesc Med Health*19: 45 - 51

Makhija NJ, Sher L. 2007. Preventing suicide in adolescents with alcohol use disorders *Int J Adolesc Med Health*;19: 53 - 9

Measho G, Amsalu F, Tesfahun M. 2013. Psychoactive substances use and associated factors among Axum university students, Axum Town, North Ethiopia *BMC Public Health*, 13 : 693

Mostafa A, etal. 2013. Relationship between anhedonia and impulsivity in schizophrenia, major depression and schizoaffective disorder *Asian Journal of Psychiatry*, 2013, DOI: http://dxdoiorg/101016/jajp201309002

Mowbray C, Megivern D, Mandiberg JM, Strauss S, Stein. 2006. Campus mental health services: Recommendations for change *American Journal of Orthopsychiatry* 76: 226 - 37

Parks HS, Schepp KG, Jang EH, HY K. *2006*. Predictors of suicidal ideation among high school students in South Korea. *J Sch Health*76: 181 - 8

Rohtash S. 2008. Suicidal ideation in relation to depression, life stress and personality among college student. *Journal of the Indian Academy of Applied Psychology,* 34(2): 259-26.

Romeo B Lee, et al. 2013. Factors associated with depressive symptoms among filipino university students, Plos one, | 8(1) doi:101371/journalpone0079825

Sher L, Sperling D, Zalsman G, Vardi G, Merrick J. 2006. Alcohol and suicidal behaviour in adolescents Minerva Pediatr 58: 333 - 9 World Health Report - Shaping the Future

Wakgari D, Aklilu A. 2011. Substance use and its predictors among undergraduate medical students of Addis Ababa University in Ethiopia *BMC public health* 11 : 660

3. Knowledge and Practice on Integrated Diseases Prevention and Control among Households in East Hararghe Zone, Ethiopia

Ayichew Seyoum[1*], Kedir Urgessa[1] and Tesfaye Gobena[1]

[1] College of Health and Medical Sciences, Haramaya University, PO Box 235, Harar, Ethiopia
* Corresponding Author: PO Box 235, Tel: +251 911 003879, Fax: +251 256 668081
E-mail: ayichewseyoum@gmailcom

Abstract

Ethiopia constitutes only one percent of the world's population; however, it contributes seve percent of the world's HIV/AIDS cases. Tuberculosis is widespread and it accounts for 31% of all deaths. Malaria has also a more epidemic profile in the highlands of Ethiopia which comprises about 40% of the total land area. Despite the ongoing efforts and progress in fighting them, HIV/AIDS, TB, and malaria remain leading causes of morbidity and mortality in the country. The objective of the study was to assess community's knowledge about and practice of integrated diseases prevention and control among households in East Hararghe Zone, Ethiopia. The study was conducted from February 17, 2014 – March 16, 2014.

A community based cross-sectional study was conducted in East Hararghe Zone using Multistage stratified sampling techniques.The data were collected from 2,319 households using structured interview. A total of 12 trained data collectors were involved to conduct fact-to-face interview with the head women household. The collected data were entered into Epi-Data version 3 and then exported to STATA version 11 for analysis. .

Findings of the study revealed that the majority (97.7%) of kebles in the study area had at least one health facility. Out of the 1,972 study participants who heard about TB, 937 (47.5%) scored above mean regarding the overall knowledge of TB, and multivariable logistic regression analysis showed the association of rural residents (AOR= 043, 95% CI: 029-063, P<0005), single marital status (AOR= 227, 95% CI: 135-379, P= 0002) and government employee (AOR= 041, 95% CI: 019-088, P= 0023) were significantly associated with comprehensive knowledge about TB. Out of the 2,121 study participants who heard about HIV/AIDS, 1,967 (92.7%) scored above mean regarding the overall knowledge of HIV/AIDS. Study participants who can read/write (AOR= 254, 95% CI: 115-561, P=0021), those participants who attended grade 5-8 (AOR= 232, 95% CI: 116-465, P= 0017) and daily laborers (AOR= 040, 95%CI: 017-091, P= 0029) were significantly associated with comprehensive knowledge about HIV/AIDS. Out of the 2,172 study participants, 934 (43%) scored above mean regarding the overall knowledge of Malaria Rural residents (AOR= 027, 95% CI: 017 -044, P < 0005), above 45 years of age (AOR= 144, 95% CI: 104- 199, P= 0030), single marital status (AOR= 381, 95%CI: 197-737, P< 0005), educational status of head of the households (can read and write (AOR= 066, 95% CI: 045-098, P= 0038), 1-4 grade (AOR= 042, 95%CI: 026-068, P< 0005), 5-8 grade (AOR= 050, 95% CI: 035-073, P <0005), 9-10 grade (AOR= 039, 95%CI: 023- 066, P < 0005) and > 12 grade (AOR= 010, 95%CI: 004-029, P < 0005)), educational status of the women who can read and write (AOR= 195, 95%CI: 116-327, P=0012), occupational status of head of the women (daily laborer (AOR=058, 95%CI: 037- 092, P= 0020), government employee (AOR= 053, 95%CI: 014-080, P=0014)), frequent visit done by the HEWs (AOR= 047, 95%CI: 031- 070, P< 0005) were significantly associated with comprehensive knowledge about Malaria.Based on the findings of this study, it is evident that the primary health service facility coverage in the study area was high; frequent visit of households by HEWs was observed; the overall knowledge of study participants regarding TB and malaria was unsatisfactory unlike the overall knowledge of study participants regarding HIV/AIDS, which was very high.

Keywords: TB, HIV/AIDS; Malaria; Health extension workers; Health extension program

1. Introduction

The substantial investment in health sector in terms of human resources, construction of facilities, equipping and providing pharmaceuticals will positively impact the health status of the nation. The major priorities of the third Health Sector Development Program (HSDP-III) involve improving maternal and child health as well as reducing and reversing the impact of major communicable diseases such as HIV/AIDS, tuberculosis (TB), and malaria (*FMoH, 2010*). So, in 2003, in response to the country's health problem, the Ethiopian Federal Ministry of Health (FMoH) launched a new health care plan called the "Accelerated Expansion of Primary Health Coverage," through a comprehensive Health Extension Program (HEP). HEP introduced 16 packages in four areas of care: Disease Prevention and Control (HIV/AIDS, TB and malaria), Family Health, Hygiene and Environmental Sanitation, and Health Education and Communication. Health Extension Workers (HEWs) are young women who took a one-year course of skill oriented basic training on HEP packages (*Alula, 2008; Hailom, 2011*). Their major task is increasing knowledge and skills of communities and households to deal with preventable diseases and be able to access services available at clinics and hospitals.

For many years, TB, HIV/AIDS and malaria have been recognized as major public health problems in Ethiopia. Knowledge about TB, HIV/AIDS and malaria preventive methods are not fairly sufficient even after the launch of health extension program. Moreover, there is significant discrepancy between the existing knowledge on preventive methods and its practices. There are scant studies that have tried to

discover underlying reasons for the gap. Limited access to information, low level of comprehensive knowledge and the widespread misconceptions about tuberculosis, HIV/AIDS and malaria could be barriers to use intervention techniques (Solomon et al, 2003; Mengiste et al, 2005; Gemeda et al, 2010).

A better understanding about the barriers to HEP and community's knowledge about TB, HIV/AIDS and malaria is important to identify effective strategies to improve community's knowledge about TB, HIV/AIDS and malaria. Therefore, the aims of this study were to assess the knowledge of study participants about TB, HIV/AIDS, and malaria and identify the role of HEWs to enhance the community's knowledge about TB, HIV/AIDS and malaria.

2. Materials and Methods

2.1. Study Area and Period

A community based cross-sectional study was undertaken from February 17, 2014 – March 16, 2014., The primary goal of the study was to assess the community's knowledge about TB, HIV/AIDS and malaria, as well as the role of HEWs towards enhancing community's knowledge about TB, HIV/AIDS and malaria in East Hararghe Zone which is one of the 20 zones in Oromia Nartional Regional State. According to current administrative structure, the zone has 19 woredas. Based on the 2007 census conducted by the Central Statistical Agency of Ethiopia (*CSA, 2007*), East Hararghe zone had a total population of 2,723,850. A total of 580,735 households were counted in this zone which resulted in an average of 49 persons to a household. The zone has 216,943 (827%) urban inhabitants, and HEP has been commenced in East Hararghe zone since2003.

2.2. Population and Data Collection

All households in the selected woredas during the study period met the eligibility criteria (a house with female head of the household aged over 18 years, able to speak and hear at the time of interview and not critically ill), and those volunteered to participate in the study were interviewed about their knowledge of TB, HIV, HIV/AIDS and malaria using a semi-structured interview. The interview was done house-to-house by trained data collectors. The interview consisted of closed-ended questions about socio-demographic characteristics, patient's knowledge about TB, HIV/AIDS and malaria as well as the role of HEWs towards enhancing the knowledge about TB, HIV/AIDS and malaria.

A total of seven questions ((1) Information about TB (2) Source of information (3) Major symptoms of TB (4) Transmissibility of TB (5) Mode of TB transmission (6) Curability of TB, and (7) TB prevention) were asked to assess knowledge of the research participants about TB. Similarly, questions like information about HIV/AIDS and its cause, its mode of transmission, treatment for HIV and preventive method of HIV/AIDS infection were asked to assess knowledge of the participants. Questions were asked to assess knowledge of study participants about TB, HIV/AIDS and malaria.

2.3. Data Analysis

The collected data were computerized using Epi data version 31. Data cleaning was carried out by running frequency of each categorical variable and cross tabulation of different categorical variables. Descriptive statistics were summarized as percentage, means and standard deviations.

The associations of the outcome variables like knowledge of TB, knowledge of HIV, knowledge of malaria and the role of HEWs towards knowledge about TB, HIV/AIDS and malaria was analyzed using logistic regression. The overall knowledge about TB, HIV/AIDS, Malaria and the role of HEWs to enhance knowledge about TB, HIV/AIDS and malaria were assessed by scoring system. A score of one was given to correct responses, zero being used for incorrect/do not know responses. Mean value was used to categorize study participants into two categories. Scores less than the mean value were considered as low knowledge, while scores greater than the mean value were considered as high knowledge. Accordingly, study participants who scored above the mean value (395) of the seven questions for the knowledge of TB were categorized as knowledgeable. Similarly, the mean value (403) of the questions about knowledge of HIV was used to categorize the study participants into two categories. Knowledge of malaria was categorized as low or high knowledge using mean value of 20.

2.4. Ethical Consideration

The study protocol was reviewed and approved by Haramaya University, College of Health and Medical Sciences Institutional Health Research Ethics Review Committee (IHRERC). The aim of the study was described to each study participant and written informed consent was obtained from all participants prior to the commencement of the interview. To ensure their confidentiality, study participants were represented by codes. The study participants were not interviewed about their HIV status. At the end of each interview, misconceptions were explained to the study participants.

3. Results

3.1. Socio-demographic Characteristics of the Study Participants

Out of the total 2,343 estimated sample size, 2,319 study participants (age range from 18 to 88 years, mean age 36.7 years) participated in the study, which gave 99 % response rate. Among 2,319 study participants, the majority of them were rural dwellers (85.5%), married women (87.8%), Muslims (87.3%) and Oromos(89.3%) (Table1).

Table 1. Socio-demographic characteristics of study participants

Variable	WoredaNumber	Percent	
Study participants Woreda	Gursum	370	15.9
	Babile	226	9.8
	Kurfacele	140	6.1
	Kombolcha	336	14.5
	Metta	613	26.4
	Haramaya	634	27.3
Age in years	18-30	1,044	4.5
	31-45	804	34.7
	>45	471	20.3
Residence	Urban	337	14.5
	Rural	1,982	85.5
Number of HH members	2	179	7.7
	3-5	1,123	48.4
	> 5	1,017	43.9
Number of under five children	0-3	2,287	98.6
	4-6	31	1.3
	>6	1	0.1
Religion	Christian	291	12.5
	Muslim	2,024	87.3
	Others	4	0.2
Marital **status**	Married	2,036	87.8
	Single	115	5.0
	Divorced	106	4.6
	Separated	61	2.6
Educational status of the head of household	Illiterate	1,363	58.8
	Read/Write	242	10.4
	1-4th Grade	153	6.6
	5-8th Grade	291	12.6
	9-10th Grade	184	7.9
	11-12 Grade	21	0.9
	>12 Grade	65	2.8
Educational status of the women/ respondents	Illiterate	1,657	71.4
	Read/Write	152	6.6
	1-4th Grade	167	7.2
	5-8th Grade	196	8.5
	9-10th Grade	110	4.7
	11-12 Grade	4	0.2
	>12 Grade	33	1.4

3.2. Health Facility Related Characteristics of the Study Area

Among the 2,319 study participants, the majority (97.7%) of them reported that their kebeles had at least one health facility during the study period. However, the proportion of health post in rural kebeles was significantly higher than that of the urban kebeles (75% vs 40.1%, X^2 = 1588786, P < 0005). Meanwhile, the proportion of Clinic (421% vs 31%, X^2= 5462718, P<0005) and Pharmacy/ Rural Drug Vendor (332% vs 23%, X^2= 4375148, P< 0005) were significantly higher in urban kebeles than in rural kebeles. Among 2,319 study participants, the majority (91.8%) of them reported that Health Extension Workers visited their house regularly. However, the proportion of rural study participants who

replied Health Extension Workers regularly visited their houses was significantly higher than that of study participants in urban areas(944% vs 766%, $X^2 = 1206268$, $P < 0005$) (Table 2).

Table 2. Health related characteristics of study participants.

Variable	Respondent's residence		
	Urban n(%)	Rural n(%)	Total n(%)
Avialability health facility in the kebele			
Yes	334 (99.1)	1,932 (97.5)	2,266 (97.7)
No	3 (0.9)	50 (2.5)	53 (2.3)
Type of health facility aviable			
Health post	138 (40.9)*	1,486 (7.5)*	1624 (7.0)
Clinic	142 (42.1)*	62 (3.1)*	204 (8.8)
Pharmacy/ rural drug vender	112 (33.2)*	45 (2.3)*	157 (6.8)
Health center	90 (26.7)	552 (27.8)	642 (27.7)
Hospital	4 (1.2)	13 (0.7)	17 (0.7)
Time of walking distance to the nearby Health facility(in hours)			
Less than an hour	312 (92.6)	1,976 (99.7)	2,288 (98.7)
2-4 hours	16 (4.7)	4 (0.2)	20 (0.9)
Greater than 4 hours	9 (2.7)	2 (0.1)	11 (0.5)
HEWs visit your home frequently			
Yes	258 (76.6)*	1,870 (94.4)*	2,128 (91.8)
No	79 (23.4)	112 (5.6)	191 (8.2)
Frequency of HEWs visit			
Daily	2 (0.8)	54 (2.9)	56 (2.6)
4-6 times a week	6 (2.3)*	36 (1.9)*	42 (2)
1-3 times a week	97 (37.6)	338 (18.1)	435 (20.4)
Every other 2 or 3 weeks	40 (15.5)	447 (23.9)	487 (22.9)
Every month	101 (39.1)	954 (5.1)	1,055 (49.6)
More than a month	12 (4.7)	41 (2.2)	53 (2.5)

HEWs Health Extension Workers ** Presence of statistically significant difference*

3.3. Knowledge and Practice of Study Participants about Tuberculosis

Out of the 2,319 study participants, the majority (85%) of them reported that they had ever heard about TB before the study period. However, the proportion of urban study participants who heard about TB was significantly higher than that of the rural study participants (97.9% vs 82.8%, X2 = 514566, P < 0005). Besides, 1,972 study participants, i.e.67.8%, of them stated that they heard about TB and they mentioned health extensions workers (HEWs) as a source of information about TB. But, the proportion of rural study participants who mentioned HEWs as a source of information about TB was significantly higher than that of urban study participants (72.8% vs 43%, $X^2 = 1119194$, P< 0005). Out of 1,972 study participants who heard about TB, the majority (95.6%) of them mentioned cough for more than two weeks as a major symptom for TB. About 99.4% of the study participants who had heard about TB stated TB as a transmittable disease, while the majority (94.9%) of them believe that TB could be transmitted through droplets during sneezing and coughing. Out of 1,972 study participants who heard about TB, 93.5% of them considered TB as a preventable disease and 96.8% of the study participants mentioned TB as a curable disease. However, the proportion of urban study participants who replied TB as a curable disease was significantly higher than that of rural study participants (99.4% vs 96.3%, $X^2 = 85875$, P= 0003) (Table 3).

Table 3. Study participants' knowledge and practice about TB.

Variable	Respondent's residence		
	Urban n (%)	Rural n (%)	Total n (%)
Have ever heard about TB			
Yes	330 (97.9)*	1,642 (82.8)*	1,972 (8.5)
No	7 (2.1)	340(17.2)	347 (1.5)
Source of information about TB			
Family members	35 (10.6)*	356 (21.7)*	391 (19.8)
Friends	220 (66.7)*	532 (32.4)*	752 (38.1)
Mass media (Radio, TV etc)	52 (15.8)	196 (11.9)	248 (12.6)
Health Extension workers	142 (4.3)*	1,196 (72.8)*	1,338 (67.8)
Others	12 (3.6)	91 (5.5)	103 (5.2)
Major symptoms of TB			
Cough greater than two weeks	318 (96.4)	1,567 (95.4)	1,885 (96.6)
Night sweat	107 (32.4)*	880 (53.6)*	987 (5.0)
Weight loss	138 (41.8)	775 (47.2)	913 (46.3)
Loss of appetite	88 (26.7)	530 (32.9)	618 (31.3)
Chest pain	58 (17.6)	287 (17.5)	345 (17.5)
I don't know	2 (0.6)	30 (1.8)	32 (1.6)
TB a transmittable disease			
Yes	329 (99.7)	1,631 (99.3)	1,960 (99.4)
No	1 (0.3)	11 (0.7)	12 (0.6)
The main route/s of transmission			
Through droplets during sneezing & coughing	319 (9.7)	1,542 (94.5)	1,861 (9.5)
Eating together with TB infected patients	68 (20.7)*	854 (52.4)*	922 (4.7)
Living in the same house with TB infected patients	76 (2.3)*	855 (52.4)*	931 (47.5)
Sharing same drinking cup with TB infected patients	143 (43.5)*	960 (58.9)*	1,103 (56.3)
Others	23 (7)	43 (2.6)	66 (3.4)
TB a preventable disease			
Yes	305 (924)	1,538 (93.7)	1,843 (93.5)
No	25 (76)	104 (6.3)	129 (6.5)
TB cure with effective treatment			
Yes	328 (99.4)	1,581 (96.3)	1,909 (96.8)
No	2 (0.6)	61 (3.7)	63 (3.2)

Presence of statistically significant difference

Out of the 1,972 study participants who heard about TB, 937 (475%) scored above mean regarding the overall knowledge of TB. Crude and adjusted effects of selected covariates obtained from logistic regression are summarized in Table 4 for the overall knowledge about TB Rural residents (AOR= 043, 95% CI: 029-063, P<0005), single marital status (AOR= 227, 95% CI: 135-379, P= 0002) and government employees (AOR= 041, 95% CI: 019-088, P= 0023) were significantly associated with comprehensive knowledge about TB (Table 4).

Table 4. Association of study participants' socio demographic characteristics with their overall knowledge about TB .

Variable		Overall knowledge about TB			
		High n (%)	Low n (%)	COR (95% CI)	AOR (95%)
Residence	Urban	114 (12.2)	216 (20.9)	R	
	Rural	823 (87.8)	819 (79.1)	052 (041-067)*	043 (029-063)*
Age	18-30	439 (46.8)	430 (41.5)	R	
	31-45	339 (36.2)	359 (34.7)	108 (088-132)	084 (067-106)
	>45	159 (1.7)	246 (23.8)	158 (124-200)*	098 (073-131)
Marital status	Married	858 (91.7)	867 (83.8)	R	
	Single	26 (2.8)	70 (6.8)	266 (168-422)*	227 (135-379)*
	Divorced	36 (3.8)	62 (5.9)	170 (111-260)*	111 (071-175)
	Separated	16 (1.7)	36 (3.5)	223 (122-404)*	175 (091-341)
Religion	Christian	121 (12.9)	155 (1.5)	R	
	Muslim	813 (86.8)	879 (84.9)	084 (065-109)	096 (055-166)
	Others	3 (0.3)	1 (0.1)	026 (003-253)	038 (003-407)
Ethnicity	Oromo	827 (88.3)	905 (87.4)	R	
	Amhara	105 (11.2)	128 (12.4)	111 (085-147)	061 (034-107)
	Others	5 (0.5)	2 (0.2)	036 (007-189)	040 (007-240)
Educational status of head of the house hold	Illiterate	492 (52.5)	625 (60.4)	R	
	Read /write	95 (10.1)	123 (11.9)	101 (076-136)	102 (072-145)
	1-4 Grade	75 (8)	58 (5.6)	061 (042-087)*	100 (066-153)
	5-8 Grade	127 (13.6)	120 (11.6)	074 (056-098)*	104 (073-150)
	9-10 Grade	94 (1.0)	79 (7.6)	066 (048-091)*	107 (067-171)
	11-12 Grade	13 (1.4)	7 (0.7)	042 (017-107)	051 (016-167)
	>12 Grade	41 (4.4)	23 (2.2)	044 (026-074)*	063 (027-143)
Educational status of the respondent / Woman	Illiterate	615 (65.6)	739 (71.4)	R	
	Read /write	49 (5.2)	88 (8.5)	150 (104-215)*	113 (074-174)
	1-4 Grade	82 (8.8)	66 (6.4)	067 (048-094)*	116 (077-176)
	5-8 Grade	119 (12.7)	68 (6.6)	047 (035-065)*	080 (051-125)
	9-10 Grade	54 (5.8)	55 (5.3)	085 (057-125)	136 (078-235)
	11-12 Grade	1 (0.1)	3 (0.3)	250 (026-2406)	865 (068-11043)
	>12 Grade	17 (1.8)	16 (1.5)	078 (039-156)	191 (071-509)
Occupation of Head of the house Hold	Farmer	762 (81.3)	866 (83.7)	R	
	Daily laborer	91 (9.7)	111 (10.7)	107 (080-144)	120 (077-185)
	Gov'temployee	56 (6)	46 (4.4)	072 (048-108)	072 (036-141)
	Other	28 (3)	12 (1.2)	038 (019-074)*	077 (033-180)
Occupation of the responden t/ woman	Farmer	479 (51.1)	759 (73.3)	R	
	Daily laborer	62 (6.6)	142 (13.7)	144 (105-199)*	111 (072-171)
	Gov't employee	34 (3.6)	26 (2.5)	048 (028- 081)*	041 (019-088)*
	Other	362 (38.6)	108 (10.4)	019 (015-024)*	019 (014-026)*
Health facility in Respond- ent's Kebele	Yes	922 (98.4)	1,023 (98.8)	R	
	No	14 (1.5)	12 (1.2)	077 (035-168)	067 (029-154)
	Not sure	1 (01)	-		
Time of walk- ing	<1 hour	928 (991)	1,016 (982)	R	

Distance to the nearby health facility	1-5 hours	5 (05)	16 (15)	292 (107-800)*	203 (066-627)
	>5 hours	4 (04)	3 (03)	068 (015-307)	039 (007-217)
Frequent visit done by HEWs	Yes	858 (916)	968 (935)	R	
	No	79 (84)	67 (65)	075 (053-105)	068 (046-102)

COR = Crude odds ratio AOR= Adjusted odd ratio CI= Confidence interval

Table 5.Study participants' knowledge and practice about HIV/AIDS.

Variable	Respondent's residence		
	Urban n (%)	Rural n (%)	Total n (%)
Have ever heard about HIV/AIDS			
Yes	333 (98.8)*	1,788 (90.2)*	2,121 (91.5)
No	4 (1.2)	194 (9.8)	198 (8.5)
Sources of information			
Family members	55 (16.5)*	385 (21.5)*	440 (20.7)
Friends	221 (66.4)*	596 (33.3)*	817 (38.5)
Mass media (Radio, TV etc)	45 (13.5)	303 (16.9)	348 (16.4)
Health Extension workers	179 (53.7)*	1,376 (7.7)*	1,555 (73.3)
HIV/AIDS a transmittable disease			
Yes	330 (99.1)	1,764 (98.7)	2,094 (98.7)
No	3 (0.9)	24 (1.3)	27 (1.3)
The main route/s of transmission			
Through unsafe sexual intercourse	209 (63.3)*	1,408 (79.8)*	1,617 (77.2)
Through contaminated needle/ sharp materials	289 (87.6)	1,524 (86.4)	1,813 (86.6)
Others	6 (1.8)	32 (1.8)	38 (1.8)
Do not know	35 (10.6)	30 (1.7)	65 (3.1)
HIV/AIDS a preventable disease			
Yes	321 (96.4)	1,748 (97.8)	2, 069 (97.5)
No	12 (3.6)	40 (2.2)	52 (2.4)
Type of prevention methods			
Safe sexual intercourse	156 (48.6)*	1,396 (79.9)*	1,552 (7.5)
By taking care from contaminated needle/ sharp materials	273 (85.1)	1,442 (82.5)	1,715 (82.9)
Using screened blood for transfusion	98 (30.5)*	824 (47.1)*	922 (44.6)
HIV/AIDS cure with effective treatment			
Yes	33 (9.9)	132 (7.4)	165 (7.8)
No	300 (90.1)	1,656 (92.6)	1,956 (92.2)
HEWs teach about HIV/AIDS			
Yes	165 (49.6)*	1,554 (86.9)*	1,719 (81.1)
No	168 (50.4)	234 (13.1)	402 (18.9)

Presence of statistically significant difference

3.4. Knowledge and Practice of Study Participants about HIV/AIDS

Among 2,319 study participants, the majority (91.5%) of them reported that they had heard about HIV/AIDS before the study period. However, the proportion of urban study participants who heard about HIV/AIDS was significantly higher than that of the rural study participants (98.8% vs 90.2%, $X^2 = 272861$, $P < 0005$). Among 2,121 study participants who heard about HIV/AIDS the majority (73.3%) of them mentioned health extensions workers (HEWs) as a source of information about HIV/AIDS. Here, the proportion of rural study participants who mentioned HEWs as a source of information about HIV/AIDS was significantly higher than that of urban study participants (77 % vs 53.7 %, $X^2 = 772541$, $P< 0005$). Among 2,121 study participants who heard about HIV/AIDS, 98.7% of them answered HIV/AIDS as a transmittable disease, and about 97.5 % of the participants replied HIV/AIDS as a preventable disease. Among 2,121 study participants who heard about HIV/AIDS, about 76.9% of them use HIV preventive techniques; howeve, the proportion of urban study participants who

use HIV preventive techniques was significantly higher than that of rural study participants (82.9 % vs 75.8 %, X^2 = 79654, P= 0005). Among 2,121 study participants who heard about HIV/AIDS, about 78% of them answered HIV/AIDS as a curable disease. Among the study participants who heard about HIV/AIDS the majority (81.1%) of them mentioned HEWs taught them about HIV/AIDS. However, the proportion of urban study participants that mentioned HEWs taught them about HIV/AIDS was significantly lower than rural participants (49.5% vs 86.9%, X^2 = 255 1166, P < 0005) (Table 5).

Out of the 2,121 study participants who heard about HIV/AIDS, 1,967 (92.7%) scored above mean regarding the overall knowledge of HIV/AIDS. Crude and adjusted effects of selected covariates obtained from logistic regression were summarized in Table 6 for the overall knowledge about HIV/AIDS. Study participants who can read/write (AOR= 254, 95% CI: 115-561, P=0021), 5-8th grade study participants (AOR= 232, 95% CI: 116-465, P= 0017) and daily laborer (AOR= 040, 95%CI: 017-091, P= 0029) were significantly associated with comprehensive knowledge about HIV/AIDS (Table 6).'

3.5. Knowledge and Practice of Study Participants about Malaria

Among 2,319 study participants involved in the study, the majority (937%) of them reported that they have heard about malaria before the study period. However, the proportion of urban study participants who heard about malaria was significantly higher than that of the rural study participants (97 % vs 93.1%, X^2 = 75495, P = 0006). Among 2,172 study participants who heard about malaria, more than half (71.9%) of them mentioned health extensions workers (HEWs) as a source of information. But, the proportion of rural study participants who mentioned HEWs as a source of information was significantly higher than that of urban study participants (75.7% vs 50.1%, X^2 = 897966, P< 0005). Out of 2,172 study participants who heard about malaria, 48.6% of them mentioned chills as a major symptom. However, the proportion of rural study participants who mentioned chills as a major symptom was significantly higher than that of urban study participants (35.8% vs 50.4%, X^2 = 252212, P< 0005). About 80% of the study participants who hadheard about malaria stated malaria as a communicable disease; although the proportion of rural study participants who mentioned mlaria as a communicable disease was significantly lower than that of urban study participants (79.1% vs 84.7%, X^2 = 53935, P=0020). About 96.2% of the study participants replied that malaria is a preventable disease; however, the proportion of rural study participants who mentioned malaria as a preventable disease was lower than that of urban study participants (95.7% vs 98.8%, X^2 = 70702, P=0008). Among 2,172 study participants who heard about malaria, 76.2 % of them mentioned malaria as is a fatal or sever disease while about 93.5 % of them stated malaria as curable disease, but it needs effective treatment. However, the proportion of rural study participants who stated malaria as a curable disease was lower than that of urban study participants (93.1% vs 96.3%, X^2 = 49193, P=0027). Among 2,319 study participants involved in the study, less than half (40.4%) of them had insecticide treated bed nets (ITNs), but the proportion of rural study participants who reported that they had IRNs in their houses were significantly lower than that of urban study participants (38.6% vs 50.7%, X^2 =174955, P < 0005). Out of 2,319 study participants involved in the study, about 76.4% of them mentioned HEWs taught them about malaria. However, the proportion of urban study participants who were taught about malaria by HEWs was significantly lower than that of the rural study participants who (53.7% vs 80.3%, X^2 = 1127576, P < 0005) (Table 7).

Out of the 2,172 study participants, 934 (43%) scored above mean regarding the overall knowledge of malaria. Crude and adjusted effects of selected covariates obtained from logistic regression are summarized in Table 8 for the overall knowledge about malaria rural residents (AOR= 027, 95% CI: 017 -044, P < 0005), above 45 years of age (AOR= 144, 95% CI: 104- 199, P= 0030), single marital status (AOR= 381, 95%CI: 197-737, P< 0005), Amhara ethnic group (AOR= 243, 95% CI: 122-484, P= 0012), educational status of head of the households (can read and write (AOR= 066, 95% CI: 045-098, P= 0038), 1-4 grade (AOR= 042, 95%CI: 026-068, P< 0005), 5-8 grade (AOR= 050, 95% CI: 035-073, P <0005), 9-10 grade (AOR= 039, 95%CI: 023- 066, P < 0005) and > 12 grade (AOR= 010, 95%CI: 004-029, P < 0005)), educational status of the women who can read and write (AOR= 195, 95%CI: 116-327, P=0012), occupational status of head of the women (daily laborer (AOR=058, 95%CI: 037- 092, P= 0020), government employee (AOR= 053, 95%CI: 014-080, P=0014)), frequent visit done by the HEWs (AOR= 047, 95%CI: 031- 070, P< 0005) were significantly associated with comprehensive knowledge about malaria (Table 8).

Table 6. Association of study participants' socio-demographic characteristics with their overall knowledge about HIV/AIDS.

Variable		Overall knowledge about HIV/AIDS			
		High n (%)	Low n (%)	COR (95% CI)	AOR(95%)
Residence	Urban	303 (15.4)	30 (19.5)	R	
	Rural	1,664 (84.6)	124 (80.5)	133 (087-202)	098 (049-196)
Age	18-30	935 (47.5)	59 (38.3)	R	
	31-45	687 (34.9)	38 (24.7)	114 (075-173)	150 (097-234)
	>45	345 (17.5)	57 (3.7)	038 (026-056)*	074 (047-116)
Marital status	Married	1,749 (8.9)	121 (78.6)	R	
	Single	83 (4.2)	13 (8.4)	044 (024-082)*	063 (032-125)
	Divorced	81 (4.1)	17 (1.1)	033 (019-057)*	060 (033-109)
	Separated	53 (2.7)	3 (2)	122 (038-397)	186 (055-629)
Religion	Christian	256 (1.3)	30 (19.5)	R	
	Muslim	1,708 (86.8)	123 (79.9)	163 (107-248)	093 (035-242)
	Others	3 (0.2)	1 (0.6)	035 (003-349)	036 (003-449)
Ethnicity	Oromo	1,749 (88.9)	125 (81.2)	R	
	Amhara	211 (10.7)	29 (18.)	052 (034-080)*	050 (019-131)
	Others	7 (0.4)	-	-	-
Educational status of	Illiterate	1,080 (54.9)	116 (75.3)	R	
head of the household	Read /write	215 (10.9)	9 (5.8)	256 (128-513)*	254 (115-561)*
	1-4	145 (7.4)	5 (3.2)	311 (125-775)*	264 (096-723)
	5-8	269 (13.7)	14 (9.1)	206 (117-365)*	232 (116-465)*
	9-10	173 (8.8)	9 (5.8)	206 (103-414)*	241 (097-600)
	11-12	21 (1.1)	-	-	-
	>12	64 (3.2)	1 (0.6)	687 (094-5000)	399 (037-4341)
Educational status of	Illiterate	1,355 (68.9)	122 (79.2)	R	
the respondent/	Read /write	132 (6.7)	8 (5.2)	148 (071-310)	161 (067-384)
Woman	1-4	155 (7.9)	9 (5.8)	155 (077-311)	081 (037-177)
	5-8	188 (9.6)	5 (3.2)	338 (137-839)*	207 (071-601)
	9-10	100 (50.8)	10 (6.5)	090 (046-177)	081 (031-210)
	11-12	4 (0.2)	-	-	-
	>12 Grade	33 (1.6)	-	-	-
Occupation of the	Farmer	1,633 (8.3)	126 (81.8)	R	
Head of the	Daily laborer	191 (9.7)	25 (16.2)	059 (037-093)*	040 (017-091)*
household	Gov't employee	100 (5.1)	3 (2)	259 (080-823)	109 (022-539)
	Other	43 (2.2)	-	-	-
Occupation of the	Farmer	1,207 (61.4)	119 (77.3)	R	
Respondent / woman	Daily laborer	186 (9.5)	24 (15.6)	076 (048-122)	092 (043-198)
	Gov't employee	60 (3.1)	4 (2.6)	148 (053-414)	084 (021-334)
	Other	514 (26.1)	7 (4.5)	724(335-15-62)*	556 (247-1253)*
Health facility in	Yes	1,938 (98.5)	153 (99.4)	R	
Respondent's	No	29 (1.5)	1 (0.6)	229 (031-1692)	276 (034-2243)
Kebele					
Frequent visit done by	Yes	1,815 (92.3)	141 (91.6)	R	
HEWs	No	152 (7.7)	13 (8.4)	091 (050-164)	054 (028-102)

COR= Crude odds ratio AOR= Adjusted odd ratio CI= Confidence interval

Table 7. Study participants' knowledge and practice about Malaria .

Variable	Respondent's residence		
	Urban n (%)	Rural n (%)	Total n (%)
Have everheard about Malaria			
Yes	327 (97)*	1,845 (93.1)*	2,172 (93.7)
No	10 (3)	137 (6.9)	147 (6.3)
Sources of the information			
Family members	34 (10.4)*	355 (19.2)*	389 (17.9)
Friends	191 (58.4)*	474 (25.7)*	665 (30.6)
Mass media (Radio, TV etc)	37 (11.3)	244 (13.2)	281 (12.9)
Health Extension workers	164 (50.1)*	1,397 (75.7)*	1,561(71.9)
Others	20 (6.1)	69 (3.7)	89 (4.1)
The major symptoms of malaria			
Fever	266 (81.3)	1,464 (79.3)	1,730 (79.6)
Severe headache	78 (2.3)*	749 (40.6)*	827 (38.1)
Chills	117 (35.8)*	938 (50.8)*	1,055 (48.6)
Joint pain	23 (7)*	235 (12.7)*	258 (11.9)
Lack of appetite	105 (32.1)	629 (34.1)	734 (33.8)
Malaria communicable disease			
Yes	277 (84.7)*	1,460 (79.1)*	1,737 (80)
No	50 (15.3)	385 (20.9)	435 (20)
The main route/s of transmission			
Through biting Mosquito	269 (97.1)	1,380 (94.5)	1,649 (9.5)
Through drinking contaminated water	9 (3.2)*	452 (3.1)*	461 (26.5)
Through direct contact with sick person	9 (3.2)*	328 (22..5)*	337 (19.4)
Eating/ drinking together with sick person	3 (1.1)*	288 (19.7)*	291 (16.7)
Others	21(7.6)	18 (1.2)	39 (2.2)
Malaria is a preventable disease			
Yes	323 (98.8)*	1,766 (957)*	2,089 (96.2)
No	4 (1.2)	79 (43)	83 (3.8)
household have ITNs			
Yes	171 (50.7)*	766 (38.6)*	937 (40.4)
No	166 (49.3)	1,216 (61.4)	1,382 (59.6)
Malaria is fatal/sever disease			
Yes	240 (73.4)	1,415 (76.7)	1,655 (76.2)
No	87 (26.6)	430 (23.3)	517 (23.8)
Malaria is curable with effective treatment			
Yes	315 (96.3)	1,717(93.1)	2,032 (93.6)
No	12 (3.7)	128 (6.9)	140 (6.4)
HEWs teach about Malaria			
Yes	181 (53.7)	1,591 (80.3)	1,772 (76.4)
No	156 (46.3)	391 (19.7)	547 (23.6)

Presence of statistically significant difference

Table 8. Association of study participants' socio demographic characteristics with their overall knowledge about Malaria.

Variable		Comprehensive knowledge about Malaria			
		High	Low	COR	AOR
		n (%)	n (%)	(95% CI)	(95%)
Residence	Urban	92 (9.8)	235 (19)	R	
	Rural	842 (90.2)	1,003 (81)	047 (036 – 060)*	027 (017 -044)*
Age	18-30	524 (56.1)	453 (36.6)	R	
	31-45	289 (30.9)	481 (38.8)	192 (159 -233)*	126 (098 -161)
	>45	121 (1.3)	304 (24.6)	291 (227 -371)*	144 (104 -199)*
Marital status	Married	869 (93.1)	1,037 (83.8)	R	
	Single	21 (2.3)	88 (7.1)	351 (216 -570)*	381 (197 -737)*
	Divorced	19 (2)	78 (6.3)	344 (207 -572)*	158 (090 -278)
	Separated	24 (2.6)	35 (2.8)	122 (072 -207)	057 (031 -106)
Religion	Christian	108 (11.6)	173 (14)	R	
	Muslim	823 (88.1)	1,064 (85.9)	081 (062 -104)	190 (099 -365)
	Others	3 (0.3)	1 (0.1)	021 (002 -203)	019 (012 -271)
Ethnicity	Oromo	852 (91.2)	1,079 (87.1)	R	
	Amhara	76 (8.1)	158 (12.8)	164 (123 -219)*	243 (122 -484)*
	Others	6 (0.7)	1 (0.1)	013 (001 -109)	021 (002 -271)
Educational status of head of the household	Illiterate	415 (44.4)	853 (68.9)	R	
	Read /write	84 (9)	141 (11.4)	082 (061 -110)	066 (045 -098)*
	1-4	92 (9.9)	47 (3.8)	025 (017 -036)*	042 (026 -068)*
	5-8	168 (1.8)	110 (8.9)	032 (024 -042)*	050 (035 -073)*
	9-10	117 (12.5)	60 (4.8)	025 (018 - 036)*	039 (023 -066)*
	11-12	13 (1.4)	7 (0.6)	027 (010 - 066)*	057 (015 -213)
	>12 Grade	45 (4.8)	20 (1.6)	022 (013 – 037)*	010 (004 -029)*
Educational status of the res pondent/ Woman	Illiterate	579 (6.2)	961 (77.6)	R	
	Read /write	28 (3)	111 (9)	239 (156 -366)*	195 (116 -327)*
	1-4	109 (8.7)	52 (4.2)	029 (020 -041)*	076 (047 -122)
	5-8	137 (11.7)	50 (4)	022 (016 -031)*	069 (040 -116)
	9-10	64 (6.8)	44 (3.6)	041 (029 -062)*	098 (050 -193)
	11-12	2 (0.2)	2 (0.2)	060 (008 -429)	233 (018 -3064)
	>12 Grade	15 (16.)	18 (1.4)	072 (039 -145)	209 (068 -641)
Occupation of the Head of the	Farmer	757 (81)	1,063 (85.9)	R	
	Daily laborer	94 (10.1)	112 (9)	085 (063 -113)	154 (088 -271)

household	Gov't employee	53 (5.7)	51 (4.1)	068 (046 -102)	169 (074 -388)
	Other	30 (3.2)	12 (1)	028 (014 -056)*	145 (052 -414)
Occupation of the	Farmer	403 (43.2)	1,011 (81.7)	R	
respondent/	Daily laborer	55 (5.9)	160 (12.9)	116 (083 -161)	058 (037 -092)*
woman	Gov't employee	31 (3.3)	32 (2.6)	041 (025 -068)*	033 (014 -080)*
	Other	445 (47.6)	35 (2.8)	003 (002 -005)*	004 (003 -006)*
Health facility in	Yes	923 (98.8)	1,211 (97.8)	R	
Respondent's	No	10 (1.1)	27 (2.2)	106 (099 -427)	136 (029-576)
Kebele	Not sure	1 (0.1)	-		
Frequent visit	Yes	841 (90)	1,161 (93.8)	R	
done by the	No	93 (10)	77 (6.2)	060 (044 -082)*	047(031 -070)*
HEWs					

COR= Crude odds ratio AOR= Adjusted odd ratio CI= Confidence interval, R= *reference*

4. Discussion

The results of this community-based cross-sectional study showed that 85% of the community members of East Hararghe zone had information about TB. The finding is similar to the results of studies from South West Ethiopia (*Abebe et al, 2010*) and North Ethiopia (*Mesfin et al, 2005; Yimer et al, 2009*), Afar Region (*Legesse et al, 2010*), Malaysia (*Koay, 2004*) and rural China (*Wang et al, 2008*). The results of this study showed that the main sources of information mentioned by the study participants are also similar with the source of information stated in the previous findings of the studies conducted in other part of Ethiopia (*Mesfin et al, 2005*). In the current study, majority of the research participants mentioned Health Extension Workers as a source of information about TB which is not in agreement with studies done in Lahore (*Christina et al, 2009*), Iraq (*Hashim et al, 2003*) and Pakistan (*Umair et al, 2011*). In these countries, as identified by the respective studies, most of the study participants' mentioned mass media as a major source of information about TB. This might be due to improved access to primary health care units and success of HEP in disseminating health information about diseases prevention for the community member.

A higher proportion of the study participants mentioned that cough that persists for more than two weeks is the major symptom of the disease and inhaling respiratory droplets are the main route of disease transmission. However, the overall knowledge of study participants regarding TB is still low. Results of the study regarding the major symptoms of PTB and main route of its transmission are also in agreement with the findings of other studies conducted elsewhere (*Mesfin et al, 2005; Yimer et al, 2009; Abebe et al, 2010; Legesse et al, 2010*). In the present study, the study participants reported that PTB is treatable and curable effectively with modern drug. This finding is also compatible with the findings of previous studies in other parts of Ethiopia (*Mesfin et al, 2005; Legesse et al, 2010*), in Iraq (*Hashim et al, 2003*), and in South Africa (*Abebe and Mitikie , 2009*).This might be due to improved access to primary health care units, frequent visit of households by HEWs and success of HEP in disseminating health information about diseases prevention for the community member.

From the finding of current study, the overall knowledge of respondents about HIV was high. A comparable report was found in Ethiopia from high school students (*Abebe andMitikie, 2009*). But a health facility based study in Harar, Ethiopia (*Ayichew and Mengistu, 2013*) and community based research from China indicated a significant level of lack of knowledge about HIV (*Maa et al, 2007*). The overall knowledge in the present study area was may be due to improved access to primary health care units, frequent visit of households by HEWs, and success of HEP in disseminating health information about diseases prevention for the community member. Creation of high awareness about HIV/AIDS in the community at large is helpful to reduce morbidity and mortality from HIV/AIDS, tuberculosis and malaria through development of community skills and knowledge.

In the present study, the overall knowledge about malaria was observed to be low among the study population. This result is in conformity with previous findings of other similar studies conducted in Butajira, Ethiopia (*Deressa et al, 2003)*, in northern Ghana (*Adongo et al, 2005*), in rural northwest Tanzania (*Mazigo et al, 2010*), andin rural areas of Rajkot woreda, Gujarat-India (*Chovatiya et al, 2013*). The findings, however, contrast with other similar studies conducted in south-western Nigeria(*Adedotun et al, 2010*), in metropolitan Lagos, Nigeria(*Iriemenam et al, 2011*), and in a low endemic setting of Shewa Robit Town, northeastern Ethiopia(*Abate et al, 2013*). This might be due to lack of comprehensive way of information dissemination to address all components of overall knowledge about malaria.

In the present study, the majority (937%) of the respondents stated that they have ever heard about malaria before the study period. This was consistent with other studies conducted in rural northwest Tanzania [*Mazigo et al, 2010*], in rural areas of Rajkot woreda, Gujarat-India [*Chovatiya et al, 2013*] and in a low endemic setting of Shewa Robit Town, northeastern Ethiopia [*Abate et al, 2013*] that shows almost all the respondents have heard about malaria. The main source of information was Health Extension Workers which indicate the strength of Health Extension Program.

In the present study, majority (80%) of the study participants mentioned malaria as a communicable disease. However, a considerable number (20%) of the study participants replied that malaria can be transmitted by drinking contaminated water. Thus, the knowledge level of respondents about the mode of malaria transmission is not satisfactory when it is compared to the findings of the previous studies conducted in Kishe settlement area, South West Ethiopia (*Adera, 2003*), in south western Nigeria (*Ako-Nai et al, 2012*), in Baringo Woreda, Kenya (*Munguti, 1998)*,and in a low endemic setting of Shewa Robit Town, northeastern Ethiopia (Abate *et al, 2013)*. This may be due to not addressing the community members' misconception about the mode of malaria transmission. So, a misconception about malaria transmission still exists. Increasing the knowledge about malaria transmission and benefits of using available preventive and control measures by the individual households and the community could contribute much to the overall reduction of the malaria burden.

The present study demonstrated that respondents had a good knowledge about malaria signs and symptoms. Majority of the respondents mentioned fever as the most common symptom of malaria which is in agreement with observations from other similar studies on Ethiopian rural community (*Deressa et al, 2003*),and in rural areas of Rajkot woreda, Gujarat-India (*Chovatiya et al, 2013*). This high level of awareness of the clinical features of malaria might be due to HEWs' frequent households visit .

5. Conclusions and Recommendations

Based on the findings of this study, it is evident that the primary health service facility coverage in the study area is well distributed. Frequent visit of households by HEWs to improve access and equity to preventive essential health interventions at the village and household levels are in line with the decentralization process to ensure health care coverage to the rural communities.

The overall knowledge of the study participants regarding Tuberculosis was not satisfactory. The results of this study revealed that the pariticipants had low level of knowledge about ways of disease transmission. Therefore, more attention needs to be given to improve study participants' knowledge regarding different ways of disease transmission.

The present study also assessed the overall study participants' knowledge towards the risk of HIV/AIDS and associated factors using community based cross-sectional study. The results indicate that the majority (92.7%) of study participants had good knowledge about HIV/AIDS. Despite the high level of knowledge, there are still misconceptions and speculation about HIV treatment. Thus, due consideration needs to be given to improve absence of effective treatment. Rather, the community needs to be more aware about the treatment role which significantly improved the possibility of living with HIV.

The participants' awareness about symptoms and preventive measures of malaria was high. Although HEWs are playing a scientific role on upgrading community's knowledge on disease prevention, the findings of this study revealed that study participants' overall knowledge about malaria remain unsatisfactory. A misconception about malaria transmission still exists. Furthermore, use of other preventive measures was low. Therefore, efforts need to be exerted to strengthen the existing overall knowledge of the target community about malaria, especially on its mode of transmission, proper handling and effective use malaria bed nets.

6. Acknowledgments

We would like to acknowledge the study participants. The study was financially supported by Haramaya University, Office of Research Affairs.

Conflict of interest

The authors declare that they have no competing interests.

Authors' contributions

Ayichew Seyoum designed the study, participated in data collection, analysis and drafted the manuscript.
Kedir Urgessa participated in study design, analysis, write-up and critically revised the manuscript.
Tesfaye Gobena participated in study design, analysis, write-up and critically revised the manuscript.
All authors read and approved the final manuscript AS is the guarantor of the paper.

7. References

Abate A, Degarege A, Erko B. 2013. Community knowledge, attitude and practice about malaria in a low endemic setting of Shewa Robit Town, northeastern Ethiopia. *BMC Public Health* 13:312.

Abebe A and Mitikie G. 2009.: Perception of high school students towards voluntary HIV counseling and testing, using health belief model in Butajira, SNNPR. *Ethiopian Journal of Health Development* 23:148-153.

Abebe, G., Deribew A, Apers L, Woldemichael K, Shifa J, Tesfaye M. 2010. Awareness, healthcare seeking behavior and perceived stigma towards tuberculosis among tuberculosis suspects in a rural community in Southwest Ethiopia.*PLoS One* 5:10.

Adedotun, A., Morenikeji O, Odaibo. 2010. A Knowledge, attitudes and practices about malaria in an urban community in south-western Nigeria. *Journal of Vector Borne Diseases* 47:155-9.

Adera, D. 2003. Beliefs and traditional treatment of malaria in Kishe settlement area, South West Ethiopia. *Ethiopian Medical Journal* 41:25–34.

Adongo, PB, Kirkwood B, Kendall C. 2005. How local community knowledge about malaria affects insecticide treated net use in northern Ghana. *Tropical Medicine and InternationalHealth* 10:366-78.

Ako-Nai, K and Adesiyan M. 2012. Unusually High prevalence of malaria in a tertiary institution setting in south westernNigeria *International J Med* 2012; 7:121-9.

Alula, S.2008. The implementation of Ethiopia's Health Extension Program: An overview Ethiopia's good practice: Health Extension Program.Addis Ababa.

Ayichew, S. and Mengistu L. 2013. Knowledge of tuberculosis (TB) and human immunodeficiency virus (HIV) and perception about provider initiated HIV testing and counselling among TB patients attending health facilities in Harar town, Eastern Ethiopia.*BMC Public Health* 13:124.

CSA (Central Statistical Agency of Ethiopia). 2007.

Chovatiya, S., Gajera N, Soni V. 2013. People's perception on malaria: A case study in rural areas of Rajkot District, *Gujarat-India International Journal of Health Science* 2:1 – 5.

Christina, M., Domingo B, Ong-lim A. 2009. A Descriptive study of the knowledge, attitudes and practices on tuberculosis among treatment partners of pediatric patients in Tarlac.*PIDSP* 10:2-4.

Deressa, W., Ali A, Enquoselassie F. 2003. Knowledge, attitude and practice about Malaria the mosquito and antimalarial drugs in a rural community. *Ethiopian Journal of Health Development* 17:99 - 104.

FMOH(Federal Ministry of Health). 2010. Ethiopia's fourth national health accounts, 2007/2008 Addis Ababa.

Gemeda, A., Amare D., Ludwig A., Kifle W., Jaffer S., Markos T. 2010. Knowledge, health seeking behavior and perceived stigma towards tuberculosis among tuberculosis suspects in a Rural Community in Southwest Ethiopia.*PLOSE ONE*.

Hailom, B. 2011. Ethiopia's Health Extension Program: Improving Health through Community Involvement. The Scientific Electronic Library Online, 2011.

Hashim, D., Kubaisy W, Dulayme A. 2003. Knowledge, attitudes and practices survey among health care workers and tuberculosis patients in Iraq.*East Mediterranean Health Journal* 9:721-722.

Iriemenam, N., Dosunmu A, Oyibo W, Fagbenro-Beyioku. 2011. A Knowledge, attitude, perception of malaria and evaluation of malaria parasitaemia among pregnant women attending antenatal care clinic in metropolitan Lagos, Nigeria. *Journal of Vector Borne Diseases*48: 12 - 7.

Jango B., Mengistu L and Girmay M. 2013. Community's knowledge, attitudes and practices about tuberculosis in Itang Special Woreda, Gambella Region, South Western Ethiopia.*BMC Public Health* 13:734.

Koay, TK. 2004. Knowledge and attitudes towards tuberculosis among the people living in Kudat Woreda, Sabah Med J Malaysia 2004, 59:1-2.

Legesse M., Ameni G., Mamo G., Medhin G., Shawel D., Bjune G., Abebe F. 2010. Knowledge and perception of pulmonary tuberculosis in pastoral communities in the middle and lower Awash Valley of Afar region, Ethiopia.*BMC Public Health* 10:187.

Maa, W., Detelsb R., Fengb Y., Wua Z., Shenc L., Lic Y. 2007. Acceptance of and barriers to voluntary HIV counselling and testing among adults in Guizhou province, China.*AIDS* 21(Suppl 8): 129 - 135.

Mazigo, H., Obasy E, Mauka W, Manyiri P, Zinga M, Kweka E . 2010. Knowledge, attitudes, and practices about malaria and its control in rural northwest Tanzania. *Malar Res Treat* 2010: 794261.

Mengiste, M., Tesfay W, Israel G, Girmai WM, and Madeley J.2005. Community knowledge, attitudes and practices on pulmonary tuberculosis and their choice of treatment supervisor in Tigray, northern Ethiopia Ethiopian.*Journal of Health Development*.

Mesfin, M., Tasew W, Tareke G, Mulugeta W, RichardJ. 2005. Community knowledge, attitudes and practices on pulmonary tuberculosis and their choice of treatment supervisor inTigray, northern Ethiopia. *Ethiop Journal of Health Development* 19:25.

Munguti, J. 1998. Community perceptions and treatment seeking for malaria in Baringo Woreda, Kenya: Implications for disease control. *East African Medical Journal* 75: 687 - 91.

Solomon,GS. Tewodros E, Girum A, Girmay M, Getahun A. 2003. Disease-related knowledge and practices of tuberculosis patients. *Ethiopian journal of Health Sciences*.

Umair, M., Ubeera M, Hussain S, Abdullah M, Saeed A, Omer F *et al.* 2011. Urban–rural inequities in knowledge, attitudes and practices regarding tuberculosis in two districts of Pakistan's Punjab province. *BMC International Journal Equity in Health* 10:8.

Wang, J., Fei1 Y, Shen H, Biaoxu B. 2008. Gender difference in knowledge of tuberculosis and associated health-care seeking behaviors: rural area of China. *BMC Public Health* 8:354.

Yimer, S, Hansen CH, Yimaldu T, Bjune G: 2009. Health care seeking among pulmonary tuberculosis suspects and patients in rural Ethiopia: a community-based study.*BMC Public Health* 9:454.

4. Trend Analysis of Causes of Admissions and Mortality at Hiwot Fana Specialized University Hospital

Bekele Belayihun[1] , Negga Baraki [2], Yadeta Dessise[1]

[1]Department of Public Health, College of Health and Medical Science, Haramaya University, Haramaya, Ethiopia
[2]Department of Environmental Health, College of Health and Medical Science, Haramaya University, Haramaya, Ethiopia

Abstract:
The decision to admit patients to hospital wards is determined by age, co-existing illness (co-morbidity), physical and laboratory findings, the ability of the patient to comply reliably with an oral medication, and the resources availability of the patient outside the hospital. The overall objective of this study was to analyze the cause of admissions and mortality in Hiwot Fana Specialized University Hospital in ten retrospective years. The collected data were entered into Epi data and analyzed using SPSS version 16. This data were next examined with time series analysis that used morbidity and mortality cases as the main outcome.

In the period 1994-2003 there were 28,297 total hospital admissions reported in different cause. The common cases of admissions were pneumonia, soft tissue injury, and single spouts delivery over ten years.The median number of in-patients admitted in years 1994-2003 E.C.was about 193 per year. The major cause of death over ten years record was also pneumonia, malaria, soft tissue injury and malaria. Number of deaths per year had a decreasing trend from 1994 to 2003. The median number of deaths per ten years was 155 and the overall mortality ratio was 43.3%. Mortality Ratio has shown statistically significant change during the study period. The association between cause of admission and mortality was statistically significanct. Cause of admission increased but reduced mortality rate over ten years.

The findings of this study can be used as stepping stones for further in-depth investigations to know the causes of admission and mortality in area. The study can also given information (clues) about the burden of diseases in the community. Furthermore, the study can give insight about the most frequent and severe forms of illnesses to those health workers who are working in the area.

1. Introduction

The decision to admit patients to hospital wards is determined by age, co-existing illness (co-morbidity), physical and laboratory findings, the ability of the patient to comply reliably with an oral medication, and the resources availability of the patient outside the hospital(1). Disease distribution is a function of several factors that influence its occurrence(2) . The most important elements which are necessary for occurrence of disease transmission are existence of susceptible population, disease causing organism and means of transmission. Any change in the magnitude of these agents affects the prevalence or incidence of diseases in the community.

The emergence of new pathogens and implementation of health promoting intervention programs that influence human behavior are also important factors that affect the transmission of disease. It is becoming widely accepted that non-communicable or chronic diseases are also now the major causes of death and disability in low- and middle-income countries (3, 4, 5). Moreover, health care to prevent and control these diseases is expensive and unavailable, and the inhabitants are increasingly exposed to risk factors(6, 7). In developed countries, non-communicable diseases namely cardiovascular diseases are the main reasons for cause of admissions. However, in cities and towns of developing countries, the increasing urbanization and westernization of the population is changing the morbidity pattern of disease(8, 9,10). In particular, smoking is increasing in underdeveloped countries. Whereas, according to a study done in South Africa in 2006, admissions to the medical wards constituted 40% of the total hospital admissions(12). Other studies done in the developing countries revealed that causes of admissions were mostly associated with the circulatory system followed by respiratory and infectious diseases(11). Referral hospitals are the most important focal point for disease-specific health promotion and education(13). Most of the routine disease epidemiology relies on reports of notifiable disease.

In most developing countries, notifiable diseases are under-reported and the data are usually based on case reports. Even though review of records of referral hospital admissions may not indicate the actual prevalence of diseases in the community, it would provide clues about the changing pattern of diseases affecting the community .

Ethiopia is one of the developing and poorest countries in the world. It is experiencing recurrent problems as a result of droughts and conflicts. The incidence of certain diseases increases during droughts. The main diseases most commonly encountered are: malaria, diarrhea, and intestinal helminthiasis, acute respiratory infections including pneumonia, tuberculosis and skin diseases. Outbreaks of meningitis, measles and diarrhoeal diseases including cholera are also common during droughts. Unfortunately, data on the specific diseases that indicate reasons for hospital admission in Ethiopia and their outcomes are scarce, and also the reporting system in Ethiopia is not satisfactory enough to produce good quality information(14, 15).

Analysis of causes of hospital admissions and mortality would be helpful to identify the major cause of hospital admissions and mortality, and to fill the information gaps on disease epidemiology that exist in the routine disease reporting system not only in Ethiopia but also in the region.

This study was conducted in Hiwot Fana Specialized University Hospital because the physician consultation and treatment cost of this hospital is affordable to most people in the city as compared to private clinics (serves). In addition, the admission departments of the Hospital serves all patients from all corners of the city, surrounding woredas in the region, and neighboring regions without requesting any referral papers.

Findings of the study would give sound information if there is any change in disease distribution in the past ten years. The findings can also be used as stepping stones for further in-depth investigations to know causes of admission and mortality in area and they would give information (clues) on the burden of diseases in the community. So, the findings of the study would give insight to health workers practising in the area to know the most frequent and severe forms of illnesses and to other stakeholders on the extent of the problems and the associated factors of morbidity and mortality. Thus, the study was onward plausible line of attack to improve the intervention program. The results were helpful for health policy makers and planners to utilize the findings to undertake public health measures against common and serious diseases responsible for hospitalization in the region.

Therefore, these studies were attempted to determine the relationship between the reasons for admission and socio-demographic variables such as sex, age and also cause of mortality. The overall objective of this study was to analyze the cause of admissions and mortality in Hiwot Fana Specialized University Hospital in ten retrospective years. Hence, the specific objectives of this research were to investigate the yearly trends for causes of admissions and mortality in hospitalized patients and identify the major causes of admission and mortality of ten top diseases over the years.

2. Method and Materials

2.1. Study Area and Period

Harari National Regional State is one of the regional states of Federal Democratic Republic of Ethiopia. It is located at East part of Ethiopia at distance of 515 km from Addis Ababa. It is neighbored to the north with Kombolcha and Jarso, to the east with Gursum and Babile Weredas, in the south Fedis and in the west with Haramaya Woreda of the Oromia Regional State. The total area of the region is estimated to be 340 sqkms, of which the share of the urban areas is 6% and that of the rural area accounts for 94% of the total estimated area of the region According to health and health indicator of 1999, the total population of the region was 209,000, of which 54% are urban dwellers while the rest dwell in the rural part of the region. According to the Harari Regional Health Bureau report, the health service coverage is estimated to be above 100%. There are 6 Hospitals (2 military, 1 private, 1 NGO and 2 governmental) , 6 health centers and 23 health posts (HP), of which 17 health posts are found in rural areas of the region. The study was conducted in Hiwot Fana Specialized University Hospital, which is one of the region's referral hospitals. Actually, the population that seek health services from this hospital are not limited to the region, but people who come from nearby regions like Oromia and Somali National Regional States get health services from this hospital. The study was conducted from November 2011-January 2012 .

2.2. Study Design

The study followed the time-series type of study design based on the review of inpatient reports of cause of admission and mortality in Hiwot Fana Specialized University Hospital.

2.2.1. Population

Source population

All statistics on cause of admission and mortality was obtained from four admission wards at Hiwot Fana Specialized University Hospital.

2.2.2. Study population

Top-ten statistics records of patients' cause of admissions and mortality in the surgery, medical, gynecology and obstetrics as well as pediatrics wards from 1994-2003 E C were included in the study.

Inclusion criteria: All the admitted patients' cause of admission and mortality statistics data in the hospital was included.

Exclusion Criteria: Statistical records that have missing values for many of the interest variables were excluded.

2.3. Study Variables

Dependent variables : Morbidity and Morality

Independent variables :Socio demographic characteristics: sex, age, time series and causes of admission and mortality that affect the outcome variables were taken as independent variables.

2.4. Sample Size Determination

The research intends to include top ten causes of admissions in the specified four wards of the hospital in the specified period of time.

2.5. Sampling Technique

Census type data collection was applied.The ward inpatient reports at four wards were identified for the years from 1994 to 2003 EC. Each admission and mortality in the reports was recorded on a tally sheet indicating the months of admission and mortality, Becides, it also shows whether or not an admission diagnosis of causes had been defined for the patient.

2.6. Data Collection Procedures

2.6.1. Data collection instrument

Spreadsheet paper as an instrument for the data collection was used to document of all the causes and mortality.The spreadsheet primarily constituted important socio-demographic characteristics (age, sex), monthly admission diagnosis and death (causes of admission, causes of mortality and other related variables).

2.7. Data Collection

The data were collected from secondary sources of information from Hiwot Fana Specialized University Hospital. Data were collected from four wards (sources) in order to comprehensively get the possible data. The data sources of the four wards were only monthly reports from the hospital or copies in the regional Health Office.There were 10 data collectors and two supervisors. Two-day training was given to the data collectors by the principal investigators on the methods of recording the spreadsheet used for the study . In addition to training the data collectors, the principal investigators supervised the overall activities.

2.8. Data Quality Assurance

It is clearly known that the problem with such report for research poses difficulty in lack of reliable documentations. To assure the quality of data, different mechanisms were developed. In order to minimize and maximize the quality of the data, an intensive training was given for all data collectors and supervisors to ensure reliability of the data; data was triangulated from the monthly reports of the hospital or regional health office.. The principal investigator supervised continuously the data collectors and 10% of the records were crosschecked against hospital medical reports. Data entry software including Epi data version 31 was used for double data entry which helps to validate the entered data.

2.9. Data Management and Statistical Analysis

Data was entered into Epi data version 31. The data was analyzed using Statistical Package for Social Sciences (SPSS) version 16. They would be examined with time series analysis that used morbidity and mortality cases as the main outcome. There are two main goals of trend analysis (a) identifying the nature of the phenomenon represented by the sequence of observations, and (b) forecasting (predicting) future values of the trend variable. Both of these goals require that the pattern of observed time series data is identified and more or less formally described. A P-value of < 005 is considered significant.

2.10. Ethical Consideration

Ethical clearance was obtained from the Haramaya University College of Health Sciences, Ethical Clearance Committee, and permission was secured from the hospital administration at all levels, before the start of the study.

2.11. Limitation

A serious limitation of such retrospective reviews based on hospital reports are that data were often incomplete, entries not standardized and potentially misleading because of lack of appropriate denominators for a meaningful interpretation. A single registered case may not be found in the list of causes of admission.There is no any factor of admission and mortality record in the record sheet.

3. Result and Discussion

3.1. Results

In the period 1994-2003 there were 28,297 total hospital admissions reported in different cause. The maximum admitted record over ten year was in 2003, 37% from the total record. Similarly, maximum mortalities were recorded in the same year. The common causes of admission over ten years were pneumonia which was followed by soft tissue injury; the third cause was single spouts delivery .The minimum record over ten years occurred in 1994. The median number of inpatients admitted in years 1994-2003 EC was about 193 per year. The minimum and maximum number of deaths reported from 1994 and 2003 EC was 6 and 75 , respectively. The major causes of death over ten years record were pneumonia, malaria, soft tissue injury and malaria. Number of deaths per year had a decreasing trend from 1994 to 2003. The median number of deaths per ten years was 155 and the overall mortality ratio was 43.3%.

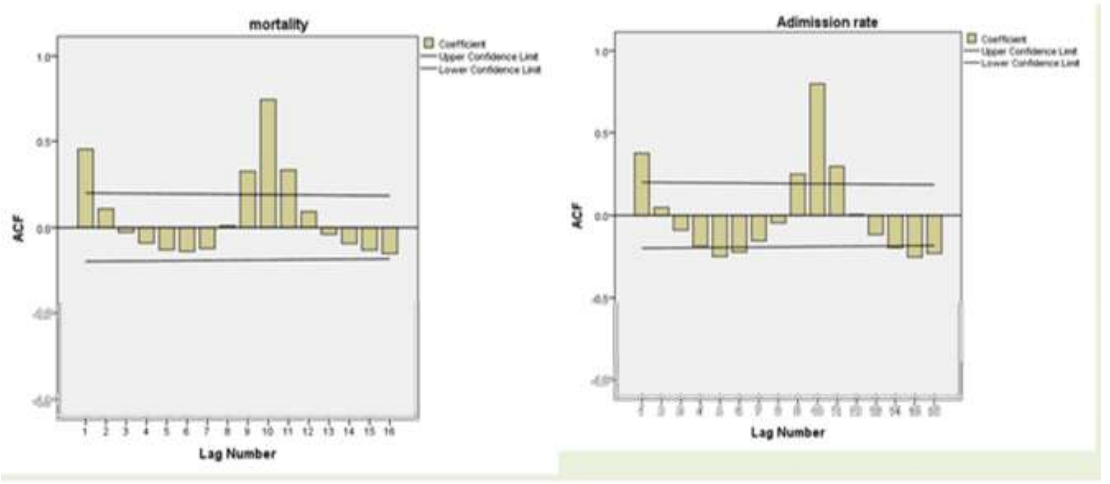


Fig 1: Autocorrelation result

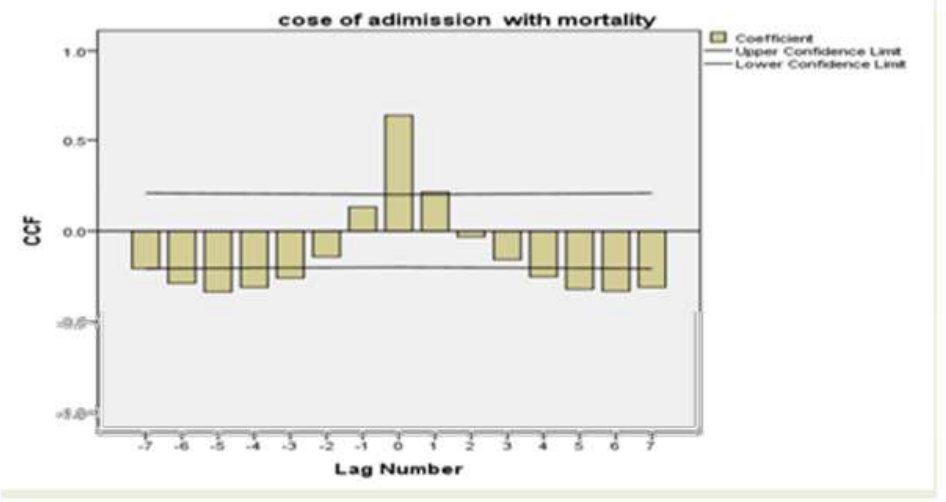


Fig 2: Crosse correlation among admission with mortality

The association between cause of admission and mortality is negatively correlated. In this study, the cause of admission increased in years because the admission criteria were not properly followed, however; the mortality rate decreased. This indicates over the year diagnostics and treatment outcome increased or it may be because deaths were not registered appropriately with the cause of death. The series exhibits a smooth downward trendin mortality but upward trend in admission with no hint of seasonal variations. There might be individual series with seasonality, but it appears that seasonality is not a prominent feature of the data in general.As the cause of admission increased over the years, the mortality rate decreased.

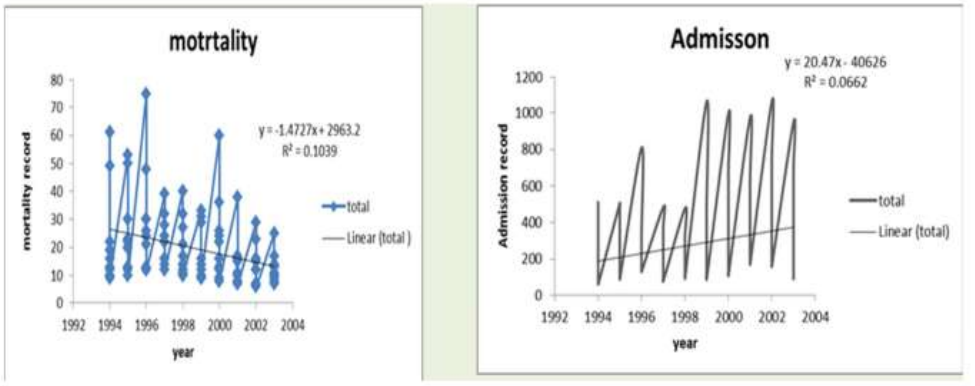


Fig 3: trend of mortality and cause of admission

Sta tistical model shows the association between cause of admission and mortality over ten year's record was significantly associated (P=0000). The coefficient of determination shows the cause of admission determine mortality rate (R 2 =041) but the determination skill was not positively associated.

Model Statistics

Model	MAPE	MAE	RMSE	Model Fit statistics		Ljung-Box Q(18)		
				MaxAE	Stationary R-squared	Statistics	DF	Sig.
mortality - Model_1	41.889	7.387	10.128	35.579	.416	262.234	18	.000

associated.

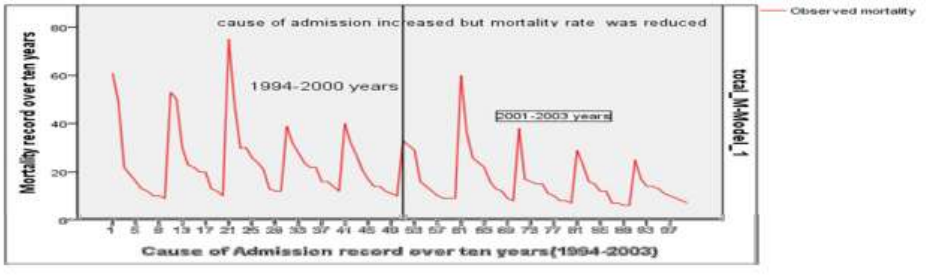


Fig 4: trend of mortality with independent of admission

3.2. Discussions

Mortality and Admission: There was generally a decreasing trend of all mortality cause during the study period. As indicated in the results section, all mortality cause rate have not shown a statistically significant decrease between 1994 and 2000 EC. This finding is a result of confidence intervals comparison that depends on the sample size considered. However, in cities and towns of developing countries, the increasing urbanization and westernization of the population is changing the mortality pattern of diseases. Health service coverage indicators had shown the highest increment during the study period. This could possibly be due to the several well-coordinated immunization campaigns coordinated among the ministry of health, World Health Organization, UNICEF and other governmental and non-governmental stakeholders. These were in line with the Health policy directions of the Ethiopian government.

In our study, non-communicable diseases were identified as the main reasons for admission and mortality; there is high prevalence admission of pneumonia and single spout delivery. Pneumonia and malaria were the major cause of mortality. Similar studies conducted in Nigeria in 2007 indicated that the major cause of admission and mortality in Nageria was non-communicable disease; there was a high prevalence hypertension, tuberculosis and diabetes mellitus with their related complications are the non- communicable disease indications for medical admission and mortality. Other simmilar studies conducted in Canada (2001) showed that pneumonia was the major cause of admisson but not the major cause of mortality in Canada. This study contradicts with the result of our study because the Canadian study was conducted only on HIV postive patients .

The mean mortality rate of Hiwot Fana Hospital over ten years was 195. A study conducted in Tikur Anbessa Hospital, Addis Ababa in 2007 showed that the overall mortality rate was 143. In this study, pneumonia was an important cause of death. A similar study in Eldoret, north-western Kenya (Menge *etal*., 1995) found pneumonia as the second most common cause of pediatric admissions to the district hospital. Other similar studies on analysis of one year experience of pediatric observation unit in Korea in 2007 showed that pneumonia was the most common

disease requiring admission (17%). Our study contradicted with the findings of the above similar studies because our study focused on all patients in four ward departments but the above studies focused on only pediatric department patients.

4. Conclusions and Recommendation

Based on the findings of the study, the following conclusionswere made. Out of the mortality causes considered in this study, only mortality ratio shown a statistically significant change during the study period. Though statistical significance differs from practical significance, it indicated the need to decrease the mortality cause to a greater extent. Pneumonia was the leading cause of mortality over ten years. In this study mortality has shown a remarkable reducing trend. This indicates that the health service coverage had improved during the study period. There is no single "standard" measurement of health status for individuals or population groups in Hiwot Fana Hospital.

Individual health status may be measured by an observer who performs an examination and rates the individual along any of several dimensions, including presence or absence of life-threatening illness, risk factors for premature death, severity of disease, and overall health. Therefore, the responsible body of the Hospital should give infancies to patient data record and storing the cause of admission and mortality with different risk factors and also give training on the importance of data to make right decision.

5. References

Braunwald, E., Fauci, A. S., Hauser LS, Longo LD, Jameson J. L. *Harrison's Principles of Internal Medicine 17th ed*ition.McGraw-Hill,New York, USA.

Dagnew, M, Damte S and Daniel B, 2007 Analysis of admissions to the pediatric emergency ward of Tikur Anbessa Hospital in Addis Ababa, Ethiopia, *Ethiop Journal of Health Dev* 21 (1): 48 - 52.

Johan, Giesecke, 1994 Modern infectious disease epidemiology,1 - 19

Mandell, LA and Wunderink R. 2008. Community-Acquired Pneumonia: Treatment, Site of Care In: Kasper LD.

Menge, I, Esamai F, Van Reken D, Anabwani G. 1995. Pediatric morbidity and morality at the Eldoret District Hospital., Kenya *E Afr Med J* 72 (3): 165 - 169.

Miranda, J. J. and Patel, V. 2005. Achieving the Millennium Development Goals: Does Mental Health play a Role? PLos Medicine 2(10): e291.

Perel, P., Casas JP, Ortiz Z and Miranda JJ. 2006. Non communicable diseases and injuries in Latin America and the Caribbean Time for Action. *PLos Medicane* 3 (9): 344.

USAIDS. 2002. Report on the global HIV/AIDS epidemic.Geneve, Available at P45(http://wwwunaidsorg).

Valleron, A.J. 2008. .Mortality and morbidity worldwide, now and tomorrow: what is known? CR Biol Dec; 331 (12): 991 - 1006.

WHO. 2000. Management of the child with a serious infection or severe malnutrition GENEVA.

WHO. 2005. Preventing Chronic Diseases: A vital investment WHO Global Report Geneva: World Health Organization.

5. Factors Affecting Utilization of Maternal Health Care Services in Kombolcha District, Eastern Hararghe Zone, Oromia Regional State, Eastern Ethiopia

Desalew Zelalem[1]*, Bekele Belayihun[1], Kedir Teji[2], Desalegn Admasu[3]

[1]Department of Public Health, College of Health and Medical Science, Haramaya University, Haramaya, Ethiopia
[2] School fo Nursing and Midwifery, College of Health and Medical Science, Haramaya University, Haramaya, Ethiopia
[3]Department of Medical Laboratory Science, College of Health and Medical Science, Haramaya University, Haramaya, Ethiopia

Abstract

World Health Organization estimates that more than half a million women loss their lives in the process of reproduction worldwide every year. Most of these mortalities are avoidable if mothers have access to maternal health care services. The study was conducted with objectives of determining the prevalence of utilization of maternal health care services and identifying factors affecting it.

A community based cross-sectional survey was conducted in six kebeles of Kombolcha district. A total of 495 women of reproductive age participated in the study and the selection of them was made using simple random sampling technique. Data was collected using an structured interviewer. and analyzed using SPSS version16.

A total of 495 women were included in this study and from these women, about 86.1% had at least one ANC visit during their last pregnancy. About 61.7% of mothers had less than four visits which is less than the recommended one and 46.2% started it in the second trimester. Only 25.3% of respondents gave birth in health institutions and rural women were less likely to use institutional delivery- 20.9% compared to urban women 35.9%.

Institutional delivery is very low in the study area. Thus, more efforts should be made to educate the society in general and mothers in particular. More effort should also be exerted to strengthen community participation and increase the accessibility of maternal health care services to the rural community. Moreover, concerned government and non-governmental organizations should provide to the community accurate information about the services provided in the health institutions.

1. Introduction

Child bearing is one of the hazardous experiences that women engage in while bringing new life to this world. It is often associated with complications that may cause morbidities, disabilities and mortalities. World Health Organization (WHO) estimates that more than half a million women loss their lives in the process of reproduction worldwide every year; of these deaths, about 99 percent are from developing countries. The share of Sub-Saharan Africa from the total death toll for developing countries is more than fifty percent and life time risk of dying from pregnancy is extremely high, i.e., for every 26 mothers, one mother dies as a result of pregnancy and child birth in Sub-Saharan Africa. This frequency is about 281 times more than the maternal death in more developed countries, where one every 7300 mothers dies as a result of pregnancy and child birth(WHO, 2007).

In addition to the risk of dying during pregnancy and child birth, many more women suffer from short and long term maternal disabilities and illness. According to WHO (2001), for every maternal death, an estimated 30 to 50 women suffer pregnancy related health problems such as vesico-vaginal fistulae, infertility, and depression that can be permanently debilitating (WHO, 2011).

Globally, more than 70% of maternal deaths are due to five major complications (which are direct obstetric complications): hemorrhage (25%), infection (15%), and complication of unsafe abortion (13%), hypertension (12%), and obstructed labor (8%). This complication can occur at any time during pregnancy and child birth, often without forewarding and often requiring immediate access to emergency obstetric care for their management (SMTCR, 1997). The World Bank estimates that 74% of maternal deaths could be averted if all women had access to interventions that address complications of pregnancy and child birth, especially emergency obstetric care (Adam W., & Mariam C, 2004). Similarly, studies that focused on maternal morbidity and mortality in developing countries have repeatedly recommended the need for antenatal care and availability of trained personnel to attend women during labor and delivery (FCI & SMIAG, 1998). ANC provides avenue to provide pregnant women with information, treat existing social and medical conditions and screen for risk factors. However, it is not enough to receive ANC, since majority of the fatal complications occur during or shortly after delivery. It is, therefore, important that pregnant women have skilled obstetric attendance during delivery. However utilization of these services in most developing countries is constrained due to various cultural, socio-economic and demographic factors (Addai I, 2000). As the result, disparities between developed and developing countries in terms of utilization of antenatal, delivery and postnatal services are unfairly large. In developed countries, it is estimated that about 97% of the pregnant women receive ANC and 99percent use skilled obstetric service at delivery. Where as in developing countries only 65% and 53% of women use ANC and skilled obstetric care services, respectively (FCI, 2002).

Ethiopia is one of the Sub-Saharan African countries that experience the highest maternal mortality ratios in the world, i.e., 673 per 100,000 live births and more than fourteen thousand mothers die as the result of pregnancy and related causes each year (CSA, 2006). In addition, more than 400,000 suffer long term disabilities due to complications during pregnancy, delivery or postpartum periods. The use of ANC, delivery and postnatal services by Ethiopian women is one of the lowest in the world. Almost all births take place at home in Ethiopia (94%) with only six percent of women delivering in heath institutions. The majority of the births are assisted by relatives or some other untrained person.

Attendance of prenatal care is very low; only 28 % of all Ethiopian mothers received pre-natal care from a trained heath professional. The quality and frequency of this care is variable; many women receive the care either too late in their pregnancy or too few times (CSA, 2006).
Most maternal mortalities and disabilities in the country are due to direct obstetric complications, which are avoidable if women can get adequate and timely antenatal, delivery and post-delivery services. The major causes of maternal death are abortion (32percent), obstructed labor (22%), hypertension (9%), sepsis (12%), haemorrhage (10%), and others (15%) (MOH, 2003). Reducing maternal morbidities and mortalities is the issue that is given due attention by Ethiopia. The Ethiopian government is among the first African governments that made a strong commitment to the United Nations inspired Millennium Development Goals (MDGs) by making one of the MDG targets, maternal health, central to its national development strategy, i.e., reducing maternal mortality by three quarters between 1990 and 2015, which would mean reducing to 250/100,000 livebirths by 2015 from the 1990 estimate of 990 (FRDE/MOFED, 2008, WHO, 2010). However, in spite of the concerted efforts of the Ethiopian government, the level of maternal mortality is not reduced as desired. The 2011 EDHS for instance estimates the maternal mortality to be 676 maternal deaths per 100,000 livebirths (CSA, 2012). Similarly utilization of maternal health care services are not improved to the expected level. Regional variations in terms of the level of utilizing maternal health care services are very high and these regional variations and their determinants are not well examined in the country.

The situation of maternal health care utilization in Oromia national regional state in which the current research is done is low even compared to the national level. The 2005 EDHS shows that the proportion of mothers who received ANC, delivered at health institutions, delivered with assistance of health professionals, and made postnatal checkup was 24.8, 4.3, 4.8 and 4.5percents, respectively for Oromia national regional state while it was 27.6, 5.3, 6.0, and 5.5percents, respectively for the country as a whole (CSA, 2006). Moreover utilization of maternal health care services was lower for Oromia national regional state compared to other regions in the country. For example the use of both delivery and post-natal care services was lower for Oromia region compared to Addis Ababa, Gambella, Harari and Dire Dawa regions. The use of antenatal care was higher for urban women (69percent) than their counterparts in rural areas (23.7%)(CSA, 2006). In general, the variations in utilizing maternal health care services and factors affecting its utilization varied by geographic area, socio-economic and cultural settings in the country which calls for investigation of area and culture specific determinants of maternal health care utilization. However, the magnitude of utilization of maternal health care services and factors affecting it are not investigated in Eastern hararghe zone in general and Kombolcha district in particular while this part of the country has its own peculiar geographic, socio-economic, and cultural setting which might affect utilization of these services. Studies trying to explore factors affecting utilization of maternal health care services in eastern hararghe zone in general and Kombolcha district in particular are very scanty and it is this knowledge gap that lead us to initiate this study. Thus identifying factors specific to each area so as to identify area specific measures that can help minimize the hinderants is very crucial. The purpose of this research was therefore to identify the major factors that influence the utilization of maternal health care services in Kombolcha district, eastern hararghe zone, oromia regional state.

Studies have been done to explore the determinants of maternal health care services utilization in the country. These studies have shown that different factors affect maternal health care service utilization in the country. However, these factors vary across geographic areas, socio-economic and cultural settings. Thus, identifying factors peculiar to a given geographic area and socio-economic and cultural settings is crucial for understanding community level determinants of maternal health care service utilization. Moreover, this study tries to include variables that were not included in the previous studies. These variables include: women's knowledge about and attitude towards maternal health care services; availability and accessibility of maternal health care services; women's knowledge of risk factors associated to maternity; women's perception of quality of services; and cost of transportation and services.

The potential beneficiaries of the results of this study are the society in general and women and children in particular as the interventions made on maternal health care services improves the utilization of these services. Moreover, governmental and non-governmental organizations working on maternal and child health care may use the results of this study as an input in their planning for improving maternal and child health.The general objective of this study was to assess the factors that affect utilization of maternal health care services and to suggest relevant recommendations that enable the concerned bodies to design relevant intervention strategies in Kombolcha district. The study was conducted in June, 2012.

2. Methods and Materials

2.1. Study Area and Period

A community based cross-sectional study design that employed quantitative data collection method was carried out to assess factors affecting utilization of maternal health care services in June 2012 in Kombolcha district, Eastern Hararghe Zone of Eastern Ethiopia. Kombolcha district is one of the 19 districts in Eastern Hararghe zone. MelkaRafu, which is the zone's administrative city, is located at a distance of 18 kms from Harar town to the north direction. The district had 20 kebeles of which three were urban and 17 were rural [FEDO of East Hararghe zone, 2010]. In 2007/2008 the total population of the district was 104,248 of which about 51% were males while 49% were females. In 2007/2008 there were 13 clinics, 11 health posts, one health center and one drug shop. The health coverage of the district was about 86% (FEDO of East Hararghe zone, 2010).

2.2. Study Population

The study populations were women of reproductive age (15-49years) who gave at least one live birth in the five years prior to the survey date and who were the permanent residents of the district.

2.3. Sample Size and Sampling Technique

The sample size was determined using the formula of Cochran $n=Z^2PQ/d^2$(Cochran WG, 1977). Thus taking the prevalence of one of the major parameters in this study, i.e., antenatal care utilization, which was 24.8 percent (0.25) for Oromiya Regional State (CSA, 2006) the sample size was determined. The estimate of the sample in this study was desired to be precise at confidence level of 95% and margin of error of four percent (d). Then, using the formula $n=Z^2PQ/d^2$, the sample was determined to be: $(1.96)^2(0.25)\ (0.75)/\ (0.04)^2 = 450$. Adding 10% allowance for non-response, the total sample size was determined to be 495. To identify the study units, the district was first stratified into urban and rural areas and one urban and five rural kebeles were selected from the district using simple random sampling technique. Then, lists of eligible women who live in the selected Kebeles were obtained from kebele health extension workers registration books. A probability sample proportional to the population size technique was used to determine the number of respondents that were selected from each Kebele. Finally, the respondents included in the study from each Kebele were identified by using simple random sampling technique.

2.4. Data Collection Instrument and Method

The questionnaire was adapted from Ethiopian Demographic and Health Survey English version. It was further developed after reviewing of relevant literatures that address the objectives of the study. After extensive revision, the final version of the English questionnaire was developed and translated to the local language, i.e., Affaan Oromo to make the communication between the data collectors and respondents easy. Pre-testing of the questionnaire was made in rural kebele adjacent to the study area, i.e., Haramaya kebele which has similar socio-demographic setting with the study population. Based on the feedback obtained from pre-testing, further refinement of the questionnaire was made. Ten data collectors who completed minimum of grade ten and can speak local language and two nurses with diploma for supervision were recruited, trained, and assigned as data collectors and supervisors, respectively. In collecting the data a face-to-face interview technique was used.

2.5. Study Variables

The outcome variables in this study are antenatal and delivery care services utilization for which the categories are either use or non-use of the services. The independent variables were categorized into demographic which included age of women and their husbands, marital status and place of residence, and socio-economic condictions which include education, occupation, and religion of women and their husbands as well as women's knowledge/attitude towards maternal health care services, availability and accessibility of maternal health care services, women's perception of quality of services, and cost of transportation and services.

2.6. Data Analysis

The data was entered using EpiInfo Version 3.51 and finally was exported into SPSS Version 16.0 for data analysis. Frequencies and summary statistics such as means, standard deviations, percentages, and ranges were computed to describe the study population in relation to relevant variables. The association and significance between the dependant and independent variables were measured using binary logistic regression analysis.

2.7. Ethical Considerations

The ethical clearance was obtained from Haramaya University, College of Health sciences Research Ethics Review Committee. The survey was commenced after obtaining permission from Eastern Hararge Zonal Health Department and District council. Informed verbal consent was obtained from each study subject. Each respondent was informed about the objective of the study and assurance of confidentiality.

3.Results

3.1 Socio-Economic Characteristics

A total of 495 women were included in this study to investigate the factors that influence utilization of maternal health care services. All of the respondents were Muslims in their religion, more than 95% of them were married, and more than 60% of them were housewives. The majority of respondents were illiterate (71.9%) and primary level (grades1 to 8) educated constituted 26.3%. Secondary and above level educated constituted less than two percent. The majority of respondents were in the age category from 20 to 34 which is the peak reproductive age category, and about 93.3% of the respondents lied in this age category. About 69.9% of the respondents had family members attending formal schools.

3.2 Maternal Related Factors

About 12.1 % of respondents ever experienced abortion/still birth. More than 95% of the respondents have access to health facility in their own kebele while only 1.8 %of respondents have no access to health facility in their own kebeles. About 86.1% of the respondents attended antenatal care (ANC) for their recent birth. Of these, 35.5% started attending ANC in the first trimester, 46.2% in the second trimester and the remaining 18.3% in the third trimester. Out of 426 mothers who received ANC for their recent pregnancy, 263 (61.7%) made less than four visits while 163 (38.3%) made four and more ANC visits during the course of their recent pregnancy. Only 25.3% of respondents gave birth in health institutions for their recent birth with the help of health professionals while majority (74.7%) of respondents gave birth at home without the help of health professionals. Rural women were less likely to use institutional delivery 20.9% as compared to urban women 35.9%.

Those women who delivered at home were asked why they preferred home. According to their responses the reasons were: easy labor 281

(75.9%), feel shame to go to health institutions 42(11.4%), distance of health facility 36(9.7%), other reasons 11(3.0%). Of those who gave birth at home, 255 (69.1%) were attended by TTBA's followed by neighbors, 103 (27.9%). The remaining 12 (3.0%) were attended by others.

Those women who delivered at health institution were asked why they prefer health institution. Their reasons were: feeling sick 32 (25.6%), due to received health education 37 (29.6%), to save mother's life 31 (24.8%), to get good service 15 (12.0%), no fee 6(4.8%), and other reasons 4 (3.2%).

Of those who gave birth at health institutions, 52(41.3%) were attended by midwifes, 34(27.0% were followed by nurses), 17(13.5%), were treated by medical doctors 4(3.2%), of the were seen by health extension workers 2 (1.6%) of them by health officers and 16 (13.5).of them stated they don't remember About 92.1% of husbands of respondents lied in the age category from 25 to 44years. The major occupation of husbands was farming (90.1%) and followed by merchant (7.3%) and the remaining occupations constitute less than three percent. The majority of husbands were illiterate (51.7%) or they got primary level (grades1 to 8) education (44.6%). Secondary and above level educated constituted less than four percent.

3.3. Factors Associated with Use of Maternal Health Services

The bivaraite analysis of factors affecting attendance of ANC indicated that age, education, , health education on maternity of women; presence of health facility in the kebele; family size of the household; history of abortion/still birth; means of transport to the nearest health facility; perception of women to the quality of maternal services; and rural-urban residence were found to be significant predictors of ANC utilization. On the other hand, the bi-variate analysis of factors affecting delivery at health institution indicated that level of education and occupation of women, , levelof education and occupation of husbands, , family member's/s' education, household family size, history of difficult labor, means of transport to the nearest health facility, women's perception of quality of maternal services and rural-urban residence to be significant predictors of utilization of institutional delivery.

Table 1. The result of logistic regression: The effect of demographic and socio-economic factors on the use of ANC services, 2012.

Characteristics	COR	Sig	AOR 95%CI	
			Lower	Upper
Age of respondent				
15_24*	1.452	0.669	0.262	8.033
25_39	5.440	0.034	1.133	26.113
40_49 (RC)	1			
Educ respondent				
Illiterate (RC)	1			
Primary & above	2.587	0.031	1.090	6.140
Health educ on maternal health				
Yes*	3.184	0.234	0.472	21.471
No (RC)	1			
Family size				
Below five children (RC)	1			
Five & above five children*	1.514	0.263	0.732	3.128
History of abortion/still birth				
Yes	13.536	0.000	5.673	32.297
No (RC)	1			
Means of transport to health institution				
Walk (RC)				
Vehicle*	2.718	0.070	0.922	8.013
Perception of quality of services				
Good/Very good	10.136	0.000	2.776	37.006
Bad/very bad (RC)	1			
Rural-urban residence				
Rural(RC)	1			
Urban	5.463	0.001	1.995	14.957

*RC: refers to reference categor, *These variables are insignificant at p≤ 0.05*

To examine the effect of the variables on ANC and institutional delivery utilization by controlling the confounders Two models were fitted, i.e., one for ANC utilization and one for institutional delivery. As the result, the variables such as age and education of mothers and perception of mothers to quality of maternal services provided, were found to be significant predictors of ANC utilization (see Table 1 for detail).

On the other hand, the results of logistic regression for institutional delivery showed that variables like occupation of mothers and their husbands, education of husbands, history of difficult labor were found to be significant predictors of institutional delivery (see Table 2 for detail).

Table 2. The result of logistic regression: The effect of demographic and socio-economic factors on the use of health institutions for delivery, 2012.

Characteristics	COR	Sig	AOR 95%CI	
			Lower	Upper
Occup. of respondent				
Farmer*	0.658	0.187	0.353	1.255
Merchant	4.171	0.001	1.762	9.874
House wife (RC)	1			
Educ. respondent				
Illiterate (RC)	1			
Primary & above*	1.024	0.939	0.562	1.865
Occup. husband				
Farmer (RC)	1			
Merchant	4.128	0.001	1.722	9.896
Others*	2.824	0.126	0.748	10.658
Educ. husband				
Illiterate (RC)	1			
Primary & above	1.704	0.038	1.031	2.819
Family member attend formal school				
Yes	1.909	0.012	1.151	3.165
No (RC)	1			
Family size				
Below five children (RC)	1			
Five & above five children*	1.244	0.452	0.704	2.198
History of difficult labour				
Yes	4.045	0.000	2.290	7.147
No (RC)	1			
Means of transport to health facility				
Walk (RC)	1			
Vehicle	2.644	0.028	1.109	6.305
Perception of quality of services				
Good/Very good	3.374	0.000	2.076	5.483
Bad/very bad (RC)	1			
Rural-urban residence				
Rural (RC)	1			
Urban*	2.230	0.063	0.957	5.198

*RC: refers to reference category *These variables are insignificant at p≤ 0.05*

3. Discussion

A total of 495 women were included in the study Of which, 86.1% had at least one ANC visit. From the total respondents, 61.7% of mothers had less than four visits and 46.2% of mothers started attending ANC in the second trimester. The finding differs from EDHS 2011 in which 34% of mothers received ANC from skilled providers for their recent births (CSA, 2012). This could be due to the fact that EDHS covered more remote areas. But, this finding is consistent to the findings of the study done by Zeine*et al* in Hadiya zone in 2009 in which 86.3% of women made at least one ANC visit during the course of their recent pregnancy (Zeine A*., et al*, 2010).

About 38.3% of the respondent mothers made four and more ANC visits which is higher than the national level in 2011 in which only 19% mothers made four and more ANC visits (CSA, 2012). Demographic and socio-economic variables such as age of women, education of women and their husbands, receiving health education on maternity, presence of health facility in the kebele, presence of family member/s who

has/have attended formal school, family size, history of abortion/still birth, history of difficult labor, means of transport, perception of quality of maternal services and rural-urban residence were found strongly related to maternal health care services utilization.

In this study education of women and their husbands remained strong predictor of maternal health care services utilization and these results are consistent to the findings elsewhere(Elo IT 1992; Shariff, Singh (2002) & Iyaniwura & Yussuf 2009). Women engaged in farming and merchant activities were more likely to use institutional delivery compared to housewives. Similarly, women married to merchants and others were more likely to use institutional delivery compared to women married to farmers. Mothers who previously experienced obstructed labor were found to be higher users of maternal health care services. This result is consistent to other studies (Mesfin *et al*, 2004). Similarly mothers who previously experienced abortion/still birth were better users of maternal health care services than mothers who did not. This could be because of the fact that mothers who had history of obstructed labour/abortion/still birth have practical experience about the dangers associated with pregnancy and child birth than those who did not and this could motivate them to receive ANC and give birth at health facility.

4. Conclusions

The study showed that a significant proportion of women in the study area are not using maternal health services, particularly institutional delivery. Those women with low level of education and married to husbands with low level of education, unemployed and married to farmers, whose family member/s do not attend formal school, who never experienced difficult labour, abortion/still birth, who use foot as means of transport, who perceived the quality services provided to be low quality and residing in rural areas were greatly disadvantaged in utilizing maternal health care services. Thus, improving education of the population in general and women and girls in particular and availing appropriate package of maternal services to the disadvantaged groups could be an appropriate strategy to utilize maternal health services in the area.

5. Acknowledgements

This research was funded by Haramaya University, College of Health and Medical Sciences. The researchers would like to acknowledge the University for the financial support to conduct this study. We would also like to thank the interviewers and study subjects without whom this study would not have been realized.

6. References

Adam W., and Mariam C. 2004. The Millennium Development Goals for Health: Rising to the Challenges .Washington, DC: World Bank.

Addai, I. 2000. Determinants of use of Maternal and Child health services in rural Ghana. *Journal of Biosocial science* 32 (1): 1 - 15.

Cochran, W. G. 1977. *Sampling Techniques*, 3rd edition. John Wiley & Sons, New York, USA.

CSA (Central Statistical Agency [Ethiopia]) and ICF International. 2012. Ethiopia Demographic and Health Survey 2011. Addis Ababa, Ethiopia and Calverton, Maryland, USA: Central Statistical Agency and ICF International.

CSA (Central Statistical Agency [Ethiopia]) and ORC Macro. 2006. Ethiopia Demographic and Health Survey 2005. Addis Ababa, Ethiopia and Calverton, Maryland, USA: Central Statistical Agency and ORC Macro.

Elo, IT .1992. 'Utilization of maternal health care services in Peru: the role of women's education', *Health Transition Review* 2, (1): 1-20.

FCI & SMIAG (Family Care International and the Safe Motherhood Inter Agency Group).1998. A comprehensive package of services for safe motherhood, New York.

FCI (Family Care International and the Safe Motherhood Inter Agency Group). 2002. Available at www.safemotherhood.org/facts_and_figures/initiative. html (Accessed on 20 June 2011)

FDRE/MOFED (Federal Democratic Republic of Ethiopia, Ministry of Finance and Economic Development). 2008. Ethiopia: Progress Towards Achieving the Millennium Development Goals: Successes, Challenges and Prospects. Addis Ababa: Development planning and Research department.

FEDO (Finance and Economic Development Office) of East Hararge zone. 2010. Physical and Socio-Economic Profile of East Hararge zone. Harar, Ethiopia (Unpublished document).

Iyaniwura, CA., and Yussuf, Q. 2009. Utilization of Antenatal care and Delivery services in Sagamu, southwestern Nigeria. *African Journal of Reproductive Health* 13, (3).

Mesfin N., Damen H., and Getnet M. 2004. Assessment of safe delivery service utilization among women of childbearing age in north Gondar Zone. *Ethiopian Journal of Health Development*, 18 (3): 14 - 152.

MOH (Ministry of Health). 2003. Reduce Model: An advocacy tool for accelerated reduction of maternal and newborn morbidity and mortality in Ethiopia. Addis Ababa, Ethiopia: MOH/WHO.

Shariff, A & Singh, G. 2002. Determinants of Maternal Health Care Utilization in India: Evidence from a recent household survey, NCAER, New Delhi.

SMTCR (Safe Motherhood Technical Consultation Report). 1997. The Safe Motherhood action agenda: Priorities for the next decade. New York: Family Care International in collaboration with Safe Motherhood Inter Agency Group.

WHO (World Health Organization). 2001. Maternal Mortality in 1995: Estimates developed by WHO, UNICEF, UNFPA and the World Bank. Geneva.

WHO (World Health Organization). 2007. Maternal Mortality in 2005: Estimates developed by WHO, UNICEF, UNFPA and The World Bank. Geneva, Switzerland.

WHO (World Health Organization). 2010. Trends in Maternal Mortality: 1990_2008: Estimates developed by WHO, UNICEF, UNFPA, and the World Bank, 2010.

Zeine, A., Mirkuzie, W., and Shimeles, O. 2010. Factors influencing antenatal care services utilization in Hadiya zone. *Ethiopian Journal of Health Sciences* 20 (2) :75 - 82.

6. Prevalence and Intensity of Soil Transmitted Helminthes among Elementary Students of Babile Town, Eastern Ethiopia

Ephrem Tefera*, Jemal Mohammed[1], Habtamu Mitiku[1]

[1]Haramaya University, College of Health and Medical Sciences, Department of Medical Laboratory sciences, Harar, Ethiopia

Abstract

Soil-transmitted helminthes are the most common infections worldwide affecting the most deprived communities. Infections with soil- transmitted helminthes affect most frequently children in developing countries and are associated with poor growth, reduced physical activity and impaired learning ability. This study was aimed at determining the prevalence and intensity of soil-transmitted helminthes among Elementary Students of Babile town.

A cross sectional parasitological survey was conducted from May 14 to June 08, 2012. Stool samples were collected from 644 students and examined by the McMaster method. Data were analyzed using SPSS version 16.0. Logistic regression was used to calculate predictors of parasitic infection. The Pearson χ 2 test was used to explore the associations between infection and the various independent variables.

Though the prevalence of intestinal parasite was 14.1% (91/644), only three students were infected with soil transmitted helminthes with a prevalence rate of 0.47% (3/644). The prevalence of H. nana, E. vermicularis, Hookworm, G. lamblia and T. trichiura infections were 13%, 0.6%, 0.3%, 0.3% and 0.2%, respectively. A significant relationship was found between intestinal parasitosis and grade levels of the respondent students. Similarly, a significant relationship was found between Hymenolepiasis nana and sex of students, Hymenolepiasis nana and grade levels of students. Students of lower grade are four times more likely to develop intestinal parasitosis than students of higher grade. Females are two times more likely to develop Hymenolepis infection than males. Thus, of all the examined students, nearly one out of ten were infected with intestinal parasites. Health information dissemination is recommended. Since infection by Hymenolepis nana is a long term health problem in the area, provision of regular treatment by anthelminthic drug of choice for hymenolepiasis is also recommended.

1. Introduction

Soil-transmitted helminths (STHs, also known as geohelminths or intestinal helminths) are serious infectious diseases of humans (Awasthi *et al.* 2003). They are particularly prevalent in poor populations living in tropical and sub-tropical regions of developing countries (Brooker *et al.* 2006). Recent estimates suggest that *A. lumbricoides* infects over 1 billion people, *T. trichiura* 795 million, and hookworms (*Ancylostoma duodenale* and *Necator americanus*) 740 million. The greatest numbers of soil-transmitted helminth infections occur in sub-Saharan Africa, the Americas, China and East Asia (WHO, 2004).

Soil-transmitted helminths include *Ascaris lumbricoides, Trichuris trichiura* and Hookworms (*Ancylostoma duodenale* and *Necator americanus*) and infections with such soil-transmitted helminths (STHs) are common across sub-Saharan Africa and elsewhere in developing nations (Brooker *et al.* 2006, Hotez *et al.* 2008). These infections typically afflict the poorest population segments and impact on human health, nutrition, and worker productivity and hence exacerbate poverty (Savioli *et al.* 2004). Soil-transmitted helminth infection is found mainly in areas with warm and moist climates where sanitation and hygiene are poor, including in temperate zones during warmer months. These STHs are considered Neglected Tropical Diseases (NTDs) because they inflict tremendous disability and suffering yet can be controlled or eliminated (CDC, 2010).

The highest disease burden with soil transmitted helminthes is observed in poor communities with insufficient water supply, inadequate sanitation, and little health awareness. Soil-transmitted helminths are known to highly aggregate in the host populations, with a small proportion of individuals harboring a disproportionately high proportion of the total worm burden (Naish *et al*2004). Infections with soil transmitted helminths affect most frequently children in developing countries and are associated with poor growth, reduced physical activity and impaired learning ability (Stephenson *et al* 1990, Nokes *et al.* 1992, koroma *et al.* 1996, Stolzsfus *et al.* 1996).

High incidence of parasitic infections and polyparasitism affect the health status of human host (Savioli *et al.* 1992, Albonico *et al.* 1998). In particular, there is evidence to support the relationship between helminth infections, malnutrition and child development, with negative consequences for cognitive function and learning ability (Crompton, 1992, nokes and Bundy, 1994, Oberhelman *et al.* 1998, Ray, 1999, Saldiva *et al.* 1999). Such infection can only be definitely controlled by improvement in sanitation and living conditions, but in the short term these measures are scarcely implemented due to lack of resources.

Hence, the World Health Organization (WHO) recommended a baseline survey to be conducted in schoolchildren to determine the prevalence and intensity of infections. As a result, periodic treatment of the endemic population with a broad spectrum anti-helminthic drug has been advocated as a cheap and effective means of reducing the worm burden and its related morbidity (Montresor *et al.* 1998). Moreover, such treatment should then be given according to the results of the survey. The whole population should be treated in case of high prevalence and intensity, targeted treatment is preferred in case of high prevalence and low intensity, whilst case management is the option of choice in case of low prevalence and intensity (Andrade *et al.* 2001).

In Ethiopia, the prevalence of *A. lumbricoides* infection was 29% in the highlands, 35% in the temperate areas, and 38% in the lowlands. The prevalence of hookworm infection was highest in the lowlands (24%) followed by the temperate (15%) and highland (7%); whereas *T. trichiura* infection exhibited similar prevalences in all altitudinal regions (13% on the average) (Jemaneh, 2000).

In Eastern Ethiopia, a study on the prevalence of intestinal helminthic infections and associated risk factors among school children in Babile town was conducted by Girum (2001). In this study, 415 school children delivered stool sample and examined by formol ether concentration technique. Nine species of intestinal helminths were identified with an overall prevalence of 27.2% (113 of 415 children). The predominant parasite was *Hymenolepis nana* 10.1% (42/415). The prevalence of Soil Transmitted Helminthes (STH) was 14.2% (59 out of 415). Among which hookworm was 6.7% (28/415), *A. lumbricoides was* 3.9% (16/415), and *T. trichiura* 3.6% (15/415) [22].

In Babile town, where the study was conducted, very few numbers of studies regarding helminthic infection in general and soil transmitted helminthic infections in particular were carried out, these are Schistosoma mansoni prevalence survey in 1989 (AAU Press, 1998) and the prevalence of intestinal helminthic infections (Tadesse, 2005). However, no intensity of STH study was carried out in the area so far. Thus, the objective of the present study was to determine the prevalence and intensity of soil transmitted helminths among school children of Babile town for proper care and interventions to be conducted in the area.

2. Methods and Materials

This study was conducted in Babile town, Eastern Hararghe from May 14 to June 8, 2012. The town is located about 561 km away from the capital, Addis Ababa. It is situated in eastern Hararghe Zone between two nearby towns namely: Harar and Jijiga. The total population of the town was 17, 704, of which 8782 were males and 8922 wewre females. Babile town is situated at an altitude of 1340 meters above sea level with mean annual rainfall mean annual temperature of 410 – 800mm and 24^0C – 28^0C, respectively. In the town, there are two elementary schools (Babile Elementary School #1 & Babile Elementary School #2) and one secondary school. In the town, there were 3742 students during the study period, of which 2086 were males and 1656 were females. The heath coverage of the town reached almost 100%. The water and latrine coverage of the town were 28% and 90% respectively (Oromia Regional State, Eastern Haraghe, Babile town, 2011).

Six hundred forty four students were selected from the schools to participate in the study. The sample size was determined using the standard formula for single population proportion and the proportion of STHs among elementary students of Babile town to be 14.2% (p=0.142). To get maximum sample size, expected margin of error to be 4% (d=0.04) and with 95% confidence level. Hence, the calculated sample size becomes 644. Then, the total sample size, i.e., 644, was proportionally allocated to the two elementary schools Students' enrollment list obtained from the from the two schools was used as the sampling frame. Hence, according to probability proportional to size calculation, elementary school № 1 contributed 567 students of the 644 sample size and Elementary school № 2 contributed 77 of the 644 required sample size. Then, the subjects of the study was selected from the list at random using random number table, i.e. 567 students from the enrollment list of elementary school № 1 and 77 students from the enrollment list of elementary school № 2.

All the necessary information was collected using pre-tested structuredquestionnaire. Two Diploma holder Laboratory Technicians from the local health center were recruited and assigned as data collectors. School teachers and unit leaders helped the data collectors by bringing the selected students from the respective classrooms.

Before beginning stool sample collection, the latrine was inspected and appropriate corrective measures were taken based on the shortcomings discovered. After giving adequate instruction on how to collect the stool sample, each study subject was provided a stool cup and applicator stick to bring at least 3gm of fresh stool sample of his/her own, that was sufficient for egg count by the McMaster method to determine the prevalence and infection intensity of soil transmitted helminthes. We also hired an individual who can read and write to accompany and inspect students who are small enough for proper stool sample collection. A laboratory technologist supervised the appropriateness of the stool sample delivered by the study participants before accepting the samples. Finally, each sample together with filled questionnaire was labeled and transported (after being preserved using formalin) to Harar Campus side lab for processing and examination.

All collected stool samples were processed by the McMaster Method for egg count to determine the prevalence and infection intensity of soil-transmitted helminthes. In brief, 2gm of feces was weighed in a plastic beaker and 30 ml of saturated sodium chloride solution was added. The mixture was homogenized & the fecal suspension was strained three times through a tea strainer to withhold large debris. Then, the filtrate was homogenized by pouring it 10 times from one beaker to the other and both sides of the McMaster counting chamber were filled up with the filtrate by using a Pasteur pipette. The counting chamber was allowed to stand for two minutes and later examined under the microscope. All the eggs under the two separate grids were counted. Finally, the number of eggs per gram of feces is obtained by multiplying the total number of eggs under the two grids by 50.

The collected data were entered, cleaned and analyzed using SPSS version 16.0. Intestinal parasite prevalence was expressed as the percentage of subjects found positive for each parasite. ORs for prevalence data was calculated using multilevel logistic regression models. Chi-square tests were used to test differences in prevalence of infection. Anthropometric data and results of the stool examinations were analyzed according the WHO guidelines (19). Logistic regression was used to calculate predictors of parasitic infection. Statistical significance was set at $P < 0.05$. The Pearson χ 2 test was used to explore for associations between infection and the various independent variables.

Ethical clearance was obtained from Institutional Research Ethics Review Committee (IRERC), College of Health and Medical Sciences, Harar campus, Haramaya University. Informed consent from Parents/Guardians/Teachers of the study subjects and verbal ascent from the study subjects were obtained before data collection. The objective and benefit of the study was thoroughly explained to the Parents/Guardians/Teachers of the study subjects. Only volunteers were involved and students were having the right to withdraw from the

study. Information meeting was held with parents/guardians/school teachers and with the students to explain the purpose of the study, and the procedure involved. Results were kept confidential. All students positive for intestinal parasites were treated using appropriate drugs.

3. Results

A total of 644 students from the two elementary schools at Babile town were involved in this study. Out of the 644 study participants, 364 (56.5%) were males and 280 (43.5%) were females. The age range of the students varies between 5 and 25. Of which age range, 10-14 years consists of the highest number of students 316 (49.1%) followed by 5-9 years, 277 (43.0%). Mean age of the students was 10.45 years $\pm$ 2.9 SD. The weight of the students varies between 15Kg and 70 Kg with mean weight of 31.84 Kg $\pm$ 10.15SD. Similarly the height of the students varies between 1.04m and 1.80m with mean height of 1.38m $\pm$ 14.43SD.

Of the 644 stool specimens examined, 91 of them were positive for one and more than one intestinal parasites making the prevalence rate 14.1%. The prevalence of intestinal parasite was 14.1% (91 out of 644). The most prevalent detected parasite was *Hymenolepis nana* 13% (84/644) followed by *Enterobius vermicularis* 0.6% (4/644). The least prevalent was *Trichuris trichiura* 0.2% (1/644).

Even though the aim of this study was to determine the prevalence and intensity of soil transmitted helminthes; two (0.3%) students were hookworm infected (2/644) both with light infection intensity (100 eggs per gram of feces and 200 eggs per gram of feces respectively) (Montresor *et al*., 1998. oOnly one student (0.2%) was found to be Trichuris infected) again with light infection intensity (300 eggs per gram of feces), (Montresor *et al*., 1998). In this study, no student was identified as Ascaris infected. Neither moderate nor heavy infections were also recorded. All in all, the prevalence of soil-transmitted helminthes was 0.47% (3/644).

Out of the 91 positive students for intestinal parasites, 43 were males and the remaining 48 were females. At α = 5%, there is no statistical significant intestinal parasitic infection difference between males and females (P = 0.054). But at α = 10%, but there is a statistical significant intestinal parasitic infection difference between males and females (Table-1).

Table 1. Distribution of intestinal parasites in relation to sex among students of Babile town from May 14 to June 8, 2012.

	Result of stool examination			
Sex	Negative	Positive	Total	χ^2 and P-value
Male	321(88.2%)	43(11.8%)	364	χ^2 = 3.705
Female	232(82.9%)	48(17.1%)	280	df = 1
Total	553	91	644	P = 0.054

Of the 91 intestinal parasitosis infected students, 44 (15.9%), 43 (14.6%), and 4 (8.3%) were found in the age range 5-9 years, 10-14 years, and 15-19 years, , respectively. No student more than 20 year old was identified as intestinal parasitosis infected. No statistical significant intestinal parasitic infection difference was also observed among the different age groups (P = 0.458). (Table not indicated).

From the 644 stool samples examined, 84 of them were positive for *Hymenolepis nana* with a prevalence rate of 13.0%. Of the 84 Hymenolepiasis infected students 39 of them were males and 45 were females. A statistical significant Hymenolepiasis nana infection difference was observed between males and females (P = 0.045) (Table-2).

Table 2. Frequency of *Hymenolepis nana* infection by sex among students of Babile town, from May 14 to June 8, 2012

	Result of stool examination			
Sex	Negative for *H. nana*	Positive for *H. nana*	Total	χ^2 and P-value
Male	325 (89.3%)	39 (10.7%)	364	χ^2 = 4.004
Female	235 (83.9%)	45 (16.1%)	280	df = 1
Total	560	84	644	P = 0.045

Out of the 84 Hymenolepiasis infected students, 42 of them were in the age range of 5-9, 38 of them were in the age range 10-14, and four of them were in the age range 15-19. The infection of Hymenolepiasis nana was not associated with age (P = 0.428) (Table-3).

Table 3. Frequency of *Hymenolepis nana* infection by age groups among students of Babile town, from May 14 to June 8, 2012

	Result of stool examination			
Age group	Negative for *H. nana*	Positive for *H. nana*	Total	χ^2 and P-value
5-9	235 (84.8%)	42 (15.2%)	277	χ^2 = 2.774
10-14	278 (88.0%)	38 (12.0%)	316	df = 3
15-19	44 (91.7%)	4 (8.3%)	48	P = 0.428
20^+	3 (100%)	0 (0.0%)	3	
Total	560	84	644	

Of the 91 infected students, only two (2.2%) students were infected with two parasites i.e. by *Enterobius vermicularis* and *Hymenolepis nana*. The remaining 89 (97.8%) were infected with one parasite only.

Out of the 91 intestinal parasite infected students, 26 (16.7%), 19 (18.4%), 15 (17.2%), 19 (19.6%), 3 (5.1%), 4 (7.5%), 3 (7.9%), 2(3.9%), and 2 (3.9%) students were from grades 1, 2, 3, 4, 5, 6, 7, and 8, respectively. A statistically significant intestinal parasitic infection difference was observed among the different grades (P = 0.018) Out of the 84 Hymenolepiasis infected students, 26, 18, 14, 16, 3, 3, 2, and 2 students were from grades 1, 2, 3, 4, 5, 6, 7, and 8, respectively. There is also a statistically significant Hymenolepis nana infection was observed among the different grades (P = 0.018). . Six hundred forty four students from the two elementary schools participated in this study. Of which 443 (68.8%) were first cycle students (Grades 1 - 4) and the remaining 201 (31.2%) were second cycle students (Grades 5 - 8). Out of the 91 intestinal parasite infected students, 79 (17.8%) were first cycle students and the rest 12 (6.0%) were second cycle students. A statistically significant intestinal parasitic infection difference was observed between first and second cycle students (P = 0.000) (Table-4).

Table 4. Distribution of intestinal parasites in relation to grouped grade of students of Babile town from May 14 to June 8, 2012.

	Result of stool examination			
Grouped grade	Negative	Positive	Total	χ^2 and P-value
First cycle	364 (82.2%)	79 (17.8%)	443	χ^2 = 16.036
Second cycle	189 (94.0%)	12 (6.0%)	201	df = 1
Total	553	91	644	P = 0.000

Similarly, of the 84 Hymenolepiasis infected students, 74 (16.7%) of them were from first cycle whereas 10 (5.0%) of them were from second cycle. Here also statistically significant Hymenolepis nana infection difference was observed between first and second cycle students (P = 0.000) All the other risk factors such as parents' occupation, family size, finger nail status, shoe wearing habit, presence or absence of latrine, and water source for drinking were not associated with intestinal parasitosis (P > 0.05). As indicated in table 5 below, after adjusting for all predictors of parasitic infection, students of lower grade are four times more likely to develop intestinal parasitosis than students of higher grade (adjusted OR 4.33 and 95% C.I. is 2.06 – 9.13) and (P = 0.000) (Table-5).

Table 5. Parameter estimates from multivariable logistic regression model predicting the probability of parasitic infection among students of Babile town, from May 14 to June 8, 2012.

Predictors of Parasitic infection	B	P-Value	Adjusted OR	95.0% C.I.	
				Lower	Upper
Sex (Male)			1.00		
Sex	0.46	0.055	1.58	0.991	2.511
Age (Years)	0.19	0.39	1.21	0.79	1.85
Grade of students (Second cycle)			1.00		
Grade of students	1.47	0.000*	4.33	2.06	9.13
Finger nail status (Trimmed)			1.00		
Finger nail status	-0.61	0.33	0.54	0.16	1.88
Latrine usage (Always)			1.00		
Latrine usage	0.56	.630	1.75	0.18	16.88
Hand washing after defecation (Yes)			1.00		
Hand washing after defecation	-0.38	0.74	0.68	0.68	6.80
Eating uncooked vegetables (No)			1.00		
Eating uncooked vegetables	0.18	0.80	1.19	0.31	4.58
Water for drinking (Tap water)			1.00		
Water for drinking	0.13	0.70	1.14	0.59	2.20

As indicated in the table below, having adjusted for all predictors of Hymenolepiasis, females are two times more likely to develop Hymenolepis infection than males (Adjusted OR 1.64 and 95% C.I. is 1.01 – 2.65) (P = 0.046). Similarly, students of higher grade are 80% less likely to develop Hymenolepis infection than students of lower grade (Adjusted OR 0.20 and 95% C.I. is 0.10 – 0.50) and (P = 0.000) (Table-6).

Table 6. Parameter estimates from multivariable logistic regression model predicting the probability of Hymenolepis infection among students of Babile town, from May 14 to June 8, 2012.

Predictors of Hymenolepis infection	B	P-Value	Adjusted OR	95.0% C.I.	
				Lower	Upper
Sex (Male)			1.00		
Sex	0.49	0.046*	1.64	1.01	2.65
Age (Years)	0.18	0.42	1.20	0.78	1.86
Grade of students (Second cycle)			1.00		
Grade of students	-0.60	0.000*	0.20	0.10	0.50
Finger nail status (Trimmed)			1.00		
Finger nail status	-0.67	0.28	0.50	0.14	1.76
Latrine usage (Always)			1.00		
Latrine usage	0.66	0.57	1.94	0.20	18.80
Hand washing after defecation (Yes)			1.00		
Hand washing after defecation	-0.37	0.75	0.69	0.07	6.95
Eating uncooked vegetables (No)			1.00		
Eating uncooked vegetables	0.32	0.64	1.38	0.35	5.41
Water for drinking (Tap water)			1.00		
Water for drinking	0.13	0.72	1.13	0.58	2.23

4. Discussion

This study aimed at determining the prevalence and intensity of soil transmitted helminthes among students of Babile town. As the study revealed, the prevalence was found to be very much lower; almost insignificant. As it was indicated, above 0.3% for hookworms, 0.2% for *T. trichiura,* and all of them were free from *Ascaris lumbricoides*. This happened due to the recent deworming campaign conducted by the local Health Offices nearer to the study period. The campaign was carried out while we were making ourselves ready for data collection.

Despite the deworming campaign, an overall prevalence of intestinal parasites, 14.1% (91/644) was found in this study (the majority being hymenolepiasis infected). This finding was lower when compared with previous study conducted in the same area 11 years ago, i.e., 27.2% (Tadesse, 2005). The result of this study was also quite lower in comparison to same study in Wondo Genet, southern Ethiopia, i.e., 85.1% (Liza *et al.* 2010). The possible explanation for this difference could be better climatic and geographic condition of Babile town than Wondo Genet that prohibits the transmission of intestinal parasites.

In this study, the prevalence of soiltransmitted helminthes was 0.47%; which was very much lower in comparison to a previous study conducted in the same area by Girum Tadesse (14.2%) some 11 years ago. This showed the decrement in prevalence of soil-transmitted helminthes from time to time due to the launching of periodic deworming by the Ethiopian government. The predominant parasite detected in this study was *H. nana* with a rate of 13% which was slightly higher than a study conducted by Girum Tadesse in the same area with a rate of 10.1%. (Tadesse, 2005). This is may be associated with the life cycle of the parasite; which is one the auto-infecting helminthes that can be transmitted by autoinfection means if and only if remained untreated. This finding revealed that despite periodic deworming the prevalence of *H. nana* is on the increase. This is because, the deworming focuses primarily on soil-transmitted helminthes by the known anthelminthic Albendazole which has little effect on eliminating *H. nana* on a single day dose regiment. This increment in prevalence rate of *H. nana* shows absence of concern towards hymenolepiasis by the responsible bodies. This is an indication for the need to do further investigation on hymenolepiasis with its determinant factors for a plausible solution to be forwarded.

Still the prevalence of *H. nana* (13%) of this study is higher than the prevalence in Wondo Genet Shesha Kekele 24 (4.5%)() and 0.2% in West Azerbaijan province, Iran (Khosrow *et al.* 2011). This difference may be explained by variations in socio-economic status, climatic condition, and geographical location.

Thirteen percent prevalence rate for *H. nana* of this study was in disagreement with 6.1% and 2.18% of Reshid *et al.* 2016 and Sehgal *et al.* 2010 studies in India, (,) respectively. This could be explained by difference in diagnostic method employed in our study and the Indian studies; direct wet mount of the Indian studies, which less is sensitive in detecting ova of *H. nana* than concentration method (Sodium Chloride floatation) employed in our study.

In our study the prevalence of parasitic infection did not differ by gender (P = 0.054) and by age category (P = 0.458). This is in agreement with Sehgal's study in India (27). Similarly, the prevalence of Hymenolepiasis nana infection did not differ by age category of students (P = 0.428). However, being male or female has a statistically detectable effect on contracting hymenolepiasis nana infection (P = 0.045).

In our study, a strong association between intestinal parasites and grades of students was detected (P = 0.018). That is, the lesser the grades of the students the more will be the intestinal parasites seen. Similarly, infection by *Hymenolepis nana* is dependent on grades of students (P = 0.018).

This study also revealed the existence of an overall intestinal parasitic infection difference between first and second cycle students (P = 0.000). The same holds true for infection by *Hymenolepis nana* (P = 0.000).

Of all the predictors of intestinal parasitic infection, grade of the students is significantly associated with overall intestinal parasitic infection. Because logistic regression analysis showed that students of lower grade are four times more likely to develop intestinal parasitic infection than students of higher grade. This could be speculated by increase in awareness; as grade increases awareness increases so that students of higher grade will have less exposure to intestinal parasites than students of lower grade.

Similarly, of all the predictors of *Hymenolepis nana* infection, sex is significantly associated with *Hymenolepis nana* infection. Because logistic regression analysis showed that females are two times more likely to develop *Hymenolepis nana* infection than males. The possible explanation for this could be poor personal hygiene practice of females as it can be proven by the response given to one of the risk factor given by both males and females i.e. 55.6% females did not wash their hands after defecation versus 44.4% males did not wash their hands after defecation.

5. Conclusions

Nearly one out of ten students was infected with intestinal parasites; of which almost all with *Hymenolepis nana*. Extremely low number of students (almost one out of two hundred) was infected with soil transmitted helminthes. Students of lower grade had significant intestinal parasitosis than students of higher grade. Students of lower grade had significant Hymenolepiasis than students of higher grade. Students of lower grade were four times more likely to develop intestinal parasitic infection than students of higher grade.

6. Recommendations

Generally, health information dissemination is suggested to be given to students on how to protect themselves from intestinal parasitic infections. It is also suggested that the local Education Office as well as the local Health Office needs to provide safe learning environment especially for students of lower grade such as school sanitation.

Since infection by *Hymenolepis nana* is a long term health problem in the area, provision of regular treatment by anthelminthic drug of choice for hymenolepiasis to students of the town is also recommended.

7. Acknowledgements

This study was financially supported by Haramaya University government fund. We would like to thank the University for its financial support. We would also like to thank M/rs. Zuhera, M/rs. Ayantu, M/rs.Yemisrach, and M/rs. Meskerem for their unreserved support during data collection and sample processing. We are greatful to S/r Firehiwot for her helpfulness in assisting us in some part of data analysis. We also thank directors, Unit Leaders and Teachers of the two Elementary schools at Babile town.

8. References

Albonico M, Stoltzfus RJ, Savioli L., Tielsch JM, Chwaya HM, Ercole E, and Cancrini G. 1998. Epidemiological evidence for a differential effect of hookworms' species, Ancylostoma duodenale or Necator americanus, on iron status of children. *International Journal of Epidemiology* 27: 530 - 537.

Andrade C, Alava T, De Palacio IA, Del Poggio P, Jamoletti C, Gulletta M, and Montresor A. 2001. Prevalence and Intensity of Soil-transmitted Helminthiasis in the City of Portoviejo (Ecuador*). Mem Inst Oswaldo Cruz, Rio de Janeiro*, 2001; 96 (8): 1075 - 1079.

Awasthi S., Bundy DA ,Savioli L. 2003. Helminthic infections. Bmj; 327: 431–433.Brooker S, Clements ACA, Bundy DAP. 2006. Global epidemiology, ecology and control of soil-transmitted helminth infections. Adv Parasitol; 62 : 221 - 261.

Centers for Disease Control and Prevention 1600 Clifton Rd. Atlanta, GA 30333, USA 800- CDC-INFO (800-232-4636) TTY: (888) 232-6348, Nov. 2010 -cdcinfo@cdc.gov.

Crompton DWT .1992. Ascaris and childhood malnutrition. Transaction of Royal Society of Tropical Medicine and Hygiene; 86: 577 - 79.

Hotez PJ, Brindley PJ, Bethony JM, King CH, Pearce EJ, Jacobson J. 2008. Helminth infections: the great neglected tropical diseases. *J Clin Invest*; 118: 1311 - 1321.

Jemaneh L. 2000. The epidemiology of schistosomiasis mansoni and soil-transmitted helminths in elementary school children from the South Gondar Zone of the Amhar National Regional State, Ethiopia. *Ethiop Med J,;* 38 (2): 105 - 118.

Khosrow Hazrati Tappe, Habib Mohammadzadeh, Shahla Khashaveh, Baratali Rezapour and Afshin Barazesh. 2011. Prevalence of intestinal parasitic infections among primary school attending students in Barandooz-Chay rural region of Urmia, West Azerbaijan province, Iran in 2008. *African Journal of Microbiology Research*; 5 (7): 788 - 791.

Koroma MM, Williams AM, De La Haye RR, Hodges M. 1996. Effects of Albendazole on growth of primary school children and the prevalence and intensity of soil-transmitted helminths in Sierra Leone. *J Trop Ped*; 42: 371 - 372.

Liza A. Nyantekyi, Mengistu Legesse, Mulugeta Belay , Konjit Tadesse, Kebreten Manaye, Chanda Macias, and Berhanu Erko. 2010. Intestinal parasitic infections among under-five children and maternal awareness about the infections in Shesha Kebele, Wondo Genet, Southern Ethiopia. *Ethiop. J. Health Dev*; 24 (3): 185 - 190.

Montresor A, Crompton DWT, Hall A, Bundy DAP, Savioli L. 1998. Guidelines for The evaluation of soil-transmitted helminthiasis and schistosomiasis at Community level. Geneva: World Health Organization; WHO document WHO/CDS/SIP/98.1. available from the Programme Parasitic Diseases and Vector Control, World Health Organization, CH1211Geneva27, Switzerland).

Naish S. McCarthy J. Williams G.M . 2004. Prevalence, intensity and risk factors for soil-transmitted helminth infection in a South Indian fishing village. *Acta Tropica*; 91: 177 - 187.

Nokes C & Bundy DAP. 1994. Does Helminth infection affect mental processing and educational achievement? *Parasitology Today* 10: 14 - 18.

Nokes C., Grantham-Mc Gregor SM, Sawyer AW, Cooper ES, Bundy DAP. 1992. Parasitic helminth infection and cognitive function in school children. *Proc R Soc Lond*; 247: 77 - 81.

Oberhelman RA, Guerrero ES, Fernandez AM, Silio M, Mercado D, Comiskey N, Ihenacho G, and Mera R.. 1998. Correlation between intestinal parasitosis, physical growth and psychomotor development among infants and children from rural Nicaragua. *American Journal of Tropical Medicine and Hygiene*; 58: 470 - 475.

Oromia Regional State, Eastern Haraghe, Babile town. 2011.Report from the municipality office of Babile town.

Rashid MK, Joshi M, Joshi HS, Fatemi K. 2011. Prevalence of Intestinal Parasites among School Going Children In Bareilly District. *NJIRM*; 2 (1): 1 - 3.

Ray SM. 1998. Intestinal geohelminthiasis and growth in preadolescent primary school children in Northeastern Peninsular Malaysia. *Southeast Asian Journal of Tropical Medicine and Public Health;* 29: 112 - 117.

Saldiva SR, Silveira AS, Philippi ST,Torres DM, Mangini AC, Dias RM, da Silva RM, Buratini MN, and Massad E.(1999). Ascaris–Trichuris association and malnutrition in Brazilian children. Paediatric and Perinatal Epidemiology; 13: 89 - 98.

Savioli L, Albonico M, Engels D, Montresor A. 2004. Progress in the prevention and control schistosomiasis and soil-transmitted helminthiasis. *Parasitol Int*; 53: 103 - 113.

Savioli L, Bundy D & Tomkins A. 1992. Intestinal parasitic infections:a soluble public health problem. Transactions of the Royal Society of Tropical Medicine and Hygiene; 86: 353 - 354.

Sehgal R, Gogulamudi V. Reddy, Jaco J. Verweij, Atluri V. Subba Rao. 2010. Prevalence of intestinal parasitic infections among school children and pregnant women in a low socio-economic area, Chandigarh, North India. RIF; 1(2): 100 - 103.

Stephenson LS, Latham MC, Kinoti SN, Kurz KM, Brigham H. 1990. Improvement in physical fitness of Kenyan schoolboys infected with hookworm, Trichuris trichiura and Ascaris lumbricoides following a single dose of Albendazole. *Trans R Soc Trop Med Hyg*; 84: 277 - 282.

Stoltzfus RJ, Albonico M, Chwaya HM, Savioli L, Tielsch J, Schulze K, Yip R.. 1996. Hemoquant determination of hookworm-related blood loss and its role in iron deficiency in African children. *AmJ Trop Med Hyg*; 55: 399 - 404.

Tadesse G. 2005. The prevalence of intestinal helminthic infection and associated risk factors among school children in Babile town Eastern Ethiopia. *Ethiop.J.Health Dev*.; 19 (2): 140 - 147.

WHO. 2004. Soil-transmitted helminths"How to add deworming to vitamin A distribution.": World Health Organization, Geneva, STH in the news.

7. Feeding Practice, Nutritional Status and Sero- Status of Infant and Young Children Born From HIV Infected Women in Harar and Dire Dawa Public Health institutions, Eastern Ethiopia.

Firehiwot Mesfin[1]*, Bekele Belayihun[2]

[1]Scholl of Nursing and Midwifery, College of Health and Medical Science, Haramaya University, Haramaya, Ethiopia
[1]Department of Public Health, College of Health and Medical Science, Haramaya University, Haramaya, Ethiopia

Abstract

While breastfeeding carries significant health benefits to infants and young children, HIV can be transmitted during breastfeeding from an HIV-infected mother to her infant. Reducing that transmission while ensuring improved HIV-free survival is one of the most pressing public health dilemmas confronting researchers, health-care professionals, health policy-makers, and HIV-infected women in many parts of the world, especially in developing countries. Children born from HIV-positive women are particularly susceptible to malnutrition. Growth failure and wasting are frequently found in this population, especially in areas where high prevalence of HIV/AIDS co-exists with high rates of food insecurity. The aim of this study was to assess feeding practice, nutritional status, and sero status of children born from HIV infected women in Harar and Dire Dawa public Health Institutions, Eastern Ethiopia

Institution based cross sectional study was utilized in governmental health Institutions (health centers and hospitals) with ART and PMTCT facilities between the year 2012 and 2013. Data were collected from HIV + mothers through structured interview and nutritional status of children was assessed using anthropometric measurements. In addition, record review was made to investigate Sero-status of the children. The data were analyzed using SPSS version 16. WHO Antro software was used to analyze nutritional status of children. Bivariate and multivariable logistic regression analyses were used to identify factors associated with malnutrition. A total of 171 infants and young children born from HIV positive mothers included in the study. One hundred forty- four (84.2%) of HIV infected mothers had practiced exclusive breast feeding for their infants, 3 (1.8%) had practiced exclusive replacement feeding and 14% of the mothers had practiced mixed feeding.

The prevalence of stunting was 20.5% (95% CI: 14.1, 26.8,) of this 8.2% (95% CI: 3.8, 12.6) children were severely stunted. Thinness (low BMI for age) was 18.2 % (95% CI: 12.1, 24.3), of these 8.2% (95% CI: 3.8, 12.7) had severe thinness. Underweight was observed in 17% (95% CI: 11, 22.9) and, from this, 4.7 (95% CI: 1.2, 8.1) children were found severely underweight.

HIV infection among exposed infants was diagnosed 12 infants (7.0%). Among the 12, six infants, . were diagnosed as HIV positive during initial assessment at six weeks. Infants born from married mothers are less likely to be wasted (p= 0.003) COR: 0.25, 95% CI : 0.10- 0.62 and those mothers who had not support in infant feeding decision were more likely to be wasted, (p= 0.02) COR: 4.56 , CI: 1.28 - 16.23 but not underweight or stunted. Maternal age was identified as a predictor of stunting in HIV-exposed infants and young children.

Higher proportion of HIV positive mothers exclusively breast fed for the first six months which is recommended way of infant feeding practice. However, in this study, significant numbers of mothers practiced mixed feeding in the first six months of age, which is an undesirable feeding practice. Malnutrition is observed as a challenge to the HIV-exposed infants requiring the implementation of sustainable and locally-acceptable interventions. Despite the high coverage of PMTCT training, knowledge and practice, the risk of transmission from mother to child observed high in this study. . These findings underline the need to implement counseling in the promotion and support of optimal infant feeding practices in all programs for the prevention of mother-to-child transmission (PMTCT) of HIV.

1. Introduction

More than half a million children have died from AIDS and many more are becoming infected every year. Most of these infections are in Africa and nearly all are due to mother to child transmission (MTCT) [1]. HIV /AIDS is an increasingly major cause of mortality in those aged less than five years in Africa.Breastfeeding remains a common practice in parts of the world where the burden of HIV is highest and the fewest alternative feeding options exist [2,3]

While breastfeeding carries significant health benefits to infants and young children, HIV can be transmitted during breastfeeding from an HIV-infected mother to her infant. Reducing that transmission while ensuring improved HIV-free survival is one of the most pressing public health dilemmas confronting researchers, health-care professionals, health policy-makers, and HIV-infected women in many areas of the world, especially in developing countries [4, 5].

Mixed feeding with breast milk and other feeds has also been suggested to be associated with a higher risk of HIV infection for the infant than is exclusive breastfeeding, which in any case should be avoided because it carries risks of diarrhea and other infectious diseases as well as of HIV infection [6].

Children born from HIV-positive women are particularly susceptible to malnutrition. Growth failure and wasting are frequently found in this population, especially in areas where high prevalence of HIV/AIDS co-exists with high rates of food insecurity [7].The treatment of infant

malnutrition in sub-Saharan Africa is a public health priority and represents a challenge in areas with high HIV/AIDS prevalence. In Ethiopia, HIV and malnutrition are the two major causes of infant morbidity and mortality [8,9].

HIV can be transmitted from a mother to her child during pregnancy, at childbirth and through breastfeeding. Almost all infections in infants can be avoided by timely delivery of effective interventions to prevent mother-to-child transmission. Prevention of mother to child transmission programs (PMTCT) programmes have been scaled up to counsel and test thousands of women and provide ART to HIV positive women [10,11].

National efforts to identify and treat pregnant women with HIV/AIDS are growing in Ethiopia. The national guidelines states that all infants who are exposed to HIV should be tested for HIV-infection, even if their mothers received anti-retroviral treatment (ART) for Prevention of Mother- to- Child Transmission (PMTCT) [9]. Services included in the PMTCT program are counseling and testing of pregnant women, provision of ART for prevention of mother to child transmission of HIV, counseling and support for safe infant feeding practices, and referral to Care and Treatment Centers (CTC) for the infant [12].

Although there is a growing body of research on HIV in Ethiopia, the data on infant feeding choices of HIV positive mothers, nutritional status of children and HIV transmission rates are still limited. Because of such a gap in information on the extent of the problem, this study is necessitated to assess infant feeding practices of HIV^+ mothers , nutritional and sero- status of children born from HIV positive mothers attending in selected urban hospital in Harar and Dire Dawa

2. Methods and Materials

2.1. Study Area and Period

This study was conducted in purposively selected governmental health institutions (health centers and hospitals) with ART and PMTCT facilities in Harar and Dire Dawa town between the year 2012 and 2013. The government health institutions were primarily selected on the basis of the availability of the services and adequate client flow at the time of the study.

2.2. Study Design

Institution based cross sectional study design was conducted in 2012/13to assess the feeding practice (mixed feeding practice and exclusive breast feeding and exclusive replacement feeding) and nutritional status of the children.

Source of data and Study Population

All HIV positive mothers and under two children born from HIV positive mothers visiting governmental institutions in Dire Dawa and Harar towns were the source of data

Inclusion: All HIV positive mothers who attend PMTCT and ART service, and their under two years children in the selected public health institutions (Hiwot Fana and Jugal hospital in Harar town and Dilchora hospital, Sabian health center, Legehare Health Center and Gende Qore Health Center in DD town) were included.

Exclusion: HIV positive women, who were critically ill, could not talk or listen, were excluded from the study.

2.3. Sample Size and Sampling Procedures

This research included all HIV exposed infants and young children with their mothers in the mentioned specific public health institutions by using convenient sampling method.

2.4. Data Collection

Data were collected using a face- to- face structured interview carried out by trained nurses working in the specific clinics (PMTCT and ART) of the selected institutions. In addition, to easily communicate with HIV positive mothers, we used mother to mother group already organized and working in each selected institutions. Nutritional status of children was assessed using anthropometric measurements based on WHO recommended procedures [13]. Weight was measured to the nearest 0.1 kg on an electronic digital scale (Seca, Columbia, MD) and height to the nearest 0.1 cm using a locally manufactured woodenboard fitted with a measuring tape a fixed-foot plate and amovable headboard. Data about sero status of the exposed children were collected by reviewing their charts and records.

2.5. Study Variable

2.5.1. Dependent variable:

Infant feeding practice: This is categorized as exclusive breast feeding, exclusive replacement feeding and mixed feeding
Nutritional status: This is categorized as wasting, underweight and stunting
Sero status: This is categorized as HIV positive and negative

2.5.2. Independent variable:

The independent variables were:

- Socio-demographic variable: age, educational status, marital status;

- Breast health and breast feeding difficulties;
- Maternal health status;
- Obstetric history: place of delivery, mode of delivery;
- Infant health condition; and
- Anthropometric measurement (height, weight, age, MUAC and head circumference)

2.6. Data Processing and Analysis

Completed questionnaire was checked immediately and queries were resolved. Data was entered into Epi info data version 3.5.3. The data was analyzed using Statistical Package for Social Sciences (SPSS) version 16. WHO Antro software was used to analyze nutritional status of children [14] . Bivariate and multivariable logistic regression analyses were used to identify factors associated with nutritional problems.

2.7. Ethical Consideration

Ethical clearance was obtained from the Haramaya University College of health sciences, Ethical Clearance Committee and permission was secured from the hospital administration at all levels, before the start of the study. Participation was voluntary and private information was protected.

3. Results

3.1. Socio-Demographic Characteristics

A total of 171 infants and young children born to HIV positive mothers were included in the study. The mean age of the children was 9.5 months (SD = 6.02). The age of mothers ranges from 19-45 years with an average and standard deviation (SD) of 28.5 and 4.5, respectively. Of the study subjects, 82 (49.4%) were Orthodox Christian followed by 68 (41%) Muslim. The majority of the mothers 135 (80.4%) were married and 48 (28.4%) had no formal education. Out of the total study participants 126 (76.4%) were housewives followed by 17 (10.3%) daily laborers. Majority of the participants 90 (57.0%) had a monthly income of less than or equal to 200 Ethiopian birr. [Table 1].

Table 1. Socio demographic characteristics of HIV positive mothers attending PMTCT and ART clinics in Harar and Dire Dawa town health institutions from January to May, 2013.

Characteristics	Frequency	Percentage
Age of mother (n= 167)		
19-24	27	(16.2)
25- 29	64	(38.3)
30-35	70	(41.9)
>35	6	(3.6)
Religion		
Orthodox	82	49.4
Muslim	68	41.0
Protestant	12	7.2
Catholic	4	2.4
Marital status n=168		
Married	135	(80.4)
Single	16	(9.5)
Divorced	13	(7.7)
Widowed	4	(2.4)
Educational status		
No formal education	48	(28.4)
Primary	86	(50.9)
Secondary and above	35	(20.7)
Occupational status		
Housewife	126	76.4
Daily laborer	17	10.3
Government worker	8	4.8
Private/merchant	14	8.5
Income (in Ethiopian birr) (n=158)		
<=200	90	57.0
201-500	17	10.8
501-1000	31	19.6
>1000	20	12.7
Number of children (n=164)		
< 4	150	91.5
4-6	14	8.5
Family size (n=166)		
<4	68	41
>4	98	59
Head of household (n= 163)		
Yes	64	39.3
No	99	60.7

3.2. Mother's Obstetric History and other HIV Related Concerns

The large majority, 155 (92.8%), of mothers received antenatal care. One hundred fifty seven (94%) of the respondents gave birth at health institutions, 4 (2.4 %) gave birth at home assisted with trained birth attendants, and the rest gave birth at home without birth attendants. From the total respondents, 143 (85.6%), 12 (7.2%), and 12 (7.2%) had spontaneous vaginal delivery, Cesarean section delivery, and Episiotomy, respectively.

Among the respondents 126 (75.4%) are on ART and 41 (24.6%) and not on ART. One hundred twenty seven (79.4%) of the respondents had free discussion or disclosure about their HIV status with their spouse and 33 (20.6%) had free discussion or disclosure of their HIV status with their family.

3.3. Infant Feeding Practice

One hundred sixty- one (94.7%) respondent mothers stated that they received infant feeding counseling during ANC and only 9 (5.3%) mothers said they had never got advice on infant feeding. Mothers were asked about their intention of feeding of their baby. A total of 128 (80.5%) mothers had planned to feed their child exclusive breast feeding, 29 (18.2%) planned to give both breast milk and additional food

before six month and two mothers said (1.3%) planned exclusive replacement feeding . About 123 (80.9%) fed their child according to their plan but 29 (19.1%) mothers changed their feeding plan after birth. Majority of the mothers 93 (60.8%) decided by themselves how to feed their child, 55 (35.9%) were supported by health professionals while only 5(3.3%) of them said they were supported by their spouse.

Majority of the mothers (98.2%) stated that they ever fed breast to their child. On the other hand, 147 (86%) of them had followed recommended feeding practice (EBF and ERF) while significant percentage (14%) of the mothers had practiced mixed feeding. One hundred forty- four (84.2%) of the study subjects had practiced EBF for their infants and 3 (1.8%) had practiced ERF. One hundred thirty- six (79.5%) of the mothers had initiated breast feeding within one hour of delivery and 35 (20.5%) of the respondents had not initiated breast feeding within one hour of delivery. The majority of the respondents 157 (91.8%) use cup/spoon for infant feeding while others 14 (8.2%) use bottle feeding. Among the selected variables, none were predictors of feeding practices.

3.4. Nutritional Status of the Children

The prevalence of stunting was 20.5% (95% CI: 14.1, 26.8), of this 8.2% (95% CI: 3.8, 12.6) children were severely stunted. Underweight prevalence among children aged 2-23 months was 17 (95% CI: 11, 22.9) and from this 4.7 (95% CI: 1.2, 8.1) were found to be severely underweight.Those with low BMI for age (thin) were 18.2 % (95% CI: 12.1, 24.3) of the total population; of these 8.2% (95% CI: 3.8, 12.7) had severe low BMI for age. High prevalence of stunting (26.8%), underweight (21.4%) and wasting (19.6%) was found at the ages of less than six months.

3.5. HIV Infection Status

Majority of the infants 157(94%) received NVP prophylaxis while 10 (6%) did not receive. Of the enrolled infants, HIV infection was diagnosed in 12 (7.0%). Among those six infant were diagnosed as HIV positive during the six weeks. Of the HIV infected children 10 were alive and on ART, while 2 died during data collection time..

3.6. Risk Factors for Malnutrition

Infants born from married mothers are less likely to be wasted (p= 0.003) COR: 0.25, 95% CI : 0.10- 0.62. Infants whose mothers had no support in infant feeding decision were more likely to be wasted, (p= 0.02) COR: 4.56 , CI: 1.28 - 16.23 but not underweight or stunted, when compared to those with support from health professionals.

In multivariate analyses, some factors were identified as being independently associated with malnutrition. A few variables were forced into the model even if the p-value was not significant in the baivariate analysis (p <= 0.2) since they were primary variables of interest for this study.

Infants whose mothers had no support in infant feeding decision were more likely to be wasted, but not underweight or stunted, when compared to those with support from health professionals with AOR 7.01 CI : 1.67- 29.59. Infants born from mothers in age group 19-24, 25-29 and 30-35 with AOR 0.11 ,(95% CI : 0.01- 0.86), AOR 0.10 ,(95% CI : 0.01- 0.62)and AOR 0.11(95% CI : 0.02- 0.75 are less likely to be stunted, but not wasted and underweight. Among the selected variables, none of them were predictors of underweight. However, there is no statistically significant association was observed as expected, exclusively breastfed infants were found to have better nutritional status compared to those not exclusively breastfed.

Table 2. Obstetric history and other HIV related concerns ofHIV positive mothers attending PMTCT and ART clinics in Harar and Diredawa town health institutions from January to May, 2013.

Characteristics	Frequency	Percentage
ANC *(n=167)*		
Yes	155	92.8
No	12	7.2
Place of delivery *(n=167)*		
Health institution	157	94.0
Home	10	6.0
Delivery assisted by *(n=167)*		
Health professionals	157	94.6
TTBA	4	2.4
Untrained birth attendants	6	3
Type of delivery *(n= 167)*		
Spontaneous vaginal delivery	143	85.6
Caesarian section	12	7.2
Episiotomy	12	7.2
On ART *(n=167)*		
Yes	126	75.4
No	41	24.6
Disclosure of HIV status to (n=160)		
Spouse	127	79.4
Family	33	20.6
Support for infant feeding decision (n=153)		
Mother her self	93	60.8
Husband	5	3.3
Health professional	55	35.9
Maternal BMI (n=150)		
Normal	120	80
Low	30	20

4. Discussion

The present study investigated feeding practice, nutritional status, and sero status of infants and young children born from HIV positive mothers. In this study, the majority (84.2%) of the mothers practiced EBF for the first 6 months of age which is similar to the findings reported from Gondar (83.7%) and relatively higher than the findings reported from Addis Ababa (73%) [15,17]. The proportion of mothers practicing ERF (1.8%) was lower than finding reported from Gondar (5.7%) [16] . This high result of EBF might be explained by health professionals who counseled mothers according to the Ethiopian Ministry of Health guideline on infant feeding recommendations of HIV exposed infants which recommends EBF for the first 6 months and introducing complementary feeding at 6 months and continues breastfeeding until 12-18 months.

Even though majority of the mothers adhered to EBF, a significant percentage (14%) of the mothers had practiced mixed feeding for the first six months of age which was almost similar to the findings from AA (15%) and comparatively higher than findings from Gondar (10.5%) [15, 16, 17]. Mixed feeding with breast milk and other feeds has also been suggested to be associated with a higher risk of HIV infection for the infant than is exclusive breastfeeding and in any case should be avoided because it carries risks of diarrhea and other infectious diseases (6).

In our study, there was an overall high prevalence of malnutrition with HIV-exposed infants having 20% stunting, 17% wasting and 16.5% underweight. This finding is comparatively lower than findings reported from India (47% stunting, 10% wasting and 26% underweight) [18] and Rwanda 43% stunting, 8% wasting and 23% underweight.

In this study the prevalence of HIV infection among HIV-exposed infants who were tested by HIV-1 DNA PCR method was 7.6 % which is comparatively less than findings reported from Tanzania(10.5%, 13%)[19] and India (13%) .

The infection rate observed was high despite the health institution being well covered by PMTCT services. The reason for higher rates most likely a high prevalence of HIV infection among pregnant women and, it is possible that pregnant women not tested during antenatal. The infection rate among HIV exposed infants may decrease with better resourced PMTCT programs and provision of more efficacious regimens.

5. Conclusion

Higher proportion of HIV positive mothers exclusively breast fed for the first six months which is recommended way of infant feeding practice. However, in this study significant numbers of mothers practiced mixed feeding in the first 6 months of age, which is an undesirable

feeding practice. Malnutrition is observed as a challenge to the HIV-exposed infants requiring the implementation of sustainable and locally-acceptable interventions. Despite the high coverage of PMTCT training, knowledge and practice, the risk of transmission from mother to child observed in this study was high.

6. Recommendation

These findings underline the need to implement counseling in the promotion and support of optimal infant feeding practices in all programs for the prevention of mother-to-child transmission (PMTCT) of HIV.

7. References

Arpadi S., Fawzy A., Aldrovandi G. M., Kankasa C., Sinkala M., Mwiya M., Thea D. M., Kuhn L. 2009. Growth faltering due to breastfeeding cessation in uninfected children born to HIV-infected mothers in Zambia. *American Journal of Clinical Nutrition* 90: 344 - 353. [PMC free article] [PubMed].

Dagnachew M, Mucheye Gizachew,1 and Moges Tiruneh. 2012. Infant feeding practice and associated factors of HIV positive mothers attending prevention of mother to child transmission and antiretroviral therapy clinics in Gondar Town health institutions, Northwest Ethiopia. *BMC Public Health* 12 : 240.

Ersilia B, Ersilia B, Simona D. La, Dyna T, Paola , Paola G, Anna M. Doro Al tan,Leonardo Palombi, Giuseppe Liotta, Karin Nielsen-Saines, Fulvio Erba, and Maria Cristina Marazzi. 2012. Nutritional Rehabilitation of HIV-Exposed Infants in Malawi: Results from the Drug Resources Enhancement Against AIDS and Malnutrition Program. *Int J Environ Res Public Health* 9 (2): 421 - 434.

Federal HIV/AIDS Prevention and Control Office, Federal Ministry of Health. 2007. Guidelines or HIV Counseling and Testing in Ethiopia.

FHAPCO and FMOH. Guideline for prevention of mother to child transmission of HIV in Ethiopia.

FMOH. 2006. AIDS Report 6th Edition, Addis Ababa, Ethiopia, Federal Ministry of Health,; 3 - 10.

Kiersten A., Israel-Ballard,Maternowska MC, Abrams BF, Morrison P, Chitibura L, Chipato T, Chirenje ZM, Padian NS, and Chantry CJ. 2006. Acceptability of Heat Treating Breast Milk to Prevent Mother-to-Child Transmission of Human Immunodeficiency Virus in Zimbabwe: A Qualitative Study. *J Hum Lact* 22 (1): 48 - 60.

Medina Mukerem, Jemal Haidar. 2012. Assessment of the prevalence and factors influencing adherence to exclusive breast feeding among HIV positive mothers in selected health institution of Addis Ababa. Ethiopia.

Mercy G., Chiduo, Bruno P., Mmbando, Zahra P. Theilgaard2, Ib C Bygbjerg, Jan Gerstoft, Martha Lemnge and Terese L Katzenstein. 2013. Early infant diagnosis of HIV in three regions in Tanzania; successes and challenges. *BMC Public Health* 910 doi:10.1186/1471-2458-13 - 910.

Multicentre Growth Reference Study Group: WHO Child Growth Standards: Length/height-for-age, weight-for-age, weight-for-length, weight-for-height and body mass index-for-age: Methods and development. Geneva.

Saadeh, Peggy Henderson and Cota Vallenas . World Health Organization. 2005. Infant feeding and HIV transmission. Consultation on Nutrition and HIV/AIDS inAfrica:Evidence, lessons and recommendations for action.

Seth A, Chandra J, Gupta R, Kumar P, Aggarwal V, and Dutta A. 2012. Outcome of HIV Exposed infants: experience of a regional pediatric center for HIV in North India.2012 . *Indian Journal of Pediatr.* 79 (2): 188 - 93. doi: 10.1007/s12098-011-0532-8.

Slater, Mackenzie; Stringer, Elizabeth M.; Stringer, Jeffrey S. A. 2010. Breastfeeding in HIV-Positive Women: What Can be Recommended? *Pediatric Drugs* : 12 (1) : 1 - 9.

The Federal Democratic Republic of Ethiopia Ministry of Health. 2008. National Guidelines for HIV/AIDS and Nutrition.

The Federal Democratic Republic of Ethiopia Ministry of Health. 2004. National Strategy For Infant And Young Child Feeding.

Thior I,, ockma S, Smeaton LM, Shapiro RL, Wester C, Heymann SJ, Gilbert PB, Stevens L, Peter T, Kim S, van Widenfelt E, Moffat C, Ndase P, Arimi P, Kebaabetswe P, Mazonde P, Makhema J, McIntosh K, Novitsky V, Lee TH, Marlink R, Lagakos S, and Essex M. 2006. Breastfeeding plus infant zidovudine prophylaxis for 6 months vs formula feeding plus infant zidovudine for 1 month to reduce mother-to-child HIV transmission in Botswana: a randomized trial: the Mashi Study. *Journal of the American Medical Association* 296 (7): 794 - 805

World Health Organization. 2005. Consultation on Nutrition and HIV/AIDS in Africa: Evidence, lessons and recommendations for action Durban, South Africa

World Health Organization. 2008. HIV Transmission through Breastfeeding: A Review of available Evidence - An Update from 2001 to 2007.

World Health Organization. 2006. WHO Anthro for personal computers, version 2. 2007: Software for assessing growth and development of the world's children. 2007. (http://www.who.int/childgrowth/software/en/ webcite)

Yetayesh M. and Jemal H. 2009. Infant feeding practice of HIV positive mothers and its determinants in selected health institution of Addis Ababa. *Ethiop.J.health Dev:* 23 (2) : 107 – 114.

8. Pneumonia Morbidity among under Two Years Children with the Implementation of PCV Vaccination: The Case of Gursum District, Eastern Ethiopia

Gari Hunduma*, Mitiku Teshome and Yadeta Dessie****

*Department of Psychiatry, College of Health and Medical Sciences, Haramaya University, Harar, Ethiopia
**Department of Public Health, College of Health and Medical Sciences, Haramaya University, Harar, Ethiopia

Abstract

Pneumonia is one of the leading causes of morbidity and mortality among children aged less than five years in developing countries. Majority of the world put this strategy into implementation and later incorporated into the Integrated Management of Childhood Illness. Recently, a Pneumococcal Conjugated Vaccine (PCV), against bacterial cause of Pneumonia has been implemented by majority part of the world. Ethiopia also implemented this vaccination in 2011. However, the influence of this vaccination on pneumonia morbidity is yet determined. Therefore, the objective of the study was to assess pneumonia morbidity with the implementation of PCV vaccination in Gursum district, eastern Ethiopia in 2013.

The study was a community based survey. It systematically selected 500 children who were studied in seven kebeles of the district. The collected data were entered into Epidata and analyzed using STTATA 12 software.

The prevalence of pneumonia defined as having fast berating/difficulty of breathing, cough and fever in the last two weeks was 16%.Those children who did not receive full PCV vaccination were more likely developed pneumonia than those did not take/complete the PCV vaccination dose(Adjured OR=1.77; 95% CI: 1.22, 3.107). Thus, having PCV vaccination has significant importance in reducing pneumonia among less than two years children when fully vaccinated by the children which has strong programmatic implication.

1. Introduction

Pneumonia is an acute inflammatory disease of the lung parenchyma. Children are the most susceptible population group (Flesher, 2006). It is one of the leading causes of morbidity and mortality in children aged less than 5 years particularly in countries with the highest child mortality. It has been identified as the major "forgotten killer of children" by the United Nations Children's Fund (UNICEF) and WHO (UNICEF/WHO, 2006). The incidence in this age group is estimated to be 0.29 episodes per child-year in developing countries, most occurring in sub-Saharan Africa (1,022, 000 cases per annum) and South Asia (702,000 cases per annum). In developed country, it occurs at 0.05 episodes per child-year. This translates into about 156 million new episodes each year worldwide (Getinet *et al.* 2002; Williams *et al.*, 2002).

Vaccination of infants in the world's poorest countries against Streptococcus Pneumonia (pneumococcus) has the potential to prevent many deaths. Vaccination of infants and young children against pneumococcal disease has become a global health priority; WHO estimates that every year up to 1 million children less than 5 years of age die from pneumococcal disease, making it the most important cause of vaccine preventable deaths in this age-group (WHO, 2012).

In developing countries which share for more than 95% of episodes of clinical pneumonia worldwide, it is estimated that more than 150 million new cases occur annually among children less than 5 years and about two million child died yearly with pneumonia of which almost all are developing countries(Williams *et al* 2002). In Ethiopia, pneumonia is ranked as fifth of outpatient morbidity and the most common cause of inpatient (Williams*et al.*; 2002FMOH, 2008/9).

Most pneumonia deaths are believed to be due to bacterial pneumonia. Streptococcus Pneumoniae is the most common cause of bacterial pneumonia in infants and young children. Furthermore the bacterium causes otitis media, bacteraemia, sepsis, and meningitis in early childhood (Shann *et al.*, 1986; WHO, 1991; Levine *et al.* 2004). WHO developed a case-management strategy in the 1980s aiming to reduce pneumonia-related deaths at different levels and many part of the world put this thing into implementation. This was a cornerstone of the acute respiratory infection (ARI) program and was later incorporated into the Integrated Management of Childhood Illness (IMCI) guidelines which include primary care and hospital-based case management (Graham *et al.* 2008). In the recent the development of vaccines against the two leading bacterial causes of child pneumonia deaths, Haemophilusinfluenzae type b(HIb) and Streptococcus pneumonia (pneumococcus) is believed magnificently improve the child survival by preventing about 1, 075, 000 child deaths per year. As part of a comprehensive child survival package, the particular advantages of vaccines include the ability to reach a high proportion of all children, including those who are difficult to reach with curative health services, and the ability to rapidly scale up coverage with new vaccines (Madh *et al.*, 2008).

PCVs provide another effective method for pneumonia prevention in children and their families. Finding revealed from a currently available five randomized controlled trials of PCVs for prevention of pneumonia in children. These studies found reductions of 20–37% radiological confirmed pneumonia that indicate the importance of the pneumococcal vaccine serotypes as a cause of pneumonia (Klugman *et al.*, 2003;Cutts *et al.*, 2005; Brien, 2003; Andrade *et al*, 2004; Baqui 2007; WHO 2007).

The Federal Ministry of Health of Ethiopia introduced a new vaccine, 10-valent pneumococcal conjugate vaccine (PCV-10), in to the routine infant immunization schedule countrywide in September 2011. This new vaccine is administered with the existing DPT-HepB-Hib (pentavalent) vaccine at 6, 10, and 14 weeks of age (Scott, 2008).

Pneumonia is estimated to cause 2 million deaths each year in children. An estimated 19% of the 10 million childhood deaths in the world is caused by pneumonia. Streptococcus pneumoniae is the most important cause of severe pneumonia in children aged younger than two years in which up to 5o% of all cases of severe childhood pneumonia are caused by pneumococcus in developing countries. Prevention remains an important public health strategy for combating pneumonia. Vaccine-based prevention policies have proven tool extremely effective in the pediatric arena. Knowledge of the epidemiology of pneumococcal disease and its distribution is essential to assess the potential impact of implementing a vaccination program with pneumococcal conjugate vaccine (PCV) in children (Editorial, 2009;Rudan, 2008).

In developing countries which share for more than 95% of episodes of clinical pneumonia worldwide, it is estimated that more than 150 million new cases occur annually among children less than 5 years and about two million child died yearly with pneumonia of which almost all are developing countries (Getinet *et al.*, 2002).

Pneumonia has been observed to be more severe in developing countries, resulting in higher mortality rates.The annual worldwide incidence of community-acquired pneumonia has been estimated to be between1000 and 12 000 per 100 000 children. The rate of community-acquired pneumonia -associated hospitalization ranges between 22% and 50%, with an overall fatality rate of 4% and an outpatient fatality rate of nearly 1% (WHO, 2012;FMOH, 2012).

In African countries, invasive pneumococcal disease rates are up to tenfold higher than in industrialized countries, and the disease is a main cause of admissions and deaths (Mulholland *et al.*, 1999).

In Ethiopia, about one million children were estimated to be unvaccinated and about 16% under-five mortality has been attributed to vaccine preventable diseases (Jacupsa *et al.*, 2011; WHO, 2003).

The 10 serotypes of (valences) contained in PCV cause approximately 80% of the pneumococcal disease burden in Ethiopia and it is therefore expected that an equivalent reduction in the disease burden due to pneumococcal diseases will be achieved with the vaccine once introduced. The primary objective of introducing PCV in to the routine immunization program is to reduce the morbidity and mortality due to streptococcus pneumonia infections which are the leading cause of pneumonia in Ethiopia that accounts for significant morbidity and up to 28% of all deaths among children fewer than five years of age (WHO, 2012).

It is known that the majority of pneumococcal deaths, serious disease, and hospitalizations are due to pneumonia. However, obtaining epidemiologic data on pneumonia is challenging owing to different definitions used and difficulty in obtaining a microbiologic diagnosis. Deriving epidemiologic data on pneumonia requires a standardized definition and in many countries this isdone clinically utilizing WHO categories based on symptomatology (WHO, 2007).

Ethiopia has implemented the PCV-10 vaccination at national level in 2011. Depending on the finding from the other countries, the contribution of the Vaccine has been reported.The important thing in implementing this vaccination is to what extent the effect is appreciated in reducing the pneumonia morbidity and the mortality but not well quantified with research. Since the start of the of the program there hasn't been study conducted in the country that tries to see to what extent the effect of the drug appreciated.The objective of this study was to assess the prevalence Pneumonia among under-two children in Gursum district community in relation to the children PCV vaccination.

2. Methods and Materials

2.1. Study Area

The study was conducted in Gursum district, one of the districts in the Eastern Hararghea zone of the Oromia regional state. The district is located 600 km from Addis Ababa and 72 km from Harar town. The total population of the town is 2,333,791 with total households of 23,520. The district has 42 kebeles of which three of them urban. The district is bounded by Babile, Somalia and Chinaksan and Harar. The potential health coverage of the district was 80% with seven(7) health center and twenty seven (27) health posts currently providing the outpatients services (Gursum district report, 2003). The study was conducted in 2013.

2.2. Study Design

Study design was review and community based cross-sectional quantitative study. The trend was retrieved from the secondary data registration book retrospectively.

2.3. Source Population

Under five children residing in the two districts.

2.4. Study Population

Selected health centers from the available once and under-two children with their respective care taker residing in randomly selected kebeles were the study population.

2.5. Sample Size Determination

The sample size for this study was considered into two. For trend analysis, it was two years (pre and post) pneumonia morbidity data record review from two health centers and for the community based study the sample size was determined using population proportion formula, where P is the prevalence of 9% from the country report, 95% Confidence Level and 3%marginal Error(d). Single proportion formula was applied and with 5% non-response rate added and design effect of 1.5 was considered so that the final sample size was 549.

2.6. Sampling Procedures

The second component of this study wasthe community based survey. In this case, at first place, the 42 Kebeles of the district were classified as urban and rural Assuming there is urban rural difference in the prevalence of the pneumonia, the rural kebeles were classified within 10 km radius to the urban , within the 10 to 20 km to the urban and above 20 km to the urban set up. We believe that this approach gave us the representative data for the population residing in the urban and remote areas to urban. From the three urban kebeles, one was selected by lottery method and two from each three categories of the rural kebeles, here above mentioned were randomly selected. From randomly selected kebeles, households having fewer than two children were identified and representative households were selected by systematic random sampling. In case there were two children of less than two years in a household, the youngest one was selected.

2.7. Inclusion and Exclusion Criteria

Households having under two year's old children and the primary residents were included and those who were not at home after two times visit were excluded from the study.

2.8. Study Variables

2.8.1. Dependent variable

The dependent variables for this study were the prevalence of pneumonia in the community.

2.8.2. Independent variable

Socio-dedemographic characteristics and the vaccination history of the patients and house hold characteristics were the independent variables.

2.9. Data Collection

A special data collection format/tool was adopted and developed in English through reading relevant literatures.Relevant literature that can address the study's objectives was used to collect data from monthly record of the health centre. The questionnaire has five parts: socio-demogarphic characteristics, house hold related characteristics, health service utilization, and child morbidity for pneumonia and vaccination status of the child. For pneumonia diagnosis in the community, we used the child morbidity questionnaire which addresses the most common clinical features of pneumonia like fast breathing, acute cough, and fever of short duration which is translated in the local language the mother can easily understand. Record review was collected by working in respective health institution and Community based survey data was collected by fourteen (14) data collectors who completed grade ten and more.

2.10. Data Quality Controls

A three-day training was given for data collectors and supervisors on contents of data collection format, record review and health management information system. The data collection format was pre-tested in one health center, which is not part of the study to check the consistency and completeness of the data collection format. For the community based survey the questionnaires was pre-tested in 30 households to check the consistence of the questionnaires and to estimate time taken to interview one house hold. Very close supervision was undertaken during data collection process by supervisors and investigators. Supervisors and investigator were daily check the collected data for its consistency and completeness. Again, the data were rechecked for completeness and consistency by double data entry process by two data clerks.

2.11. Data Processing and Analysis

After data collection process, the data was checked for completeness, and any inconsistencies were cleaned accordingly. The bivariate analysis of multinomial regression model was used measures the strength of association between the independent and dependent variables measured and tested using Crude OR and 95% CI, adjusted OR for explanatory variables were also determined. Explanatory variables with (P-value<0.25) and variables we thought important were also considered in the final model. The significant level was considered at P-Value< 0.05.

2.12. Ethical Considerations

Ethical clearance was obtained from Haramaya University Ethical Review Committee. A signed written consent was obtained from the mothers/guardians after briefing them with all the purpose, risk and benefit of the study. Confidentiality of the data was kept throughout the data collection and the entire study period. Only allowed investigators were get access to raw data collected from the health facilities.

3. Results

3.1. Socio-demographic Characteristics

This study included 500 children of less than two years. Nearly all the respondents interviewed 471(94.20%) were biological mothers. A significant proportion of the mothers who accounted for 444 (88.88%) had no formal education. The majority of the mothers were Muslim religion followers. As to the family size, close to half of them had 4-6 family size. Two hundred and eighteen respondents (43.60%) had one child of less than five years of age, whereas the rest have had two or more under five children. Close to half (51.60%) of the respondents were males (Table-1).

Table 1. Socio-demographic characteristics of the children in Gursum district, 2013.

Variables	Frequency	Percentage
Type of the mother		
Biological mother	471	94.20
Non-biological mother	29	5.80
Educational status		
Not joined school	444	88.80
Had formal education	56	11.20
Religion		
Muslim	486	97.20
Other	14	2.80
Household income status		
High	121	24.20
Medium/Low	379	75.80
Family size		
1-3	116	23.58
4-6	222	45.12
7-13	154	31.30
Number of children under five		
Three and above	218	15.20
Two	206	41.20
One	218	43.60
Sex of the children		
Male	258	51.60
Female	242	48.40

3.2. Housing Condition and Environmental Conditions

A majority of the respondents had their own houses, and about one fifth (17.20%) had one or more rooms. About third of the respondents' had more than two familiy members. A large number of the adolescents had no separate room, and the houses had no separate kitchen for cooking. On the other hand, about two third of the households have had latrines (Table-2).

Table 2. Housing and environmental conditions in Gursum District 2013.

Variables	Frequency	Percentage
House type		
Self	464	92.80
Rent/government (3)	36	7.20
Number of rooms		
One room	414	82.80
More than one room	86	17.20
Number of door		
One	392	78.40
Two	90	18.00
Two or more	18	3.60
Number of Window		
One	294	58.80
Two	150	30.00
Two or more	56	11.20
Separate Kitchen		
No	419	61.71
Yes	260	38.29
Have Latrine		
Yes	285	57.00
No	215	43.00

3.3. Health Seeking Behavior of the Adolescents

Interestingly, a majority of the respondents utilized and a majority of them get health facility in the walking distance of less than half an hour. About one third of the respondents reported someone from the household in the last two weeks. About 10% of the households reported death from the household in the last one year (Table-3).

Table-3: Health seeking and utilization characteristics in Gursum district Eastern Ethiopia 2013

Variables	Frequency	Percentage
Where to take when child seek		
Modern facility	404	80.80
Private	64	12.80
Traditional/holly	32	6.40
Nearest health center		
Less than 1 house	357	71.40
More than an hour	143	28.60
Any person sick in the last two weeks		
Yes	153	30.60
No	347	69.40
Any death from the house in last one year		
Yes	55	11.00
No	445	89.00
The child sick in the last two weeks		
Yes	185	37.00
No	315	63.00

3.4. Prevalence of Pneumonia in the Last Two Weeks

In this study, pneumonia was diagnosed with the following criteria. The first was the presence of fast breathing/difficulty of breathing; the second was the presence of cough, and the third was the presence of fever in the last two weeks. Using these criteria, the prevalence of pneumonia was found to be 80(16%). Furthermore, 160(23.56%) of the children had one or two of these manifestation. The rest did not have these complaints. Using this as an out-come variables, further analysis was conducted using multinomial regression model by considering different explanatory variables classified in to socio-demographic charactertics, housing and sanitary conditions, health related behavior and the PCV vaccinations status.

In model-I educational status, wealth status, occupation and family size have showed statistically significant. In model-II number of door, number of window and the separate status of the kitchen again have showed statically significant. In the third Model included history of diarrheas in last two weeks and history of ear discharge were significantly associated with the pneumonia cases.

The final model showed that the household presence of those who were having door; Adjusted 0R=5.714; 95% CI: 2.337, 13.97), number of window (Adjusted OR=3.164 95%CI: 1.218, 8.220); the presence of separate kitchen(Adjusted OR= 0.33; 95% CI: 0.173, 0.661), history of ear discharge (Adjusted OR=0.343; 95% CI=0.145, 0.816) and not taking three doses of (PCV-10) vaccination(Adjured OR=1.77; 95% CI:.22, 3.107) were significantly associated with the pneumonia morbidity (Tabl-4).

Table 4. Multinomial regression model of the factors associated with pneumonia in Gursum district, 2013.

Variables	Variables	Model-I	Model-II	Model-III	Final Model
	Variables	Pneumonia Adj.OR(95% CI)	Pneumonia Adj.OR(95% CI)c	Pneumonia Adj OR(95% CI)	Pneumonia Adj.OR(95% CI)
Mother Type	Biological mother	1	1	1	1
	Non-biological mother	1.545(0.589,4.053)			
Educational status	Had no formal education	1			1
	Had formal education	0.379(0.147,0.977)			1.768(0.834,3.745)
Wealth status	High	1			1
	Medium/Low	1.584(0.827,3.037)			0.428(0.154,1.187)
Occupation	Farmer	1			1
	Other	2.649(1.469,4.776)			1.299(0.621,2.717)
	1-3	1			
Family size	4-6	1.361(0.702,2.638)			
	7-13	1.226(0.593,2.535)			
Household Rooms	Three		1		
	Two		1.093(0.577,2.072)		
	One		2.288(0.396,13.23)		
Household number of doors	Two and more		1		1
	One		14.67(6.824,31.53)		5.714(2.337,13.97)
Household number windows	Three and above		1		1
	Two		4.24(1.463,12.31)		3.164(1.218,8.220)
	One/None		1.756(0.455,6.777)		2.290(0.711,7.377)
Frequency opening	No window/not open		1		1
	Some times		0.523(0.174,1.574)		0.621(0 .198, 1.948)
	Most of the times/always		0.727(0.204,2.590)		0.524 (0.127,2.161)
Separate Kitechen	Separate kitchen		1		1
	No separate kitchen		0.397(0.208,0.756)		0.33(0.173,0.661)
Any death in last one years in the house	Yes			1	1
	No			0.511[0.221,1.182]	0.452(0.182,1.120)
Diarrhea 2 weeks	Yes			1	1
	No			0.234[0.127,0.432]	0.270(0.136,0.537)
Ear discharge history	Yes			1	1
	No			0.436[0.191,0.999]	0.343(0.145,0.816)
PCV- 10 (Full dose)	Yes				1
	No				1.77 (1.22,3.107)

4. Discussion

Using these criteria, the prevalence of pneumonia was found to be 80(16.0%).The finding indicates that PCV-3 vaccination status; the household presence of those who were having door number of window; with the presence of separate kitchen; and history of ear discharge were significantly associated with the pneumonia in the study area.

This study indicated that the prevalence of pneumonia as per our definition was 16.0%. This finding is similar to what was conducted (Gedefaw *et al*., 2014).The overall two weeks prevalence of pneumonia among under-five children was 16.1%. One thing that needs to be considered here was in our case the study subjects were two and less year's children, whereas in the study referred children of less than five years were studied. These indicate that pneumonia is a significant public health problem in the community.

Similar to past study findings (Cardoso *et al*., 2009; Mitra, 2009), households of having no windows and the windows less frequently open were associated with higher pneumonia presence. This can be seen in different aspect that when the household have window there is high chance that fresh air would enter in to the household and can reduce the chance of infections. The presence of the windows by itself might not be adequate and as the findings indicate the pattern of the opening of the window also matters.

The interesting finding from this study was the association between the PCV vaccination and the pneumonia. We examined the PCV vaccination and the pneumonia. The finding indicates that those children who did not vaccinate with full PCV were more likely to develop pneumonia than those who get vaccinated. This finding was in line with some previous study reports (Cutts *et al*., 2005) though the study finding has to be seen with its limitation that pneumonia diagnosis was made based on clinical sign and symptoms so that we were not able to identify the severity of the pneumonia which is very important to really appreciate the effect of the vaccination.

Other variable that was associated with pneumonia was that children who have no history of ear discharge were less likely developed pneumonia compared with those children experiencing each discharge. This might be associated with some bacteria which cause ear infection has also contributing to the pneumonia infections. Further study is required to look in the concomitant infecting between ear infection and pneumonia and applying the advanced level diagnosis of the diseases.

5. Conclusions and Recommendations

The prevalence of pneumonia defined as having fast berating/difficulty of breathing, cough and fever for two weeks was 16%. Those children who did not receive full PCV-3 vaccination had developed more pneumonia. PCV vaccination has significant importance in reducing pneumonia among less than two children when fully taken.

6. References

Andrade AL, de Andrade JG, Martelli CM, Silva SA, de Oliveira RM, Costa MS. 2004. Effectiveness of Haemophilusinfluenzae b conjugate vaccine on childhood pneumonia: a case-control study in Brazil. *International Journal of Epidemiology* 33: 173 - 81.

Baqui AH, E Arifeen S, Saha SK, Persson L, Zaman K, Gessner BD, *et al*. 2007. Effectiveness of Haemophilus influenzae type b conjugate vaccine on prevention of pneumonia and meningitis in Bangladeshi children: a case-control study. *Pediatr Infect DisJ* 26: 565 PMID: 17596795 doi:10.1097/INF.0b013e31806166a0.

Belachew E.Email and Wakgari D. 2012. Factors associated with complete immunization coverage in children aged 12-23 months in Ambo Woreda, Central Ethiopia. *BMc Public Health*.

Brien KL, Moulton LH, Reid R, Weatherholtz R, Oski J, Brown L,. 2003. Efficacy and safety of seven-valent conjugate pneumococcal vaccine in American Indian children: group randomized trial. *Lance* 362:355 - 61. PMID: 12907008 doi:10.1016/S0140-6736 (03) 14022 - 6de19.

Campbell GD.(1994). Overview of community-acquired pneumonia. Prognosis and clinical features. *Med Clin N Am* 78: 1035 - 48.

Cardoso M, Cousens S, Siqueira L, Alves F and Angelo L. 2009. Crowding: risk factor or protective factor for lower respiratory disease in young children? BMC Public Health [Serial online] June 3, 2004. Available at http://www.pubmedcentral.nih.gov/tocrender.fcgi?iid=9515). [Accessed May 25, 2009].

Cutts FT, Zaman SM, Enwere G, Jaffar S, Levine OS, Okoko JB, l. Efficacy of nine-valent pneumococcal conjugate vaccine against pneumonia and invasive pneumococcal disease in the Gambia: randomised, double-blind, placebo-controlled trial. *Lancet* 365:1139-46. PMID:15794968 doi:10.1016/S0140-6736(05)71876 - 6.

Federal Ministry of Health (FMOH) 2008/2009: Health and Health related indicators, 2008/9, Addis Ababa Ethiopia.

Federal Ministry of Health (FMoH). 2011 .Introducing Pneumococcal conjugate vaccine in Ethiopia, training manual for heath workers, June 2011.

Flesher G 1988. *Text book of pediatrics emergency medicine*. London: William & Wilkins Co.

Gedefaw Abeje , Mamo Wubshet , Getahun Asres. 2014. Revalence of pneumonia among under- five children in Easte town and the surrounding rural kebeles, Northwest Ethiopia; A community based cross sectional study. *Science Journal of Public Health* 2 (3): 150 - 155.

Getinet Mitike, Mesfin Addissie, Mengesha Admasu. 2002. Pneumonia for the under five children. For the Ethiopian Health Center.

Graham SM, English M, Hazir, T; Enarsond P and Dukea T. 2008. Challenges to improving case management of childhood pneumonia at health facilities in resource-limited settings. Bulletin of the World Health Organization; 86:349 - 355.

Greenwood B. 1999. The epidemiology of pneumococcal infection in children in the developing world.Philos Trans R SocLond B BiolSci; 354: 777 - 85.

Greenwood B. 1999. The epidemiology of pneumococcal infection in children in the developing world. *Philos Trans R SocLond B BiolSci* 354: 777 - 85.

Hansen. J, Black S, Shinefield H, Cherian T, Benson J and Fireman B, 2006. Effectiveness of heptavalent pneumococcal conjugate vaccine in children younger than 5 years of age for prevention of pneumonia: updated analysis using World Health Organization standardized interpretation of chest radiographs. *Pediatr Infect Dis J* 25:779 - 81. Katherine L O'Brien, Lara J Wolfson, *et al*., 2009. Burden of disease caused by Streptococcus pneumoniaein children younger than 5 years: global estimates, *Lancet* 374: 893 - 902

Klugman16. KP, Madhi SA, Huebner RE, Kohberger R, Mbelle N, Pierce N. (2003). A trial of a 9-valent pneumococcal conjugate vaccine in children with and those without HIV infection. *N Engl J Med* 349:1341 - 8. PMID:14523142 doi:10.1056/NEJMoa035060

Levine OS, Cherian T, Shah R, Batson A. Pneumo ADIP. 2004. An example of translational research to accelerate pneumococcal vaccination in developing countries. *J Health PopulNutr* 22: 26 - 74.

Lulsegad S., Mekasha A., Berhane Y. 2006. Common childhood disease. In Epidemiology and Ecology of health and disease in Ethiopia Addis Ababa. Edited by Berhane Y., Haile Mariam D., Helmut K.. Shama books; :329.

Mitra N. 2009. A longitudinal study on ARI among rural under fives. *Indian journal of community medicine* [Serial online] 2001January-March (Accessed June 25, 2009]; 26(1). Niederman MS, Bass Jr JB, Campbell GD, Fein AM, Grossman RF, Mandell LA, *et al.* 1993. Guidelines for the initial management of adults with community-acquired pneumonia: diagnosis, assessment of severity, and initial antimicrobial therapy. *Am Rev Respir Dis* 148:1418 - 26.

Shabir A Madhi, Orin S Levine, Rana Hajjeh, Osman D Mansoorc & Thomas Cheriand. 2008. Vaccines to prevent pneumonia and improve child survival. *Bull World Health Organ*. 86(5):365-72.

Shann F.1986 Etiology of severe pneumonia in children in developing countries. *Pediatr Infect Dis J* 5: 247 - 52.

Sinha A, Levine O, Knoll MD, Muhib F, Lieu TA. 2007. Cost-effectiveness of pneumococcal conjugate vaccination in the prevention of child mortality: an international economic analysis. *Lancet* 3: 369 (9559): 389 - 96.

UNICEF/WHO. 2006. Pneumonia: the forgotten killer of children. Geneva: UNICEF/WHO.

WHO. 2007. Pneumococcal Conjugate vaccine for childhood immunization – WHO position paper. Wkly Epidemiol Rec. 2007 Mar 23; 82 ,12 : 93 - 104.

Williams BG, Gouwe E, Boschi-Pinto C, Bryce J, Dye C. 2002. Estimates of world-wide distribution of child deaths from acute respiratory infections. *Lancet Infect Dis* 2 : 25 - 32.

World Health Organization 1990. Acute respiratory infections in children: Case management in small hospitals in developing countries, WHO/ARI/90.5. Geneva, Switzerland: WHO.

World Health Organization(WHO). 2009. Global elimination of measles. Geneva: World Health Organization.

World Health Organization(WHO). 2012. Measuring impact of Streptococcus pneumoniae and Haemophilus influenzae type `b conjugate vaccination. wwwwhoint/vaccines-documents.

World Health Organization (WHO). 1991.Technical bases for the WHO recommendations on the management of pneumonia in children at first-level health facilities. Geneva: World Health Organization.

9. Sexual Explicit Materials (SEM) Exposures and their Association with Sexual Behavior of School Youth in Dire Dawa, Eastern Ethiopia

Gari Hunduma*, Yadeta Dessie, Merga Deressa***, Mitiku Teshome****

*Department of Psychiatry, College of Health and Medical Sciences, Haramaya University, Harar, Ethiopia
**Department of Nursing, College of Health Sciences, Haramaya University, Harar, Ethiopia
**Department of Public Health, College of Health and Medical Sciences, Haramaya University, Harar, Ethiopia

Abstract:
Pervasive sexually explicit media availed through different material are strongly linked with unaccepted sexual permissiveness, attitude and behavior of young people.The objective of the current study was to assess the level of exposure to sexually explicit media and its association with the sexual behavior of in-school youth of Dire Dawa City Administrative Council. A cross-sectional study was carried out among 1,311 in-school young people. Simple random sampling was employed to select the study subjects. Factors associated with the exposure to sexually explicit materials and sexual initiations were investigated using multivariable logistic regression.

More than half (52.7%) of the respondents viewed sex film or films that show male or female nudity. More than one fifth of them (22.58%) reported sexual initiation. Facebook use AOR (95% CI) =1.763(1.319, 2.358) and frequent internet consumptions AOR (955 CI) =1.830(1.173, 2.855) were strong predictor of sexual explicit film viewing. Those viewing sexually explicit films were about three times more likely initiated for sex AOR(95% CI)=3.321(2.266,4.866). Thus, exposure to sexual explicit films was high among the in-school youth, which was highly predicted by use of social media such as Facebook and internet. The exposure to the sexual explicit film is found to be strong predictors of sexual initiation. The manner of using social media among the young people is what needs great monitoring by using the method of fitting to the context.

1. Introduction

Young people typically grow more curious about sex as their own bodies get sexually mature in early adolescence. Research has shown that mass media can affect a broad range of adolescent attitudes and behaviors towards sexual practices (Martinez-Gonzalez *et al*, 2003; Anderson *et al*., 2003). Sexual explicit media which are channeled through movies, music, videos, and print media often present unrealistic, inaccurate, and misleading messages that are accepted by young people. Such media users are more likely to adopt behavior depicted by characters who are perceived as attractive and realistic, and who are not punished but rewarded for their behavior (Bandura, 1986). These sexually explicit visual medias (i.e., pornography and erotic materials) designed to arouse sexual feelings are increasingly available and accesseble to the young people (Lo Vh *et al*., 2005; Brown *et al*., 2005).

Studies largely done in western countries profoundly reported that adolescents are more likely to be affected in their sexual behavior and attitude when they frequently consume these materials (Lo Vh *et al.,* 2005). It has been evidenced that sexual references on television and movies may be a key contributor to early sexual initiation, negative attitudes toward condoms and contraception, having multiple sexual partners, and teen pregnancy (Collins*et al*., 2004; Chandra *et al*.,2008).

In the developing world, there has been strong progress in media developments in recent time. Many unlicensed pornographic audio- visual materials are produced and pervasively exist in the market. Many adolescents or youth owned modern mobile phones that can help them view different films, good or bad (Negussie *et al*., , 2002;Liou and Jemal 2008). Thus, the objective of this study was to assess the level of exposures to the sexually explicit materials (SEM) and their association to sexual attitude and behavior of in-school youth in Dire Dawa City Administrative Council, Eastern Ethiopia.

2. Methods

2.1. Study Setting

The study was conducted among students of Dire Dawa comprehensive secondary and preparatory school. Dire Dawa is located in the eastern part of Ethiopia 505km, 311km and 55km for from Addis Ababa, Djibouti and Harar respectively. In 2010, there were about five comprehensive secondary and preparatory schools (3 governmental, 2 private) in Dire Dawa Administrative Council.

2.2. Study Design

A cross-sectional study was conducted among randomly selected in-school youth in Dire Dawa high schools and preparatory schools.

2.3. Source and Study Population

All youth of age 15-24 years earning in Dire Dawa high school and preparatory schools in 2012 were the source population. The study population were grade 9-12 students in Dire Dawa high schools and preparatory schools who were pursuing their studies in the 2012/13 academic year, and were available during the data collection period.

2.4. Exclusion and Inclusion Criteria
Students of grades 9-12 in Dire-Dawa City Administive Council were included in the study whereas students missing their class on the day of data collection and those who were unwilling to participate in the study were excluded.

2.5. Variables
Exposure to sexually explicit materials (one or more times) and sexual initiation,socio-economic and demographic characteristics such as sex, age, school grades, ethnicgroup, religious group, living arrangement, parents educational status, and social media consumption were variables in this study. .

2.6. Sample Size and Sampling Procedures
The sample size was found by taking level of significance to be 95%, and (Z&/2=1.96), margin of error 2%. Magnitude of exposure to sexually explicit movies (materials), 69 % n is taken from a study conducted in Addis Ababa[8]. Taking the design effect 1.5,and considering 10% non-response rate the total sample size became1,459. Randomly selected schools constituting grade 9-12 were included in the study. Classes were clustered in sections. From each clusters, sections were selected proportionally by lottery method. From each selected section, students were randomly selected and the interview was made for those randomly selected students.

2.7. Data Collection
Close–ended interview and guided self-administered questionnaire were prepared in English language and translated to Amharic were applied. The questionnaire was developed by reviewing relevant literatures on the subject to ensure reliability. The questionnaire was pre-tested and modified. The questionnaire was translated into Amharic for the simplicity of data collection. Each completed questionnaire was checked immediately after they returned to ascertain all the questions were answered consistently. In order to facilitate the data filling process and minimize the degree of missing the required data, the interviewer used guided self-administered questionnaire.

2.8. Data Analysis
Data was double entered and cleaned using EpiData, version 3.3 statistical packages. Bi-variate analysis and multivariate logistic regression models were used to check crudeand independent effect of variables by using Odds Ratio with a 95% Confidence Interval(C.I.).

2.9. Ethical Consideration
Ethical clearance was obtained from the Haramaya University College of Health Sciences, Ethical Clearance Committee. Before commencement of the study permissions were secured from concerned bodies at all levels in the school where the study would be conducted. As the majority of the subjects were less than 18 years old, consent was obtained from family and teachers joint committee who can give consent. Then, assent was obtained from the youths. This approach was used for students and is acceptable to solve the ethical challenge in this regards. Each student was presented with information sheet and consent/assent paper prepared in Amharic.

Operational Definition: Sexually explicit film: Refer to textual, visual, or aural materials that depict sexual behaviors or acts or that expose the reproductive organs of the human body. Exposure to sexually explicit materials was defined as ever watching a materials which defined as sexually explicit. School Youth was defined as youths from grade 9-12 and which were in-school.

3. Results
More than half of the respondents were males (52.62%) and majority of them were in the age range of 17-19 years. Again more than half of the respondents (56.65%) were orthodox in their religion and this was followed by Muslims (30.97%). In their living arrangement about 55% of them live with intact family. In respect to their residents, 10% lives in the rural whereas the rest 90% of the youth were from the urban (Table 1).

Table 1. Socio-demographic characteristics in Dire Dawa, 2013

Socio-demographic characteristics	Number	Percentage	
Age in years			
15-16	142	10.83	
17-19	956	72.92	
20-24	213	16.25	
Sex			
Male	690	52.63	
Female	621	47.37	
Religion			
Orthodox	740	56.45	
Muslim	406	30.97	
Other	165	12.59	
Living arrangement			
Intact family	724	55.23	
Not-intact Family	584	44.77	
Paternal education			
Primary and less	724	55.23	
Secondary and above	587	44.77	
Maternal education			
Primary and less	737	60.4	
Secondary and above	483	39.59	
Residence			
Urban	1,180	90.01	9.99
Rural	131		

3.1. Sexual Explicit Exposure and Sexual Behavior of the Adolescents

About three fourth of the respondents (73.99%) ever head about sexually explicit material. Over all, more than half (52.7%) of the respondents were viewed sex film or films that show male or female nude. In majority of the case, the youth view the films with the same sex peers (38.15%) followed by viewing alone (34.25%). The most common frequency of viewing reported was occasional that was reported by 53.32% of the young people. With regard to where the students could obtain the materials, majority of them reported that they get from their friends (43.35%) while 35.55% said they rent . On the other hand, 29.62% of the respondents reported that they ever attempted. About 55.76% of the adolescents ever had girl or boyfriends. More than one fifth of them (22.58%) reported sexual initiation. Condom non-use during the last sexual intercourse was experienced by more than one third of the students (32.09%).

3.2. Factors Associated with Sexual Explicit Film Viewing

Bivariate analysis was conducted to see the associations with the sexual explicit film viewing and the independent variable. That variable showed association with p-value less than 0.05 were taken into the final model. The final model retained five independent factors associated with sexually explicit film viewing. Females were about 15% less to be exposed AOR(95% CI)=0.150(0.116,0.194),students who were rural dwelers were about 50% less in viewing the films with AOR(95% CI)=0.505(0.323,0.792). Importantly those face book viewing using face book AOR (95% CI) =1.763(1.319, 2.358) and frequent internet use AOR (955 CI) =1.83(1.173, 2.855) where there wasw the strong predictors of the outcome variables. For detail see Table-4 below.

Table 4. Factor associated with sexual explicit material viewing among in-school youth in Diredawa Administrative council, 2013.

Variables	Sexual Explicit Film Viewing	
	(AOR)	95% CI
Sex		
Male	1	1
Female	0.150***	(0.116,0.194)
Age		
13-16	1	1
17-19	1.387	(0.916,2.100)
20-24	1.914*	(1.143,3.203)
Residence		
Urban	1	1
Rural	0.505**	(0.323,0.792)
Mobile Owning		
Yes	1	1
No	1.096	(0.724,1.658)
Facebook		
No	1	1
Yes	1.763***	(1.319,2.358)
Frequency of internet use		
Not use/rarely	1	1
Some time	1.282	(0.912,1.802)
Most of the time	1.830**	(1.173,2.855)

*$p< 0.05$, **$p< 0.01$, ***$p< 0.001$

3.3. Exposure to Sexually Explicit materials and Sexual Initiation

Separate regression model was built to see the association between the sexually explicit film viewing and the initiation of sexual intercourse. Those in-school youth who were viewing sexually explicit films were about three times more likely initiated to sex than those who were not viewing, AOR(95% CI)=3.321(2.266,4.866). Other factors that showed significant association were the sex, age, residence, information about sexual explicit films, and face book consumption (Table-3).

Table 3. Sexual initiation of the in-school youth in relation to sexual explicit exposure Diredawa, Ethiopia, 2013

	Sexual Initiation	
Variables	AOR	95% CI
Sex		
Male	1	1
Female	0.440***	(0.307,0.631)
Age		
13-16	1	1
17-19	2.774**	(1.381,5.571)
20-24	5.505***	(2.612,11.60)
Religion		
Orthodox	1	1
Muslim	0.920	(0.657,1.289)
Other	1.227	(0.785,1.918)
Residence		
Urban	1	1
Rural	2.024**	(1.235,3.318)
Mobile own		
Yes	1	1
No	0.968	(0.550,1.706)
Use face-book		
Yes	1	1
No	0.474***	(0.325,0.691)
Internet use Frequency		
Not use/rarely	1	1
Some time	0.949	(0.654,1.377)
Most of the time	1.485	(0.962,2.292)
Ever viewed Sex Film		
No	1	1
Yes	3.321***	(2.266,4.866)
Ever heard		
Yes	1	1
No	0.609*	(0.395,0.939)

*$p< 0.05$, **$p< 0.01$, ***$p< 0.001$

4. Discussion

In this study, about three fourth of the youth ever heard the existence of sexually explicit materials and more than half of them ever viewed sexually explicit films among the respondents. In agreement with this, a study conducted in the USA also indicated that 70% of 15–17 year old internet users reported viewing pornography online as very and somewhat often(Ibid, 2005). In Ethiopia, a study conducted by Berhanu *et al* (Lioul and Jamal, 2008) reported that 97.6% of the respondents were aware of the existence of sexually explicit materials and 69.5% ever seen sexual explicit practice on movies. A small variation that exists can be justified in relation to the study setting and the study period.

There are reports that identified the relationship between Facebook consumption and adolescents' involvement in risky behaviors (Huang*et al*., 2013). This study also came up with interesting finding that adolescents who reported use of Facebook were 76% more to view sexually explicit film/s. This finding requires prompt intervention to take corrective measures among the young population who are very prone and develop psychopathology for what they see.

Students who used the internet more frequently were about 83% more to view the sexually explicit films. This was also supported by previous studies conducted in different countries (Lioul and Jemal, 2008; Braun-Courville and Mary Rojas. 2009,Mitchell, Finkelhor and Wolak,. 2003).This can be explained in the way that as the individual stays more on browsing they would attempt to explore something that they heard about before or have in their mind.

Prominently observed, young people who reported viewing sexually explicit films were about three times to initiate for sex. Some previously existing literatures were also in line with these finding (Lioul and Jemal 2008;Zillmann D, 2000 and Ybarra *et al*., 2011). This indicates that unconstrained exposure to sexual material remarkably affect the adolescent sexual health prospect.

5. Conclusions and Recommendations

More than half (52.7%) of the respondents reported that they watched sex films (films that show male or female nudity). About one fifth of them (22.58%) reported sexual initiation due to waching the films. Facebook use and frequent internet consumptions were strongly associatedwith with sexually explicit film viewing. Those youth who had experienced viewing sexual explicit film were about three times more likely to initiate for sex.The manner of using social media among the young people needs great monitoring by a method that best fit. Parents can take the main share to control, monitor and guide the adolescents how to optimize the use of different social media and even the Internet itself.

6. References

Anderson CA, Berkowitz L, Donnerstein E, *et al.* 2003. The influence of media violence on youth. *Psychological Science Public Interest* 4: 81 - 110.

Bandura A. Social foundations of thought and action. Englewood Cliffs, NJ:Prentice-Hall, 1986.

Braun-Courville DK, Mary Rojas. 2009. Exposure to Sexually Explicit Web Sites and Adolescent Sexual Attitudes and Behaviors. *Journal of Adolescent Health* 45: 156 - 162.

Brown JD, Halpern CT, L'Engle KL. 2005. Mass media as a sexual super peer for early maturing girls. Journal *Adoleent Health* 36: 420 - 427.

Chandra A, Martino SC, Collins RL Elliott MN, Berry SH, and Kanouse DE 2008. Does watching sex on television predict teen pregnancy? Findings from a national longitudinal survey of youth. *Pediatrics* 122: 1047 - 1054.

Collins RL, Elliott MN, Berry SH, Kanouse DE, Kunkel D, Hunter SB. 2004. Watching sex on television predicts adolescent initiation of sexual behavior. Pediatrics 114 (3): 280 - 9.

Huang GC, Unger JB, Soto D, Fujimoto K, Pentz MA. 2013. The Impact of online and offline friendship networks on adolescent smoking and alcohol use. *Journal of Adolescent Health* .

Ibid. op. cit. n. xviii. 2. (Citing: Ybarra MLM, KJ. 2005. Exposure to internet pornography among children and adolescents: A National survey. cyberPsychology & Behavior 8: 473 - 486.

Lioul B. and Jemal H. 2008. Assessment of exposure to sexually explicit material and other factors as predictors of sexual activity among in school youth in Addis Ababa.

Lo Vh, Wei R.. 2005. Exposure to internet pornography and Taiwanese adolescents' sexual attitudes and behavior. *Journal of Broadcasting and Electronic Media* 49: 221 - 237.

Martinez-Gonzalez MA, Gual P, Lahortiga F. 2003. Parental factors, mass media influences, and the onset of eating disorders in a prospective population-based cohort. *Pediatrics* 111: 315 - 320.

Mitchell KJ, Finkelhor D, Wolak J. 2003. The exposure of youth to unwanted sexual material on the internet. *Youth and Society* 34: 330 - 358.

Negussie T., Johanne S.y, Carol H., Gunnar Bjune(2002). HIV prevalence and socio-cultural contexts of sexual activity among youth in Addis Ababa, Ethiopia. Ethiop Journal of Health Devevelopment 16: 139 - 145.

Ybarra ML, Mitchell KJ, Hamburger M, Diener-West M, Leaf JP. 2011. X-Rated Material and Perpetration of Sexually Aggressive Behavior Among Children and Adolescents: Is There a Link?. Aggressive Behavior: 1 - 18.

Zillmann D. 2000. Influence of unrestrained access to erotica on adolescents' and young adults' dispositions toward sexuality. *Journal of Adolescent Health* 27: 41 - 44.

10. Anemia and Nutritional Status of Adolescent Girls in Babile District, Eastern Ethiopia.

Kedir Teji[1*], Yadeta Dessie[1], Tesfaye Assebe[1], Meyrema Abdo[2]

[1] Haramaya Univesity, College of Health and Medical Science, Ethiopia
[2] Rift Valley University, Faculty of Health Sciences, Adama

Abstract

Adolescence is a period of rapid growth and maturation in human development, and 20% of the final adult height and 50% of adult weight is gained during this period. Nutritional status during adolescence plays an important role in the human lifecycle that influences growth and development. During this period, nutrient needs are the greatest. The objective of this study was, therefore, to assess anemia and nutritional status of adolescent girls in the Babile district, Eastern Ethiopia.

Cross-sectional quantitative study was carried out. Adolescent girls' dietary habits, nutritional status and factors affecting nutritional status, were investigated by the cross sectional study. WHO Anthro-plus software was used to analyse Anthropometric measurements. Nutritional statuses of adolescents were determined using the CDC cut of point body mass index for age. Haemoglobin was measured on site by hemacue machine. Descriptive and inferential statistical analysis was carried out depending on the nature of variables.

Results showed that 21.6% of study participants had low body mass index for age (<-2SD) or thin, 4.8% were over weighted and 1.1% were obese. 76.10% as had lower (<22 cm) Mid Upper Circumference and 32% were anaemic. Nutritional status of adolescent were low both in urban and rural adolescents, but severe thinness were higher among rural (39.3%) compared to urban (37.5%) adolescents, and was also higher at an earlier age of their life. Nutritional status of adolescent girls contributes to the nutritional status of the community. There is a need to initiate intervention measures to improve the nutritional status of adolescent girls who are the future 'mothers-to-be'. Hence, there is a need to create awareness among adolescents and their family about nutrition and health.

Keywords: Adolescent girls; Anemia; BMI for age; MUAC; Nutrition; Eastern Ethiopia

1. Introduction

Adolescence is the transition from dependent childhood to independent adulthood. Adolescents, defined by World Health Organization (1986), are persons aged 10-19 years of age. This age group makse up roughly 20% of the total world population. Remarkably, 84% of the adolescents are in developing countries (Nation 1997; WHO 2005). Adolescents constitute about 48% of Ethiopian population and about 25 percent of this age group are girls(CSA 2007).

The world health organizations declared that adolescents remain largely neglected, difficult to measure, hard to reach population in which the needs of adolescent girls in particular often are ignored(WHO 2005). Physical growth at adolescence occurs earlier and is more rapid than during pre-adolescence(Rees JM 1989) and 20% of the final adult height and 50% of adult weight occurs during this period and bone mass increase of 45% and dramatic bone remodelling occur and soft tissue, organs, red blood mass increase in size (D 2000). Nutritional status during adolescence plays an important role in the human life cycle (Doustmohammadian A, Dorostymotlagh AR *et al.* 2009). The diet of children and adolescent must be adequate to support normal and sometimes very rapid growth and development(Spear BA 2002). Nutrition in general influences the growth and development throughout infancy, childhood and adolescence; it is, however, during the period of adolescence that nutrient needs are the greatest (Lifshitz F, Tarim O *et al.* 1993).

Among adolescents, girls constitute a vulnerable group, particularly in developing countries where they are traditionally married at an early age and exposed to a greater risk of reproductive morbidity and mortality (WHO 1999). The health and nutritional status of the adolescents' girls are the reflection of cumulative effect of physical growth, the onset of the menarche and an increase in fat and muscle mass which place extra nutrition requirement. Physical growth of the adolescent girls' generally related to their dietary intake which is determined by the availability of food in terms of quantity, quality and the ability to digest and absorb and utilize the food.

The adolescents' current nutritional status will decide the wellbeing of the present as well as the future generations. Under-nutrition among these girls is associated with reduced lean body mass, lack of muscular strength and decreased work capacity(WHO 1995). Furthermore, under-fed girls are at risk of being stunted mothers who are likely to suffer obstetric complications and to deliver low birth weight babies(Thame M, Wilks RJ *et al.* 1997). In the absence of effective nutritional interventions, the low birth weight girls become the next generation of stunted mothers, thus, perpetuating the vicious cycle of malnutrition. Finding from Guatemala study on maternal-child-pair revealed that maternal birth size was a significant predictor of child's birth size and Child's birth weight increased by 29 g/100 g increase in maternal birth weight and child's birth length increased by 0.2 cm for every 1 cm increase in mother's birth length (Ramakrishnan U, Martorell R *et al.* 999).

Studies from Asia (Vankaiha K, Damyanti K *et al.* 2002; Friedman JF, Phillips-Howard PA *et al.* 2005; Mukhopadhyay A, Bhadra M *et al.* 2005; Deshmukh Pr, Gupta SS *et al.* 2006; RaoMallikharjuna K, Balakrishma N *et al.* 2006; Medhi G.K, Hazarika N.C *et al.* 2007; Choudhary S, Mishra C *et al.* 2009) and few studies from African countries (Ayoola O, Ebersole K *et al.* 2009) have reported variances in prevalence of under nutrition that all of them signify adolescent malnutrition (stinting, wasting, thinness) is a prevalent problem among the study population. With

regards to our country context, one study, we came to get, was conducted in rural community of Tigray and Addis Ababa found that, under nutrition was common problem among adolescent girls, (Mulugeta A, Hagos F *et al.* 2009; Alebachew 2010; Gebremariam, Seid *et al.* 2015). By and large, it is crystal clear that nutritional status of adolescents in general and girls in particular are under explored and as to the level of our exploration, currently, there is no national intervention program that specifically addresses adolescent nutrition. So, the current study aims at assessing the different types of nutritional status and dietary habit of adolescent girls in Babile district in Eastern Ethiopia.

2. Methods and Materials

The study was conducted in Babile district. Babile is one of the districts in Eastern Hararaghe Zone of Oromia Regional state which is found at 35 km away from Harar. This district has 21 kebeles with different climatic zones and rural urban mix living residences. Data were collected from low land agro ecological zones where the altitude is 1200 meter below sea level. Among 21 kebeble, two of them are urban and 19 of them are rural. A total of about 98,341 populations are found in the district (CSA 2007). The present study was conducted during food surplus season of the years, the period from December 2012- February 2013.

Community based cross sectional study design was employed among adolescents girls aged 10-19 years old residing at Babile district are the source population. The Study population were selected randomly from households who had adolescent girls aged 10-19 years old in the selected kebeles. The sample size for the study was calculated by taking level of significance to be 95%, (Z&/2=1.96), margin of error 3%. Since magnitude of malnutrition among adolescent girls, 50% prevalence was taken because no studies were found in the similar area. Accordingly, the final samples were 600 adolescents.

2.1. Sampling Technique

The district has 21 kebeles, of which two were urban. The study considered those kebeles which were selected randomly. These kebeles were selected from the district representing three climatic zones that possibly represent the district. One urban and ten rural kebele were included in the study. By considering the list of the households as sampling frame and taking the adolescent in the households as sampling unit, simple random sampling was employed in order to select the households. Proportionality of the number of adolescent in each kebeles was also assumed. If adolescent girl/s is/are not found in the house, proximal household was included. In cases where there were two or more adolescents in the same households, one of them was randomly selected by lottery method. Adolescents in the age 10-19 years with severe illness and who are unable to speak were excluded from the study.

For the data collection; questionnaire, anthropometric assessment, and Haemoglobin determination by heamcune cubet were used. Questionnaire consisting of different components (socio demographic/economic characteristics, food intake pattern and, food security status (both house hold and individual), dietary intake characteristics, morbidity status, physical activity, psychological related questions and substance use behaviour (khat chewing, smoking and others)) that are extracted from different literatures were used as data collection tool. The questionnaire was prepared in English and translated to local languages, Afan Orom then translated back to English to check the consistency.

A questionnaire developed by FANTA was used to measure Dietary diversity(Swindale, A *et al.* 2006; FAO 2011). A simple questionnaire designed to allow all types of foods consumed during each of the 24 previous hours to be noted. Anthropometric assessment constitute: Weight, Height, MUAC measurements. Weights were measured using digital weighting scale and recorded to the nearest 0.1 kg. Height was measured using a locally produced wooden measuring board and recorded to the nearest 0.1 cm. Subjects were measured with minimal (light) clothing and removed their shoes or hats during the measurement (Bruce C 2001). Mid Upper Arm Circumference (MUAC) was measured by using insertion type MUAC tape used commonly for measurement of pregnant mothers.

A portable battery operated photometer (HemoCue) was used to measure the haemoglobin values. Haemoglobin was measured by drawing drops of blood from the finger prink. A HemoCue –Cuvatte was filled with drop of blood and result read with in the 10 minutes of time. The photometer will be calibrated before every session using provided standard. The method was recommended for epidemiologic studies in resource poor setting (Nkrumah B, Nguah S *et al.* 2011). Both interview and blood sample collection was take place respectively at time of data collection from each client in a separate room. Haemoglobin level determination was done by trained laboratory technicians that are working outside of the respective district. And the measurements were adjusted for altitudes(WHO 2011). The cut-off point for anaemia was based on WHO (2011) recommendation for mothers and categorized as mild anaemia (Hgb 10.0-11.9 g/dl), moderate anaemia (Hgb 7.0-9.9 g/dl) and severe anaemia (Hgb less than 7.0 g/dl) (WHO 2011).

Data were collected by laboratory and nurse diploma professionals after training was given. The data collectors were trained intensively on the data collection procedures, the context of specific questions across the questionnaire, anthropometric measurement procedures to be used. For Haemoglobin determination, two laboratory technicians were employed to collect and process the sample of blood.

To control quality of data, questionnaire was prepared first in English then translated into Afan Oromo, and then back to English to maintain its consistency. A four-day training was given for the data collectors and supervisor about the objectives, methodology and process of the data collection by the principal investigator and assistant nutritionist. The questionnaires were pre-tested among 5% of the total sample size in Haramaya district (out of study site). Based on the pre-test, validity and reliability of the measurement was checked, questions that pose difficulty were revised, edited, and those found to be unclear or confusing was removed. Each data collector obtained an opportunity to be acquainted with the interview and measuring technique. Two different measurements were taken for the height, weight and MUAC by two different measurement takers for every study subjects so that the average of the two were considered for the analysis. This would help in reducing the occurrence of measurement errors by single individual measurement. The principal investigator and supervisors were compiling

the completed questionnaire every day and check them for inconsistencies, incompleteness and omissions. Any filled questionnaire which has a defect was rejected from the study. Moreover, data were double entered to check for data entry errors and correctness. The principal investigator was responsible for co-ordination and supervision of the overall data collection process.

The data were entered to Data EPI and data cleaning and editing were undertaken before analysis. For the analysis of the data, SPSS (v 16.0) was used in the study. Descriptive statistics, frequency, mean, standard deviation, and correlation were computed for the interest variables. Normality was checked by different plots (P-P and/or Q-Q-plot) if normality will not be maintained (food, meal frequency, anthropometric and biochemical analysis), in place of mean median was considered. Anthropometric data were entered and analysed using WHO Anthro-plus software.

Binary logistic regression and multiple (linear) logistic regressions were applied when the variables are normally distributed. In case normal distribution is not obtained, the variable was transformed before analysis.

Ethical clearance was obtained from Haramaya University Institutional Research Ethics Review Committee. A formal letter was taken from the college to all the concerned bodies in the woreda to obtain their co-operation in facilitating the study. The data collectors were informed aboutthe objectives and benefits of the study to get informed oral consent from the study subject's family prior to data collection. When the study subject become less than 18 years old, we requested their families' oral consent prior to data collection and additional verbal incent was obtained from the study subject when the study subject was less than 18. The respondents were told as they have the right to refuse or decline from the study at any time and refusing to participate in the study never bring any effect on them.

3. Result and Discussion

In this study, out of 600 study particpants selected, 547(91%) school girls were included in the analyses. Main reasons for refusal were fear of injection to measure haemoglobin.

Table 1. Descriptions of the respondent's socio-demographic condition of adolescent girl in Babile district of eastern Ethiopia, 2013.

Variables/ Characteristics		Number	Percent
Age :	14	187	34.2
	15	259	47.3
	16	57	10.4
	17-19	44	8.0
Ethnicity (N=660) :	Amahara	71	13.0
	Oromo	422	77.1
	Others	54	9.9
Religion (N=660) :	Orthodox	83	50.6
	Muslim	414	41.8
	Protestant	50	7.3
Marital status () :	Single	446	81.5
	Married	85	15.5
	Others	16	2.9
place of live now(N=660) :	Urban	277	50.6
	Rural	270	49.4
Grade	7-8	332	60.7
	9-10	215	39.3
Their family status	Both parent alive	450	82.3
	Loss of their family	97	17.7
occupation of respondents father	Farmer	185	33.8
	Merchant	136	24.9
	Gov. employee	156	28.5
	Others	70	12.8
occupation of respondents mothers	Farmer	140	25.6
	Merchant	241	44.1
	Gov. employee	98	17.9
	Others	68	12.4
Family monthly expense greatly depend on	Father	119	21.8
	Mother	93	17.0
	Both of them	289	52.8
	Others	46	8.4

Nutritional status was measured with BMI-for-age Z score.

Table 2. Descriptive Characteristics of the study sample (*N*=547) of adolescent girl in Babile district of eastern Ethiopia, 2013.

Characteristic	Mean	Minimum	Maximum	Std. Deviation
Age(Years)	14.97	14	19	1.012
Weight(Kg)	44.58	21.00	83.00	9.57
MUAC(cm)	20.77	12.05	30.00	2.61
Height(cm)	1.56	1.20	1.75	.09
Hemoglobiin(gm/dl)	12.94	5.20	16.90	1.59
BMI (kg/m2)	17.8	10.00	31.00	3.13

MUAC, Mid-upper arm circumference.

3.1. Prevalence of Anaemia among Adolescent Girls

Among 547 adolescents involved in the study, 32% were anaemic. Out of which 1.8% had severe anaemia (haemoglobin level less than 7gm/dl).

3.2. Prevalence of under Nutrition among Adolescent Girls

Distribution of nutritional status of respondents was determined using the CDC cut of point BMI for age. Accordingly, the results follow as6.6% were very thin (< - 3SD), 15.0% were thin (≥ - 3SD and < -2SD), 72.6% have normal range (> -2SD and less than +SD), 4.8% were overweight (+ 1 SD and + 2 SD), and 2(1.1%) of them were obese (> + 2SD) (Table 3).

Table 3. Prevalence of anaemia and under nutrition among adolescent girls in Babile district of eastern Ethiopia, 2013

Reference values		N	%	Remarks
MUAC	<18.5(severely malnourished)	107	19.6	
18.5-22.5(moderately malnourished)		309	56.5	
>22.5(normal)		131	23.9	
Overall Undernourished (<22.5)		416	76.1	
BMI for age z score	<-3 z score(Sever thinness)	36	6.6	
	-3 to -2 (Mild thinness)	82	15.0	
	>-2 to<0.99 (Normal)	397	72.6	
	1.00 to 1.99 (Overweight)	26	4.8	
	>=2 (Obese)	6	1.1	
Haemoglobin	<7 (Sever Anaemia)	10	1.8	
	7-9.9(moderate anaemia)	21	3.8	
	10-11.9(mild anaemia	144	26.3	
	>12(normal range)	397	72.6	
	Overall anaemia (HGB<12)	175	32.0	

Table 4. Nutritional status of the girls by age and residence of adolescent girl in Babile district of eastern Ethiopia, 2013

Age		Age of the adolescents			
		14	15	16	17-19
Nutritional status	Thinness(<-2SD)	46(24.6)	44(17.0)	15(26.3)	13(29.5)
	Normal range (>-2 to<0.99)	125(66.8)	204(78.8)	38(66.7)	
	Overweight and obese (≥+1SD)	16(8.6)	11(4.2)	4(7.0)	1(2.3)
Level of anaemia	Anaemic	43(23.0)	85(32.8)	31(54.4)	16(36.4)
	Non anaemic	144(77.0)	174(67.2)	26(45.6)	28(63.6)
Residence	Urban				
	Rural				

Age		Thinness(<-2SD)		Normal range (>-2 to<0.99)		Overweight and obese (≥+1SD)	
		Prevalence (%)		Prevalence (%)		Prevalence (%)	
		n	%	n	%	n	%
14		46	39.0	125	31.5	16	50.0
15		44	37.3	204	51.4	11	34.4
16		15	12.7	38	9.6	4	12.5
17-19		13	11.0	30	7.6	1	3.1
Residence	Urban	104	37.5	0	36.1	5	1.8
	Rural	106	39.3	89	33	10	2.7
Total within age groups		210	38.4	189	34.6	15	2.7

3.4. Seven-Day Food Frequency

Consumption of staple food (maize, sorghum) for seven consequative days and consumption of non-staple food (meat, eggs, lentils/groundnut, fruits and leafy vegetables) were not frequent both in rural and in urban adolescent girls (Table 5). Accordingly, 42.4% of the adolescent girls in this community never eat meatwhereas 28.7% in the community eat Rice, pasta, and/or bread one to two times per weeks and 22% of the adolescence girls eat meat less than one time per week. 72.8% of adolescence girls never eat fish (13.2% eat 1-2 times/week), and none of the adolescent girls eat fish more than four times per week. The availability and consumption of fruits is quite seasonal in most parts of Ethiopia. It was identified that, 329(60.1)% of adolescent girls eat different types of fruits and vegetables one time per ten to fifteen days, whereas 218(39.9%) never do so in the area.

Table 5. Food frequency of adolescent girl by Weekly pattern selected food items in Babile district of eastern Ethiopia, 2013.

Food items	Weekly pattern of consumption of selected food items by adolescent girls				
	Frequency				
	Never n(%)	1-2 times n(%)	3-4 times n(%)	>=5times/weeks n(%)	1 times in 10-15 days n(%)
Rice/pasta/bread	223(40.7)	157(28.7)	82(15)	41(7.5)	44(8)
Fish	398(72.8)	72(13.2)	44(8)	0	33(6)
Meat	232(42.4)	124(22.7)	93(17)	53(9.7)	45(8.2)
Egg	181(33.1)	183(33.5)	103(18.8)	44(8)	36(6.6)
Milk	222(40.6)	169(30.9)	65(11.9)	45(8.2)	46(8.4)
Fruits&Vegetables	218(39.9)	-	-	-	329(60.1)
Tea/coffee	-	26(4.8)	207(37.8)	314(57.4)	-
Potatoes	103(18.8)	176(32.2)	103(18.8)	105(19.2)	60(11)
Pea/beans	182(33.3)	182(33.3)	88(16.1)	70(12.8)	25(4.6)

4. Discussion

This study has documented that anaemia and nutritional status of adolescents are important concern for public health in Ethiopia. Adolescence is a transitional period between childhood and adulthood; targeting adolescence can provide an opportunity to prevent the onset of nutrition related chronic diseases in adults' life. Targeting adolescence needs can address adolescence specific nutrition issues and can possibly correct some nutritional problems originating in the past.

This study revealed that nearly one third (32%), of adolescents were anaemic. Of which 1.8% had severe anaemia. The magnitude of anaemia among this adolescent was less than prevalence reported India (61%)(Dutt, Patil *et al.* 2009) and almost similar to lactating mothers in the study area during food surplus season (34.2%) (Roba KT, O'Connor TP *et al.* 2015) and by far higher than study conducted in Indonesia(9.7%)(YA Indriastuti Kurniawan, Muslimatun *et al.* 2006).

Prevalence rate of thinness among this study participants was 21.6%. This figure is higher than the prevalence reported in Addis Ababa (13 %) and Mekele(14%) cities but lower than Ambo (27.5%) of Ethiopia(Alebachew 2010; Yetubie 2012; Gebremariam, Seid *et al.* 2015). The difference may be due to socio-demographic and economic differences between the study sites. The present study revealed that about 4.8% were overweighed. The this is greater than prevalence of overweight study conducted in Mekele (1.1%) and Ambo (2.6 %)(Yetubie 2012; Gebremariam, Seid *et al.* 2015) but lower than study conducted in Addis Ababa, 7.6% of adolescents were overweight(Alebachew 2010).

About 1.1% of adolescents girls were obesity, which lower than study in Mekele city (0.2) and is slightly lower than study conducted in Addis Ababa (2.6%) and Ambo (1.7%) city(Alebachew 2010; Yetubie 2012; Gebremariam, Seid *et al.* 2015).

5. Conclusion

Poor nutritional status during adolescence is an important determinant of health outcomes especially for the upcoming mothers. The result shows that majority of the samples were in the age range of 13-17 years. Regarding the anthropometric measurements, height and weight of the selected individuals were found to be significantly different when compared with the standard which would be due to faulty dietary habits. During the period of puberty, the body requires high calories and nutrients like protein, calcium, iron, foliate and zinc. Iron and calcium are particularly important nutrients during adolescence. Earlier diet surveys in India adolescent population have also shown that the diets are inadequate in all nutrients including iron, proteins, calcium and calories (Pushpamma *et al* 1982, Thimmayamma *et al* 1982 & Kapil *et al* 1993). Similar findings were also reported by Reddy *et al* 1993 and Vasanthi *et al* 1994.

Nutritional status of adolescent girls contributes to the nutritional status of the community. There is a need to initiate intervention measures to improve the nutritional status of adolescent girls who are the future 'mothers-to-be'. Hence, there is a need to create awareness among adolescents and their family about nutrition and health.

Conflict of Interest

The authors declare that they have no conflict of interest.

Authors' contributions

KT designed the study, coordinated data collection, performed analysis and interpretation of data and drafted the manuscript. YD conceived the idea and comments on the manuscript. TA helped in the data collection instrument development, and MA conceived the idea and critically reviewed the final manuscript. All authors gave final approval of the version to be published.

6. Acknowledgments

The authors are thankful to adolescent girls and their families for their cooperation. We are especially grateful for Haramaya University for the assistance and financing given to us to carry out the present work.

7. Rreferences

Alebachew, Z. 2010. Prevalence of childhood and adolescent overweight and obesity among elementary school students, Addis Ababa University.

Ayoola O., Ebersole K. 2009. "Relative height a weight among children and Adolescents of Rural South western Nigeria.*Ann Hu Biol* 36 (4): 388-399.

Bruce C. 2001. " Anthropometric indicators measurement guide." Washington DC Food and Nutrition Technical Assistance Project, Academy for Educational Development

Choudhary S., P. Mishra C. 2009. Correlates of nutritional Status of adolescent girls in thhe rural area of Varanasi. *The Internet Journal of Nutrition and Wellness* 7 (2): 132 - 137.

CSA. 2007.Centeral statistics agency of Ethiopia, Addis Ababa.

D, G. 2000. Nutrition in adolescence." *Paediatric Review* 21 (1): 32 - 33.

Deshmukh Pr, Gupta SS. 2006. "Nutritional status of adolescent in rural Wardha. Indian *Journal Pediatric*73 : 139 - 141."

Doustmohammadian A., Dorostymotlagh AR .2009. Socio-demographic factors associated with Body Mass Index of female Adolescent students in Semnan City, Iran. *Mal J Nutr* 15 (1): 29 - 35.

Dutt, R.., S. Patil. 2009. Prevalence of anaemia among adolescent girls in rural area of raigad district, maharashtra. *Indian Journal of Prev. Soc. Med* 4 (3 & 4).

FAO. 2011. Guidelines for measuring household and individual dietary diversity. Food and Agriculture Organization of the United Nations Rome; Italy: 7 - 12.

Friedman JF, Phillips-Howard PA, .2005.. Progression of stunting and its predictors among school-aged children in western Kenya. *European Journal of Clin Nutr* 59 (914 - 922).

Gebremariam, H., O. Seid. 2015. Assessment of Nutritional Status and Associated Factors among School Going Adolescents of Mekelle City, Northern Ethiopia. *International Journal of Nutrition and Food Sciences* 4 (1): 118 - 124.

Lifshitz F, Tarim O, *et al.* (1993). " Nutrition in adolescence." Endocr Metab Clinics North Amer 22: 673- 683.

Medhi G.K, Hazarika N.C 2007. Nutritional status of adolescent among Tea garden Worker. *Indian Journal of Pediatric* 74 (4): 343 - 347.

Mukhopadhyay A, Bhadra M,. 2005. Anthropometric Assessment of Nutritional Status of Adolescents of Kolkata, West Bengal. *J. Hum. Ecol* 18 (3): 213 - 216.

Mulugeta A., Hagos F. 2009. Nutritional status of adolescent girl from rural community of Tigray, Northern Ethiopia. *Ethiopia. Journal of Health Dev* 23 (1): 7 - 11.

Nation, U. 1997. The sex and age distribution of world population. The 1996 version New Work. United Nations. ."

Nkrumah B, Nguah S.2011. Hemoglobin estimation by the HemoCueH portable hemoglobin photometer in a resource poor setting. BMC Clin Pathol 11 (5).

Ramakrishnan U., Martorell R,1999. Role of Intergenerational Effects on Linear Growth. *J. Nut*r. 129: 544S - 549S.

RaoMallikharjuna K., Balakrishma N, 2006. *Asia Pac J Cli Nutr.* 15 1 (64 - 71).

Rees JM, C. M. 1989. Nutritional influences on physical growth and behaviour in adolescence. In: Adams G, ed. Biology of. Adolescent Behaviour and Development. California. Sage Publications: 139 - 162.

Roba KT, O'Connor TP, .2015. Seasonal variation in nutritional status and anaemia among lactating mothers in two agro-ecological zones of rural Ethiopia: A longitudinal study. Nutrition doi: 10.1016/j.nut.2015.03.007.

Spear BA. 2002. Adolescent growth and development. *J.Am.Diet.assoc.* 102: 523 - 529

Swindale, A, 2006. Household dietary diversity score (HDDS) for measurement of household food access: indicator guide, Version 2. Food and Nutrition Technical Assistance Project, (FANTA), .Academy for Educational Development (AED), Washington, D.C.

Thame M, Wilks RJ, 1997. Relationship between maternal nutritional status and infant's weight and body proportions at birth. *Eur J Clin Nutr* 51 (134 - 138).

Vankaiha K.., Damyanti K, 2002. Diet and Nutritional status of rural adolescent in India. *Euro J Clin Nutr.* 56: 1119 - 1125.

WHO. 1995. Physical status: the use and interpretation of anthropometry. Report of WHO Expert Committee, Technical Series 954. Geneva: World Health Organization 270-6, 445.

WHO. 1999. Programming for adolescent health and development.. Technical Report Series No.886.

WHO. 2005. Nutrition in adolescence –Issues and Challenges for the Health Sector WHO discussion paper on adolescent.".

WHO. 2011. Haemoglobin concentrations for the diagnosis of anaemia and assessment of severity. Vitamin and Mineral Nutrition Information System. Geneva, World Health Organization. (WHO/NMH/NHD/MNM/11.1).

YA Indriastuti Kurniawan, S. Muslimatun, 2006. Anaemia and iron deficiency anaemia among young adolescent girls from peri urban coastal area of Indonesia. *Asia Pac J Clin Nutr* 15 (3): 350 - 356.

Yetubie, M. 2012. Anthropometric Assessment of Adolescent Malnutrition in Elementary and Secondary Schools of Ambo Town June.

11. HIV Prevalence and Sexual Behaviours of Haramaya University Students: Implication for Prevention

Merga Dheresa [1*], Negussie Bussa[1], Yadata Dassie[1], Lemessa Oljira[1]

Health and Medical Sciences College, Haramaya University, Ethiopia

Abstract

HIV/AIDS is affecting young members of the societies especially adolescents between the age of 15 to 24 who are vulnerable and at risk of the disease. It is also estimated that most regular undergraduate university students lie within the age group of 18 to 24 years.The college environment offers great opportunity for HIV high-risk behaviors, including unsafe sex. College students are at risk because they tend to be sexually adventurous, often with multiple partners and do not consistently use condoms. Instances of offering sex in return for favors like promotions or good grades exist in some of these institutions. Commercial sex may not be uncommon as poor students seek to earn money to pay for personal upkeep. The objective of the study was tassess HIV sero-prevalence and sexual behavior of regular undergraduate Haramaya University students in the period of February 2014 to March 2014.

Cross-sectional quantitative study design was employed among 3984 regular undergraduate students in Haramaya University. They were selected by stratified random sampling proportional to ten college, level of education and gender. A total of 3984 university students were participated in this study of which 71% (2799)of them were male. Forty six percent (1820) were 21 and above years old. From the total participants, 14.9% (589) of the students used to live with their mother alone before they joined the university. From the total respondents, 40%, 37%, and 26% of students had a symptoms of depression, anxiety and stress, respectively. 0.9% of tested students were HIV positive. On the other hand, 3.6% sexually active students were HIV positive; 27.1% of the students were experienced sex, and 41.3% had multiple sexual partners. Furthermore about 58% of participants were used condom during recent sex; 13.1% of the students had got pregnant. Sex, marital status, and place of grown were predictors for condom use and statistically significant. Male students used condom more likely than female students (AOR=1.93(1.10-3.36) and those who grew in urban utilized condom more than those who grew in rural (1.57=(1.01-2.44). Those who had STI and stress were more likely to get pregnant(AOR=15(7.08-31.9) and 1.66(1.02-2.69))respectively. The study shows that a significant number of students had multiple sexual partners, they did not use condom consistently, and had sexual partners out of the university compound. This study identified student populations who were at risk of HIV, STI, unwanted pregnancy and multiple sexual partners

1. Introduction

People who have risky sex share a certain set of behaviours including having many sexual partners and not using condoms. Having risky sex would include those having unsafe sex and hazardous sex. (Ma Q et.al 2009). Because of their curiosity, enthusiasm, and urge to try and see new phenomenon, a considerable number of youth engage in hazardous health problem. As a result, the youth are being exposed to unwanted pregnancy, unsafe abortion and STI/ HIV (Derege *etal.,*2005; Wgene. et.al. 2007).

There is an argument on the assumption that university can provide protective environment from risky sexual behaviour (Cole *etal.*1975; Wegene and Fikere,2007; Lloyd *et.al.* 2008). HIV/AIDS is affecting young members of the societies especially adolescents between the age of 15 to 24 who are vulnerable and at risk of the disease. It is also estimated that most regular undergraduate university students lie within the age group of 18 to 24 years (Teka, 1993, UNAIDS, 2004, BSS, 2005, Hightow L., *et al.*2005, Lake VictoriaBasine Commission,2010).

Certain aspects of social life place members of higher education institutions at risk of contracting HIV. Enhanced personal freedom coupled with the attractions and pressures of life in higher education institutions is a recipe for sexual activity and experimentation. The college environment offers great opportunity for HIV high-risk behaviors, including unsafe sex. College students are at risk because they tend to be sexually adventurous, often with multiple partners and do not consistently use condoms. Instances of offering sex in return for favors like promotions or good grades exist in some of these institutions. Commercial sex may not be uncommon as poor students seek to earn money to pay for personal upkeep. (Teka, 1993, Adefuye A. *et al.*2009,Lake Victoria basine commission,2010).

In the world 40-50% university students had multiple sexual partners and 30-60% of them do not use condom during last sex. Eight percent had sex with commercial sex worker or sex for money /gift (Adriana *et al.* 2003; Eric *etal., 2008*; Onja *etal.*, 2008;Barbour & Salameh,2009; Zuma *etal.*, 2010.). In Ethiopia among sexually active university students, 37.5% of them had multiple sexual partners, and 29% do not use condom during their last sexual contact. Fifteen percent had sex because of exchange of money/gift (Nigatuand Seman,2011).

A number of studies have showed that AIDS has progressively been on the increase and constitutes a big problem among college and university students, although the extent of the problem is relatively unknown (Teka, 1993; Tefera *et al.*, 2004; Elias, 2009 and Getnet, 2009)

Though studies have done on general populations (EDHS, 2011), studies on specific populations such as students of higher learning institutions are scanty, in particular, Sero-prevalence data in Ethiopia on this target group is lacking.

By recognizing the above facts, the researchers want to assess the HIV seroprevalence and sexual behaviors among these youth generation. HIV testing is beneficial to better plan all aspect of their future. Understanding these risk factors and prevalence of HIV can help health care practitioners and health educators to develop messages and interventions to reduce young peoples' risk of infection with HIV and other STDs.

The objectives of this study were to assess HIV sero-prevalence and reproductive health problem and associated factors among regular undergraduate Haramaya University students in the period of February 2014 to March 2014

2. Materials and Methods

2.1. Study Area

The study was conducted in Haramaya University which is one of the oldest public universities in Ethiopia. It is located about 510 km from Addis Ababa in the Eastern Hararghe Zone at a distance of about 20 km and 40 km from the two nearby towns: Harar and Dire Dawa, respectively, and almost 5 km off the main highway at Haramaya town.

Haramaya University has three campuses viz. main campus, Harar campus and Chiro campus. In these all campuses, it has eleven colleges of which one is running continuing and distance education program. Ten of these colleges have 63 departments which run regular undergraduate program. Currently, the university has 15,090 undergraduate regular students of which 12,158 of them are in main campus, 2,419 of them are in Harar campus and 513 of them are in Chiro campus. Male students constituent 78.58% whereas female students constituent 21.42%.

This university, apart from undergraduate programs, has widely been engaged in the expansion and diversification of graduate programs. Currently, the university has 59 masters and 18 PhD Programs (Haramaya University Registrar Office, 2013).

2.2. Study Design

Institutional based cross-sectional, anonymous, quantitative survey was undertaken among randomly selected 4779 undergraduate regular students from February 2014 to March 2014

2.3. Sampling Procedure

A stratified random sampling technique was used to select 4,779 students using proportion to size allocated to three university campus, 10 collages, level of education and gender. In order to select the sample size, a list of all regular undergraduate students from all departments was obtained from the Office of the University Registrar. List of all undergraduate students in all departments was selected according to their class year. To obtain sampling frame for each selected department, the student's data were entered into SPSS16.0 before selection of study participants.

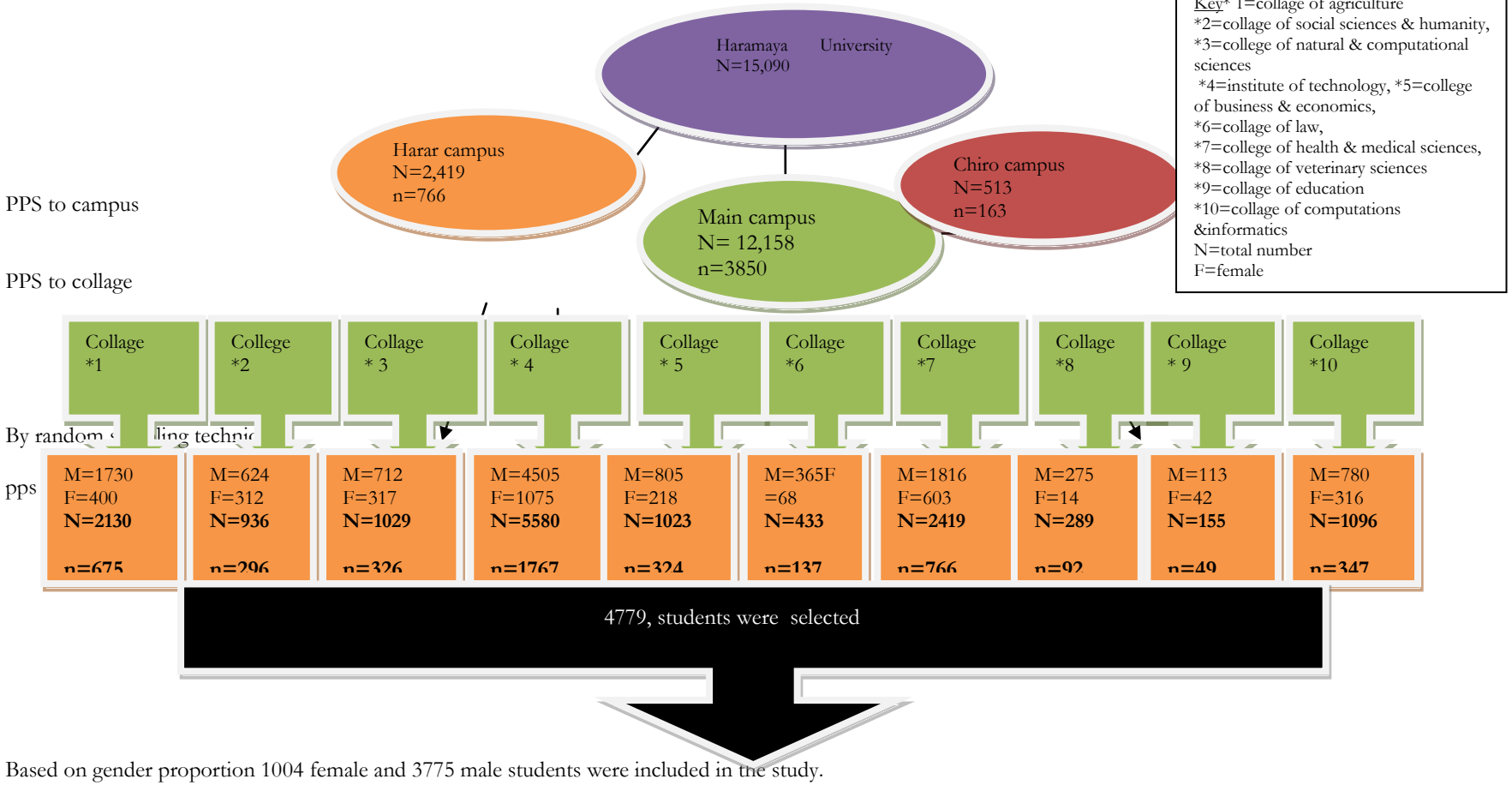
2.4. Data Collection

2.4.1. Data collection methods

Data were collected in two approaches: in the first approach pretested self-administer questionnaire was distributed to collect some socio-demographic variable, sexual behaviour, reproductive health problem, substance use and mental health disorders. The second approach was preforming laboratory test: in this procedure blood is collected from the tip of participants' finger using capillaries tubes. The collected blood is dropped on HIV test kit to determine HIV status of study participants. To confirm HIV status, we used three approaches of HIV test kit; first blood is tested on KHB test kit, if the result indicate HIV positive, the blood also transfer to the second HIV test kit called Stat-pack if for confirmation. If the first and the second result are concordant, that blood was confirmed to be HIV infected. If both results were discordant the blood is transferred to the third and last test Kit Uni-gold; the result of the last test kit decided the HIV status of the blood regardless of the result of the first two test kit result. Unique code is given for both questionnaire and test kit to link the results of HIV test to socio-demographic and reproductive health problem variable anonymously

Then the respondents filled the questionnaire by themselves after understanding the questions. The HIV test results were matched to demographic data by their unique codes. All students were provided with information on how to access HIV testing and care services and HIV risk reduction counseling.

A team of trained nurses, medical laboratorists, and investigators visited the University. The Researche team provided information on the purpose of the study, the implications of participation, the informed consent process, sample collection procedures, use of the results and confidentiality of data to the study groups.



Based on gender proportion 1004 female and 3775 male students were included in the study.

Figure1. Schematic presentation of sampling procedure

2.5. Variables

2.5.1. Independent variables

Socio-demographic characteristics, substance use and mental health problem.

2.6. Outcome Variables

HIV infection and reproductive health problems were outcome variables.

2.7. Data Analysis and Processing

Data were entered on predefined coding sheet in identifying inconsistencies. The quantitative data entered into a computer and analyzed using SPSS version 16.0. Descriptive statistics was used to calculate the prevalence of the variables used in the study. Binary logistic regressions was performed crude odds ratio (OR) and adjusted odds ratio(AOR) with 95% confidence interval (CI), to identify the predictors of HIV infection, STI, unwanted pregnancy, condom use multiple sexual partners.Initially factors that was significant at $p<0.05$ entered into the model and removed them once they become marginally significant.

2.8. Ethical Considerations

The study protocol was approved by institutional ethical clearance committee of Haramaya University, Harar campus. An official letter of co-operation was written to respective colleges from College of Health and Medical Sciences. Written informed consent was obtained from each participant. In order to protect the confidentiality of the information, names and ID were not included in the written questionnaires.

3. Results

3.1. Characteristics of Participants

For this analysis, the responses of 3,984 students were used. Majority 71% (2799) of them were male and 36% of the study participants were first year students. The mean age of participants was 20 years with standard deviation of 1.6 years and ranges from 17-29 years. Twenty five percent (972) of participants reported that their family's income is low. Fifteen percent (589) of the students grew up with their mother only. Respondents who were from rural background totaled 43% (1708) *Table 1.*Twenty six percent of students reported poor academic performance (*not shown).*

3.2. Substance Use

Nineteen percent (723) of the respondents had chewed *khat* with 70% (503) are current chewers. One fourth (126) of them were daily chewers. Among 135 students who ever used *hashish* 67%(90) were current users and among those current users 20%(18) of them used it in daily base. Among 137 students who replied to the questionnaire of *shisha,* 77%(106) of them have ever used *shisha*. Fig2.

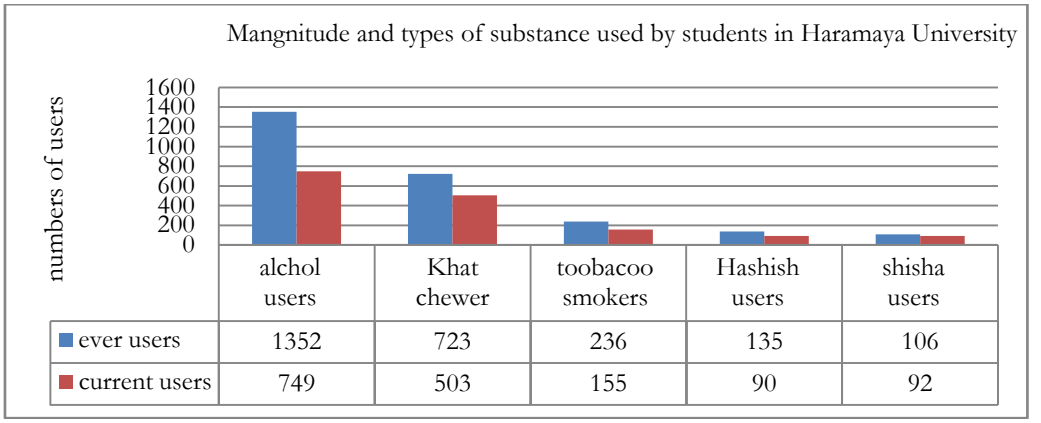


Figure 2: distribution of substance use among Haramaya University students, Ethiopia, 2014.

3.3. Sexual Behaviours of University Students

Among 3939 students responded to sexual behaviours questionnaire, 27.1 %(1067) have ever practiced sex and 43.6% (465) of sexually experienced students reported to have sex in the last six month prior to the survey.

Table 1. Socio-demographic characteristics of Haramaya University students, Ethiopia, 2014.

Variable		Frequency	Percentage
Sex(n=3984)	Male	2799	70.3
	Female	1185	29.7
Age(n=3984)	<= 20	2164	54.3
	>=21.00	1820	45.7
Place of origin(n=3944)	Urban	2236	56.7
	Rural	1708	43.3
With whom live(3945)	mother and father	2616	66.3
	mother only	589	14.9
	father only	102	2.6
	Relative	374	9.5
	Others	264	6.7
Family income(n=3957)	Low	972	24.6
	Medium	2807	70.9
	High	178	4.5
Do you have enough Pocket money(n=3944)	Yes	1822	46.2
	No	2122	53.8

The mean age for first sexual experience was18 years. Peer pressure is a mentioned reason for first sexual practice by 12.3%(131) of sexually active students. During first sexual contact only 35.2% (376) had practice protective sex. The sexual partners of 33% (141) of current sexually active students were from outside of the university compound. In the recent sexual contact, 57.8% (269) of sexually active participants had practiced protective sex. Thirty two percent (85) of them were condom users though they didn't use it consistently. Forty one percent (441) of sexually active respondents had multiple sexual partners.

A history of unintended pregnancy was reported by 13.1%(140) of students and repeated pregnancy was acknowledged by 27 %(38) of them. Abortion is committed by 85.7%(120) of the pregnant students. Nine hundred seventy nine students replied to the questionnaire that they ever acquired STI: 5.3% (52) reported acquiring of STI and half of them sought medical treatment and 48.1% (25) of them complain current STI symptom. The commonest 60% (15) reported symptoms or syndromes were genital ulcers (*Table 4).*

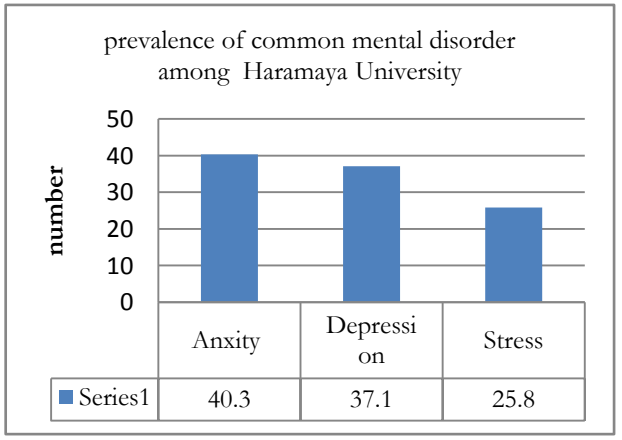


Figure. 4. Prevalence of common mental health disorders among study participants, 2014.

Among 3547 students respond to the questionnaire common mental disorder 37.15% of them have had depression. Seventeen percent of the students had manifested extremely severe stress (Fig. 4.)

3.4. HIV Sero-Prevalence among University Students

Blood sample was collected and tested from 3,399 students for HIV test by using rapid HIV test kit. Based on the recommended algorithm of HIV test, the result was classified as negative or positive for HIV. Among those voluntarily tested 3399 students 0.9% (32) was identified to be HIV positive (Table 4).

HIV in Ethiopia is commonly transmitted by heterosexual contact, thus the prevalence of HIV among sexually active students was 3.6% (32/890). HIV sero-prevalence is high among older students than younger (1.2% vs. 0.7%); Male than female (1% vs.0.8%); senior than first year students(1% vs. 0.9%); academically poor than academically good(1% vs. 0.8%) students; *hashish* user than non-hashes -users(2.6% vs.0.9%); smoker than non-smoker(1.6% vs. 0.9%); non-condom users than condom users(2.5% vs. 1.8%); having multiple sexual partner than having single sexual partner in life(2.2% vs. 1.1%); and watchers of sexually explicit materials than those who do not watcher sexual explicit material(1.3% vs. 0.8%). But all the above prevalence variation among different variables is not statistically significant.

Table. 2. Sexual behaviours among Haramaya University Students, Ethiopia, 2014.

Variable		Frequency	Percent
Ever Started Sexual Inter Curse(N=3939)	No	2872	72.9
	Yes	1067	27.1
Age At Sex Started (N=1067)	10-15 Years Old	272	25.5
	16-20 Years Old	695	65.1
	21-24 Years Old	100	9.4
Reason To Start Sex First(N=1067)	Fall In Love	632	59.2
	Because Of Gift	34	3.2
	Peer Pressure	131	12.3
	Curiosity	190	17.8
	Raped	23	2.2
	Other	57	5.3
Condon Use In First Sex(N=1067)	No	691	64.8
	Yes	376	35.2
Sex In The Past 6 Month (1067)	No	602	56.4
	Yes	465	43.6
Type of recent sexual partners (N=465)	Student	234	50.3
	Commercial Sex Worker	27	5.8
	Teacher	25	5.4
	Person In Campus	38	8.2
	Person Out Side Campus	141	30.3
Life time number of sexual partner(n=1067)	one sexual partner	626	58.7
	more than one	441	41.3
Condom Use in Last Sexual contact	No	196	42.2
(N=465)	Yes	269	57.8
How frequent do you use condom (N=269)	Always	184	68.4
	Some Times	85	31.6

3.5. Risk Factors for Unprotected Sex, Multiple Sexual Partners, Unwanted Pregnancy, HIV/STI among Haramaya University Students

3.5.1. Factors associated with sexual debut

Socio-demographic variable (sex, age, grew up with and earning pocket money), substance use (hashish use and alcohol use), depression, watching sexual explicit material and using face book are identified to be a predictors for sexual debut in bivariate analysis. The entire variable except depression sustains to be predictors in multivariate analysisis indicated in *Table 5*.

Table 3. Reproductive health problem among Haramaya University students, Ethiopia

Variable		Frequency	percentage
History of unintended pregnant(n=1067)	No	927	86.9
	Yes	140	13.1
Pregnancy frequency (n=140)	Once	102	72.9
	More Than Once	38	27.1
Pregnancy outcome(n=140)	Currently Pregnant	15	10.7
	Aborted	120	85.7
	Give Birth	5	3.6
Place of abortion(n=120)	Health Facility	95	79.2
	Home By Traditional	15	12.5
	Home By Profession	10	8.3
Abortion frequency (n=120)	Once	97	80.8
	More Than Once	23	19.2
History of acquiring STI (n=979)	No	927	94.7
	Yes	52	5.3
Type of acquired STI(n=52)	Urethral Discharge	34	65.4
	Genital Ulcer	18	34.6
Seeking Treatment for STI(n=52)	No	26	50.0
	Yes	26	50.0
Current STI(n=52)	No	27	51.9
	Yes	25	48.1
Types Current STI (n=25)	Urethral Discharge	10	40.0
	Genital Ulcer	15	60.0
HIV Sero-Prevalence (N=3399)	Negative	3367	99.1
	Positive	32	0.9

3.6. Factor Associated with Unwanted Pregnancy

In the multivariate analysis year of study, using *hashish*, number of sexual partner, being infected with STI, and being stressed were found to be predictors of unwanted pregnancy. Fifth year student were 14 times more likely to be pregnant than first year students; as number of sexual partners increase by one the chance of getting pregnant increased by 5%. The likelyhood of getting pregnant by stressed student is 66% higher than normal students *(Table 6)*

Table 4. Factor associated to sexual debut among study participants, 2014.

Variable		Ever had have sex		COR	COR
		No (%)	Yes (%)		
Age	<=20	1668(78.1)	469(21.9)	1	1
	21+	1204(66.8)	598(33.2)	1.7(1.5- 2.0)**	1.31(1.05-1.62)*
Sex	Male	1893(68.2)	884(31.8)	2.4(2.0- 2.9)**	1.6(1.24-2.18)*
	Female	979(84.3)	183(15.7)	1	1
Grew up with	Both parents	1942(75)	647(25)	1	1
	mother only	413(71)	169(29)	1.22(1.06-1.50)*	1.18(0.8-1.5)
	father only	71(71)	29(29)	1.2(0.78-1.9)	2.3(1.1- 4.9)*
	relative	261(70)	109(29.5)	1.2(0.98-1.59)	1.2(0.8- 1.8)
	others	163(62.2)	99(37.8)	1.8(1.39-2.37)**	1.5(1.05-2.3)*
Pocket money	Yes	1366(75.7)	438(24.3)	1	1
	No	1482(70.5)	619(29.5)	1.3(1.12-1.5)**	1.25(1.01-1.56)*
Hashish	Yes	2759(74.2)	961(25.8)	5.4(3.8- 7.9)**	4.5(2.601-7.8)**
	No	46(34.3)	88(65.7)	1	1
Alcohol users	Yes	1996(80.5)	482(19.5)	2.9(2.5- 3.3)**	2.05(1.6-2.5)**
	No	790(58.7)	556(41.3)	1	1
Depression	Normal	1661(75.1)	551(24.9)	1	1
	depressed	920(70.4)	387(29.6)	1.26(1.08-1.47)**	1.00(0.8-1.2)
Watch sexual	No	913(61.3)	577(38.7)	1	1
explicit material	Yes	714(84.3)	133(15.7)	3.39(2.74-4.19)**	2.6(2.08-3.48)*
Used Facebook	Yes	1685(69.9)	727(30.1)	1.76(1.49-2.09)**	1.34(1.03-1.74)*
	No	910(80.4)	222(19.6)	1	1

Table 5. Predictors of unwanted pregnancy among Haramaya University students, Ethiopia.

Variable		Unwanted pregnancy		Crud OR	Adjusted OR
		No (%)	Yes (%)		
Hashish users	No	851(88.6)	110(11.4)	1	1
	Yes	62(70.5)	26(29.5)	3.2(1.9- 5.3)***	2.9(1.4- 5.9)*
Reason start sex	Love	549(86.9)	83(13.1)	1	1
	of gift	24(70.6)	10(29.4)	2.7(1.2- 5.9)*	2.2(0.75-6.97)
	Peer Pressure	121(92.4)	10(7.6)	0.5(0.27-1.08)	0.11(0.02-0.42)*
	Curiosity	172(90.5)	18(9.5)	0.6(0.4- 1.18)	0.47(0.23-0.95)*
	Raped	15(65.2)	8(34.8)	3.5(1.45-8.57)**	2.8(0.933-8.82)
	Other	46(80.7)	11(19.3)	1.5(0.7-3.17)	1.4(0.63-3.39)
Condom use	No	588(85.1)	103(14.9)	1	1
	Yes	339(90.2)	37(9.8)	0.6(0.4-0.9)*	0.6(0.38-1.104)
no sexual partners				1.04(1.01-1.07)*	1.05(1.03-1.094)*
Ever acquired	No	833(89.9)	94(10.1)	13.08(7.2-23.6)*	19.4(0.9-64.18)*
STI	Yes	21(40.4)	31(59.6)	13.0(7.2-23.6)*	15.03(7.08-31.9)*
Stress	Normal	608(89.7)	70(10.3)	1	1
	stressed	212(81.2)	49(18.8)	2.0(1.3-2.9)*	1.66(1.02-2.69)*

3.7. Factors Associated with Condom Use

In bivariate analysis socio-demographic variable including sex, year of study, area of growing up, ever used hashish, cigarette smoking , type of sexual partners and number of life time sexual partners were identified to be predictors for condom use. In multivariate analysis, sex, area of growing up, and smoking cigarette were maintained statistically significant. Male students were used condom more likely than female students (AOR=1.93(1.10-3.36) and those who grew in urban utilized condom than grew in rural (1.57= (1.01-2.44).

Table 6. Determinants of condom use among university students, in Haramaya University, Ethiopia

Variable		Condom use		Bivariate analysis		Multivariate analysis	
		No	Yes	COR	CI	AOR	CI
Sex	Male	38.6%	61.4%	2.13**	(1.33-3.41)	1.93*	(1.10-3.36)
	Female	57.3%	42.7%	1		1	
Batch	One	34.2%	65.8%	1		1	
	Two	44.7%	55.3%	1.55	(0.95-2.54)	0.71	(0.41-1.21)
	Three	47.6%	52.4%	1.75*	(1.01-3.00)	0.60	(0.33-1.09)
	Four	41.9%	58.1%	1.38	(0.76-2.52)	0.51	(0.26-1.00)
	Five	37.5%	62.5%	1.15	(0.26-5.08)	0.93	(0.20-4.33)
Area of growing up	Urban	37.9%	62.1%	1.65**	(1.13-2.43)	1.57*	(1.01-2.44)
	Rural	50.3%	49.7%	1		1	
Ever hashish users	No	44.2%	55.8%	1			
	Yes	27.7%	72.3%	2.07*	(1.06-4.03)	0.80	(0.32-2.00)
Ever smoker	No	46.4%	53.6%	1		1	
	Yes	24.7%	75.3%	2.63**	(1.56-4.44)	2.17*	(1.26-3.7)
Type of last sexual partners	Student	44.4%	55.6%	1		1	
	Sex Worker	18.5%	81.5%	0.28**	(0.10-0.77)	2.23	(0.76-6.56)
	Teacher	48.0%	52.0%	1.15	(0.50-2.63)	0.87	(0.34-2.22)
	Person In Campus	28.9%	71.1%	0.50	(0.24-1.07)	2.29	(0.98-5.33)
	Person Out Side Campus	45.4%	54.6%	1.03	(0.68-1.58)	1.05	(0.66-1.66)
Number of sexual partner	One	48.8%	51.2%	1		1	
	More Than One	36.9%	63.1%	1.62**	(1.12-2.36)	1.20	(0.78-1.83)

3.8. Factors Associated with HIV Infection

To identify the predictors of HIV infection, different socio-demographic and substance use were checked; among all variable entered into initial model, frequency of alcohol use, reason for first sexual debut, type of sexual partners in last sex were found to be predictors for HIV infection. Those who started sexual intercourse because of gift or money were eight times more likely to be infected with HIV (COR=8.72, CI=2.12-35.70). Those students whose sexual partner was teachers were seven times more likely to be infected with HIV as compared to students whose sexual partners were students. (COR=6.912, CI= (1.08-43.9). But these all variable can't be maintained statistically significant into final multivariable model.

3.9. Factors Associated with Reported Acquired STI

To find predictors of acquiring, STI bivariate analysis was carried out. These variables were, year of study, area of growing up, hashish users, reason for first sexual intercourse, and types of recent sexual partners . Among those initially predictors for STI, area of growing up, reason for first sexual debut and type of current sexual partners and hashish users were maintained in to the model in the multivariable analysis. Students who grew in the rural were five times more likely to acquire STI than students who grew in urban (AOR=5.42,CI=1.84-15.9). Those students who start sexual intercourse because of gift were 11 times more likely to acquire STI than students that start sexual intercourse because of love (COR=10.7, CI=1.30-89.4). Students whose sexual partner were a person outside of the University compound were about six times more likely to acquire STI than whose sexual partners were students(AOR= 5.76,CI=1.78-18.6)

3.10. Factor Associated with Multiple Sexual Partners

Determinant for multiple sexual partners were identified. These variables were age of participant, sex, hashish users, stressed students, watchers of sexual explicit material and face book users. The entire variable was maintained in the final model of multivariate analysis except hashish users.

Table 7. Determinant for HIV infection among Haramaya University students, Ethiopia.

Variable		HIV Test		Bivariate		Multivariate	
		-ve	+ve	COR	CI	AOR	CI
Frequency of alcohol use	Daily	93.2%	6.8%	14.9**	(2.40-91.9)	5.74	(0.32-10.08)
	per week	98.8%	1.2%	2.5	(0.35-18.25)	1.91	(0.10-35.25)
	Rarely	99.5%	0.5%	1		1	
Sex start how	fall in love	98.6%	1.4%	1			
	because of gift	89.3%	10.7%	8.72*	(2.12-35.70)	4.07	(0.17-95.62)
	peer pressure	98.3%	1.7%	1.26	(0.25-6.16)	.000	(.00-
	Curiosity	98.8%	1.2%	0.903	(0.18-4.39)	0.6	(0.09-9.92)
Last sex with whom	Student	98.5%	1.5%	1			
	Commercial Sex Worker	95.2%	4.8%	3.28	(0.32-33.05)	4.65	(0.25-85.1)
	Teacher	90.5%	9.5%	6.912*	(1.08-43.9)	8.41	(0.43-162.6)
	Person Out Side Campus	98.3%	1.7%	1.152	(0.19-6.9)	.000	(0.00-

4. Discussion

Risky sexual behaviour among university students is the most important variable that needs urgent intervention. Risky sexual behaviour includes unintended pregnancy, repeated pregnancy, unprotected sex, and having multiple sexual partners. This study is the most comprehensive and uses a more representative student population in the university. The reported sexual experience of respondents was low as compared to different studies conducted conducted in different countries. It is far low than all African Universities students sexual practice and other developed countries university's students (Flannery D. &Ellingson L., 2002, *Abiola A. and Edward A.2008* , Yan H.*et.al* 2009, Adhikari R.2010,*Nigatu R, and Seman K.2011,*John, *TerefeGelibo et al. 2013,* AbdulrahmanImaledo et al. 2012. Somba*et al.*2014, ,Zhou*et al.*2013. *and* Degroote*et al.* 2014*).*

The difference in sexual behaviour might be because of cultural difference among the countries. In china and in countries where pre-marital and extramarital sexual practice is band by law and considered as a crime like Arab courtiers, the prevalence of sexual practice is low (Mohammad *et al.* 2015, Ghandour*et al.* 2014 and Zhou *et al.*2013).

Sexual practice among these university students seems very low, albeit they practice risky sexual behaviours. Early sexual debut, start sex because of gift(transactional sex), having sexual partners out of fellow students, and having multiple sexual partners, not using condom during recent sexual contact, getting pregnant repeatedly, and acquiring STI were predominantly observed among participants. These all risky sexual behaviours will lead students to suffer from poor health, low quality of life, and unable to achieve their academic career.

To the best of our knowledge, ours is the first study to randomly selecting university students form different colleges and year of study and collecting blood for HIV test. Therefore, it is more comprehensive and representative. The HIV prevalence in this study among sexually active students was 3.6%. This HIV prevalence in Haramaya University students by two fold higher than national prevalence(EDHS,2011). This indicated that sexually active university students in Ethiopia are at risk for HIV. The study in different part of the world ranges from 0.2% in USA and -7.7% South Africa. (Kharsany *et al.*, 2012, Helen D.*et al.*1990 and Thomas et.al. 2008, Lake Victoria Basin commission, 2010; White *etal.*,2009; de Beer*et al.*, 2012). The prevalence of HIV in our university is lower than other African university students. The variation on HIV seroprevalence between ours and other African university students might be because of national difference in HIV prevalence. As compared to many SSA countries, HIV prevalence in Ethiopia is very low (EDHS,2011). The other possible reason for low prevalence of HIV among our students might be the fact that majority of the students were practicing sexual contact with fellow students. Even though the prevalence is lower than other African university students, 3.6% prevalence of HIV which is double than the national prevalence has a great implication to Public health importance.

Alcohol and other substance use in Haramaya University were highly prevalent as compared to many others university (John Abdulrahman Imaledo *et al.* 2012; TerefeGelibo *et al.* ; 2013; DevikaMehra *et al.*, 2014; Vikas Choudhry *et al.*, 2014.). Smoking cigarette, drinking alcohol, and chewing *Khat* may pave the road to the most hard and illicit drug use. Hashish and shisha used by the respondents. All this substance put the students on risky sexual behaviours.

Frequently drinking alcohol, starting sex for gift and having sexual partners out of fellow students were significantly associated with HIV infection. This finding is also incongruent with other literatures. (White *et al.*, 2009; Khangelani Z *etal.*, 2010; EDHS, 2011 and de Beer *et al.* 2012).

Table 8. Determinant for STI among Haramaya University students, Ethiopia, 2014

Variable		STI		COR	CI	AOR	CI
		Negative	Positive				
Batch	One	93.4%	6.6%	1		1	
	Two	93.2%	6.8%	1.03	(0.54-1.96)	1.05	(0.32-3.41)
	Three	95.9%	4.1%	0.60	(0.27-1.33)	0.97	(0.26-3.64)
	Four	99.2%	0.8%	0.12*	(0.01-0.90)	0.01	(0.01-1.5)
	Five	93.3%	6.7%	1.01	(0.12-8.16)	0.05	(0.02-2.0)
Area of growing up	Urban	96.6%	3.4%	1			
	Rural	92.4%	7.6%	2.36**	(1.31-4.24)	5.42**	(1.84-15.9)
Hashish ever	No	95.5%	4.5%	1		1	
	Yes	86.2%	13.8%	3.37**	(1.65-6.87)	5.02*	(1.64-15.0)
Age At Sex Started (N=1067)	10-15 Years	90.8%	9.2%	1		1	
	16-20 Years	96.1%	3.9%	0.39**	(0.22-0.72)	.52	(0.19-1.4)
	21-24 Years	94.8%	5.2%	0.542	(0.19-1.47)	.41	(0.06-2.5)
Reason To Start Sex First	Fall In Love	96.0%	4.0%	1		1	
	for Gift	83.3%	16.7%	4.86**	(1.70-13.8)	10.7*	(1.30-89.4)
	Peer Pressure	93.0%	7.0%	1.8	(0.79-4.17)	0.92	(0.16-5.15)
	Curiosity	95.5%	4.5%	1.15	(0.50-2.61)	0.73	(0.20-2.7)
	Raped	86.4%	13.6%	3.83*	(1.05-13.9)	0.00	(0.00-
	Other	90.6%	9.4%	2.53	(0.92-6.95)	1.50	(0.31-7.06)
Recent sexual partners	Student	96.8%	3.2%	1		1	
	Commercial Sex Worker	96.0%	4.0%	1.28	(0.15-10.4)	1.07	(0.10-10.0)
	Teacher	78.3%	21.7%	8.53**	(2.45-29.6)	6.10**	(2.31-28.6)
	Person In Campus	93.9%	6.1%	1.98	(0.39-9.97)	3.88	(0.60-24.9)
	Person Out Side Campus	91.8%	8.2%	2.74*	(1.03-7.26)	5.76*	(1.78-18.6)

Table 9. Determinants of multiple sexual partners among Haramaya University students, 2014.

		No of sexual partner		Crude OR	Adjusted OR
		One	> one		
Age	<=20 year	293(62.5)	176(37.5)	1	1
	>21 year	333(55.7)	265(44.3)	1.32(1.03-1.69)*	1.7(1.07-2.7)*
Sex	Male	480(54.3)	404(45.7)	3.32(2.26-4.87)*	2.6(1.61-4.4)**
	Female	146(79.8)	37(20.2)	1	1
Hashish users	Yes	572(59.5)	389(40.5)	1.61(1.04-2.4)*	1.5(0.8- 2.7)
	No	42(47.7)	46(52.3)	1	1
Stress	Normal	407(60)	271(40)	1	1
	Stressed	137(52.5)	124(47.5)	1.35(1.02-1.8)*	1.5(1.09-2.2)**
Watch porno	Yes	297(51.5)	280(48.5)	1.35(1.02-1.81)	1.7(1.07-2.7)**
	No	92(69.2)	41(30.8)	1	1
Face book	Yes	402(55.3)	325(44.7)	1.75(1.27-2.41)	1.7(1.07-2.7)*
	No	152(68.5)	70(31.5)	1	1

In this study, risky sexual behaviour: unwanted pregnancy, multiple sexual partners, and not using condom in last sexual intercourse were associated with various variables. Those students who stay long in university became more pregnant than students that stay short in university. Therefor, those senior students were at more risk of this unwanted pregnancy. Unwanted pregnancy is also associated with acquiring STI which in turn is very important indicators for student who become pregnant also acquiring STI. It is a double burden for university students. Hashish users and depressed students got pregnant than their counter part. Female students who grew up in rural were less likely to use condom; this mean that, rural grown and female students were at high risk for STI.

Rural students who started sexual intercourse because of gift, hashish users, students whose sexual partners were a person out of the university compounds, and teachers were acquire STI than others. Males, older students, those who watch sexually explicit materials, those who use Facebook, and stressed students had multiple sexual partners than others.

5. Conclusion

The prevalence of sexual intercourse among university students seems low. The risky sexual behaviour that is hazardous to their health is prevalent. The HIV seroprevalence among university students were higher than national adult HIV prevalence. A significant numbers of students has multiple sexual partners, did not use condom consistently, and had sexual partners out of the university compound. This finding identified student groups who were at risk of HIV, STI, unwanted pregnancy, multiple sexual partners; hence public health professional can devise a mechanism on how to approach and help these kind of students so as to attain maximum reproductive health life.

6. Recommendations

This study has identified a number of reproductive and sexual health problem of university students; based on the finding we recommend that:

- Students' knowledge about sexual and reproductive health has to be maximized through continual and periodic health education (might be as one course (p/F) or through youth dialog.
- Haramaya University has to establish and strengthen youth friendly service for reproductive and sexual health
- Haramaya University Gender and HIV Directorate has to strength peer education through which students obtain accurate and up-to-date information on reproductive and sexual health
- Haramaya University Clinic has to host ART for HIV positive students at nearby clinic
- Haramaya university clinic has to strengthen HIV testing and counseling at routine health care facility and STI treatment to adders university's youth
- NGO's have to work on university students through different prevention strategies to be implemented in the campus

7. References

Abiola A. and Edward A. 2008. Prevalence of major HIV- risk related behaviour among SSS3 students in Port Harcourt Metropolis, Nigeria. *African Journal of Health Sciences.* 2008; 15 : 42 – 49.

Adefuye A., Abiona1 T., Balogun J., and Durrell M. 2009. HIV sexual risk behaviors and perception of risk among college students: implications for planning interventions.

Adhikari R. 2010. Are Nepali students at risk of HIV? A cross-sectional study of condom use at first sexual intercourse among college students in Kathmandu. *Journal of the International AIDS Society* 2010, 13:7pp3-4.

Adriana Ortiz-Ortega, Guadalupe García de la T orre, Fernando Galván, Patricia Cravioto, Francisco Paz,ClaudiaDíaz-Olavarrieta, Charlotte Ellertson, and Alejandro Cravioto 2003. Abortion, contraceptive use, and adolescent pregnancy among first-year medical students at a major public university in Mexico City. *Pan Am Journal of Public Health* 14 (2).

Barbour and Salameh. 2009. Knowledge and practice of university students in Lebanon regarding contraception. *La Revue de Santé de la Méditerranéeorientale*, Vol. 15, N°2.

Behavioral surveillance Survey (BSS) Ethiopia. 2005. Round Two, MOH/HAPCO, AAU, CSA, EPHA, Addis Ababa, Ethiopia.

Derege Kebede, Atalay Alem, Getnet Mitike, Fikre Enquselassie, Frehiwot Berhane, Yigeremu Abebe, Reta Ayele, Wuleta Lemma, Tamrat Assefa and Tewodros Gebremichael.. 2005. Khat and alcohol use and risky sex behaviour among in-school and out-of-school youth in Ethiopia. *BMC Public Health*5 : 109.

EDHS. 2011. CSA and ICF international ORC Macro, Calverton, Maryland, USA.

Elias W. 2009. Internet - Based Technology as source of sexual and HIV/AIDS Related Health Information among AAU students. Unpublished Thesis.

Eric Yeboah, Tenkorang, and Eleanor. Maticka-Tyndale. 2008. Factors Influencing the Timing of First Sexual Intercourse AmongYoungPeopleinNyanza,Kenya. *International Family Planning Perspectives*34 (4) : 177 – 188.

Fishbein M. 2000. The role of theory in HIV prevention. AIDS care. 12 (3) :273 - 278.

Flannery D. & Ellingson L. 2003. Sexual Risk Behaviors among First Year College Students. *Californian Journal of Health Promotion 2003*, 3 (1), pp 93 - 104.

Gashaw E. 2007. Low prevalence of HIV infection, and knowledge, attitude and practice on HIV/AIDS among high school students in Gondar, Northwest Ethiopia. *Ethiop.J.Health.Dev.* 21 (2): pp179 - 182.

Helen D. 1990. Prevalence of HIV among University students. *N Engl J med.1990*: 323 : 1538 - 41.

Hightow L.2005. The Unexpected Movement of the HIV Epidemic in the Southeastern United States Transmission Among College Students. *J Acquir Immune Defic Syndr* 38: 531 - 537

Cole, F C L Beighton, Ivor H Jones.1975. Contraceptive practice and unplanned pregnancy among single university students. *British Medical3Journal*4, 217 - 219.

Khangelani Z. 2010. Age at sexual debut: A determinant of multiple partnership among South African youth. *Afr. J. Reprod. Health* 14 (2): pp47 - 54.

Lake Victoria Basin Commission. 2010. HIV & AIDS Baseline Sero-behavioural Study in SixUniversities in Kenya. 35 - 40.

Lloyd CB. 2005. The Changing Transitions to Adulthood in Developing Countries.National Academies Press,Washington, DC.

Lloyd, Cynthia B. and Barbara S. Mensch. 2008. Marriage and childbirth as factors in dropping out from school: An analysis of DHS data from sub-Saharan Africa. Population Studies: *A Journal of Demography* 62:(1): 1–13..

Lule E. 2006. Adolescent health programs: Disease Control Priorities in Developing countries, Washington DC: Oxford University Press and World Bank, , pp. 1109 - 1125.

Ma Q. 2009. Early initiation of sexual activity: a risk factor for sexually transmitted diseases, HIV infection, and unwanted pregnancy among university students in China. *BMC Public Health* 9: 111

Mengistu B., Berehane Y., and Belayenh. 2011. HIV and associated factors among university students of Dire Dawa University, eastern Ethiopia.22ndAnnual EPHA Conferenace Abstract.

Nigatu R.. and Seman K. 2011. Attitudes and practices on HIV preventions among students of higher education institutions in Ethiopia: The case of Addis Ababa University. *International Research Journals.* 2 (2):828 – 840.

Onja Holisoa Rahamefy, Michèle Rivard, Madeleine Ravaoarinoro, Lala Ranaivoharisoa, Andriamiliharison Jean Rasamindrakotroka, Richard Morisset. 2008. Sexual behaviour and condom use among university students in Madagascar. *Journal of Social Aspects of HIV/AIDS*:. 5 (1).

Tefera B, Challi J, and Yoseph M. 2004. KAP about HIV/AIDS, VCT Among students of Jimma University, Jimma Zone, SW, Ethiopia. Ethiop. *J. Health Sci*..14, *Special issue.*

Teka T. 1993. College Students' Attitude and knowledge of AIDS. *Ethiop. Med. J.* 3: 233-237.

Thomas P, 2008. HIV Risk Behaviors and Testing History in Historically Black College and University Settings. Public Health Reports, 2008 3 (123) pp115.

UNAIDS Joint United Nations Programme on HIV/AIDS. 2004. Report on the Global AIDS Epidemic: 4th Global Report, Geneva.

USAID. 2010. HIV/AIDS Health Profile for Ethiopia.AA. Ethioipia Wikipedia, the free encyclopedia (2008). List of countries by HIV/AIDS Adult prevalence rate (http://en.wikipedia.org/wiki) (Accessed on 30/05/2011).

Wegene Tamire, Fikre Enqueselassie. 2007. Knowledge, attitude, and practice on emergency contraceptives among female university students in Addis Ababa, Ethiopia. *Ethiop. J.Health Dev.*21 (2): 111 – 116.

White H.L. 2009. Prevalence and predictors of HIV infection amongst Malian students. *AIDS Care. 2009*: 21 (6): 701 – 707.

WHO. 2004. Unsafe Abortion: Global and Regional Estimates of the Incidence of Unsafe Abortion and Associated Mortality in 2000.

Xu. 2011. A cross-sectional study of HIV and syphilis infections among male students who have sex with men (MSM) in northeast China: implications for implementing HIV screening and intervention programs.*BMC Public Health* 11: 287.

Yan H. 2009. Multiple sex partner behavior in female undergraduate students in China: A multi-campus survey. *BMC Public Health* 9:305.

Yussu I. 2012. HIV Prevalence High Among College Students in Zanzibar. Tanzania daily news. (http://allafrica.com/stories/201212030181.html.)(Accessed on11/1/2013).

Zuma Khangelani, Setswe Geofrey, Ketye Thabile, Mzolo Thembile, Rehle Thomas, Mbelle Ntombizodwa. Age at sexual debut: A determinant of multiple partnership among South African youth. *Afr. J. Reprod. Health*14(2): 47 – 54.

12. Quality of Life among HIV-Positive Attending ART Clinical Care in Public Health Facility of Dire Dawa Administration

Merga Dheresa[1]*, Fekede Assefa[1], Degu Abate[1], Yadeta Dessie[1]

College of Helath and Medical Science, Haramaya University, Harar, Ethiopia

Abstract

Quality of life (QOL) is defined by the World Health Organization as 'an individual's perception of their position in life, in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns.QOL is an essential component for patient with chronic disease like HIV/AIDS because worse QOL is associated with higher mortality. With the recent advances in clinical tests and treatments for those suffering from HIV/AIDS, the survival of these patients has been increased and their quality of life has become an important focus for researchers and healthcare providers. The objective of this study was to assess quality of life among HIV-positive attending their ART clinical care in public health facility in Dire Dawa administration from July 2012 through September 2012. Institutional based crosssectional study design was carried out among randomly selected 659 HIV positive individuals attending their ART clinical care in Dire Dawa administration. WHO QOL-BREF questionnaire with 26 items was used to collect data. Each item used a Likert-type five-point scale. These items were distributed in four domains. Domain scores were scaled in a positive direction (Higher scores denote higher quality of life). SPSS version 17 software was used to perform the analysis. The data was presented in percentage, proportion, mean, SD. T-test and one way ANOVA were used to test difference between and among group respectively and significance of level set at ($p<0.05$). Overall, 659 HIV positive individual who were taking ART were participated in this study. The mean age and standard deviation of participants were (36+9) with range of 19-75 years old. Mean length of month on ART was (36+26). Eighty eight percent of participants had good adherence on ART use. The mean score of QOL was highest in psychological domain followed by physical, environmental and social domain in decreasing order. Educational status, marital status, occupation and monthly income had significant differences in mean score of QOL. Start ART soon after diagnosed being on ART for longer period of time showed good QOL than other groups.

1. Introduction

Unless effectively treated, people with HIV infection suffer a long period of illness after progressing from asymptomatic infection to immune deficiency disease and death. Since the introduction of highly active antiretroviral therapy (ART), the life-expectancy of treated patients with human immunodeficiency virus (HIV) infection has been extended and HIV infection transforming from a fatal condition to a more manageable chronic disease.(Lee *et al.*,2010 and Ls *et al.*,2011). Clinical improvement of HIV-infected patients under antiretroviral therapy (ART) has often been measured by reduction in mortality, opportunistic infection rates or severe AIDS-related symptoms. ART is highly effective and has the ability to bring significant benefits. Even with improved treatment and survival, HIV/AIDS can still compromise health-related quality of life (QOL), especially for those with side-effects from treatment and/or with more advanced disease (Hansen *et al.*,2009 and Anis *et al.*,2009).

Although there are well-established immunologic, virologic, and clinical markers or predictors of HIV disease progression, self-reported health-related quality of life measures are less well understood, particularly among those patients with advanced immune disease. (Lee *et al.*,2010 and Ls *et al.*,2011).

Quality of life (QOL) is defined by the World Health Organization as 'an individual's perception of their position in life, in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns (WHO,1995). QOL is determined by the extent that ambitions and expectations correspond to personal experience; by personal perception about one's position in life, considering the cultural context and value systems in which people live; and in relation to personal goals, expectations, standards and beliefs through the evaluation of the current state in relation to the ideal, as well as to what people consider as important factors in their lives (Boer-van D.,2010, Nojimoni M.,AberyK.,andRanjibar M.,2008, LorenzaL.,Cesar L. andGuimaraes M., 2009 and Murs *et al.*,2006).

In developed country settings, QOL assessment has become increasingly important as healthcare providers attempt to understand the impact of healthcare interventions on patients' lives rather than solely their physical outcomes (Addington-Hall J.andKarila L.,2001). In particular, the main focus of palliative care is to improve the QOL of patients and their families who face the problems associated with life-limiting illness. This includes meeting patients' social, spiritual and psychological needs as well as alleviating pain and other physical symptoms (Jocham HR. and Dassen T.,2006, Selama *et al.*,2011,Watichel *et al.*,1994,Arand-Naranjo B.,2004 and Solvina M.,2003). QOL is an essential component for patient with chronic disease like HIV/AIDS because of the following reason; First of all, it has become increasingly clear that mortality reduction cannot be the only objective for health care systems facing mostly chronic and degenerative diseases. Secondly, it has also become clear that it is the patient, not the physician, who has the authority to judge his/her health status. Thirdly, the evolution of the economic evaluation methods of health care technologies has allowed and stimulated an increase in the interest in subjective health and quality of life of

patients. Now, several studies reveals that a worse QOL is associated with higher mortality (Idlor El and Beniyamini Y.,1997 and Oliva M*et al*.,2010).

QOL assessment in PLHIV provides valuable information about the effects of ART, disease progression and prognosis, and the factors that influence prognosis; results that clinical analysis is unable to provide. It must be taken into account that the evaluation of QOL by the patient does not necessarily coincide with the severity of the illness as defined by the patient's care givers. QOL provides valuable information for health care managers and authorities, as it allows evaluation of the efficiency, effectiveness and cost– benefit ratio of health care programmes, and for pharmaceutical companies that gather data on effectiveness, clinical benefit, satisfaction with treatment and treatment adherence (Ls *et al*.,2011). QOL in the HIV-infected population has not previously been investigated in Dire Dawa, and so the researcher is interested to assess quality of life among HIV infected individual and to look at factors associated to QOL. Thus, this study aimed to assess quality of life among HIV-positive attending their ART clinical care in public health facility in Dire Dawa administration July 2012 through September 2012.

2. Methods and Materials

2.1. Study Area

The study was conducted in public health institutions in Dire- Dawa Administration namely Dilchora hospital, Laga Haree health center, Sabian and Malka Jabdu health center. Dire Dawa is located in the eastern part of the country enclosed by Somali and Oromiya National Regional States. . It is found at a distance of 515 kilometers from Addis Ababa. The administration has an estimated area of 128,802 hectares. Based on the 2007 Census conducted by the Central Statistical Agency of Ethiopia (CSA), Dire Dawa has a total population of 342,827, of whom 171,930 were men and 170,897 women; 232,854 or 67.92% of the population are considered urban inhabitants. With an estimated area of 1,213.20 square kilometers, this chartered city has a population density of 328.06 people per square kilometer (CSA, 2007).

2.2. Study Design

Institutional based cross-sectional quantitative study design was conducted on 660 ART taking HIV positive adults from July 2012 through September 2012.

2.3. Sampling Technique

After selecting those public health institutions which have ART clinic in Dire Dawa administration, participants sample was allocated according to the number of HIV positive individuals taking their ART in respective heath institutions. Assuming that the patients randomly visit health facility,subsequent patients were included in the study until the desired sample was satisfied.

2.4. Data Collection

2.4.1. Data collection instrument

The instrument used in this study was adapted from quality of life questionnaire of World Health Organization (WHO-QOL-Brief). The WHOQOL Bref consists of 26 items. Each item uses a Likert-type five-point scale. These items were distributed in four domains. The four domains of QOL were, (1) physical health and level of independence (seven items assessing areas such as presence of pain and discomfort; dependence on substances or treatments; energy and fatigue; mobility; sleep and rest; activities of daily living; perceived working capacity); (2) psychological well being (eight items assessing areas such as affect, both positive and negative self concept, higher cognitive functions; body image and spirituality), (3) social relationships (three items assessing areas such as social contacts, family support and ability to look after family; sexual activity) and (4) environment (eight items assessing areas such as freedom; quality of home environment; physical safety and security and financial status; involvement in recreational activity; health and social care: quality and accessibility). There were also two items that were examined separately: one which asked about the individual's overall perception of QOL and the other asked about the individual's overall perception of his or her health. Domain scores were scaled in a positive direction (Higher scores denote higher quality of life). A Likert type five-point scale was used for each question. The fifth choice indicated the best status (score: 5), and the first choice indicated the worst status (score: 1). Questions about demographic and clinical variables of the patients such as clinical stage of the disease, HIV helper cell count (CD4+) counts at the first section of the questionnaire were added.

2.5. Data Analysis and Processing

Data was cleared and entered to computer and analyzed with SPSS version 17. The measured main outcome in this study was the over all quality of life which was considered as a continuous variables ranging from 26(minimum) to 130 (maximum). The QOL was categorized, as physical domain, psychological domain, social domain environmental domain, and mean score which was transformed to 0-100. Association of socio-demographic, clinical variables and substance use as independent variables with the quality of life was studied. We used mean, SD, t-test and one way ANOVA, for data analyses. The significance level was set at $P<0.05$.Multicollinearitybetween the variables was checked using variance inflation factor(VIF), all independent variables have VIF<10. Normality, linearity and homoscedasticity of the data were checked and maintained.

2.6. Data Collectors

The patients were interviewed by eight HIV coordinator nurses who useda structured interview. Data collectors were supervised by the principal investigator and three other supervisors. Informed written consent of all the respondents enrolled in the study was duly taken.

2.7. Variable

2.7.1. Dependent variable

Quality of life among HIV infected individual.

2.7.2. Independents variable

Age, sex educational status, marital status, CD4 count, occupation were independent variables.

2.8 Data Quality Management

To secure data quality, we used the Standardized WHOQOL -Bref questionnaire that consisted of 26 items. Each item used a Likert-type five-point scale and the questionnaire was prepared in English, and it was then translated to Amharic, Afan Oromo and Somali languages. The questionnaire passed a pretest in Hiwot Fana Hospital. Training was given to data collectors to help them understand the questionnaire very well. Supervisors (degree holder nurses) and the principal investigator assisted data collectors and checked for completeness and consistence of data during data collection time. Internal reliability of the questionnaire was tested using chronbach's alpha test. All domain of QOL accepted ranges of alpha as indicated in table below.

Table 1. Internal Reliability Of QOL Domain

Domain	N	Alpha
Physical	659	0.73
Psychological	659	0.65
Social	659	0.62
Environmental	659	0.65
Over all	659	0.86

2.9. Ethical Consideration

The study protocol was approved by the College of Health Sciences and then by institutional ethical clearance of Haramaya University, Harar campus. An official letter of co-operation was written to respective health institutions from College of Health and Medical Sciences. Some required information was obtained from the patients' file through their physicians or nurses and not by researchers. Written informed consent was obtained from each participant. In order to protect the confidentiality of the information, names and personal identification was not included in the written questionnaires.

3. Results

3.1. Socio-Demographic Characteristics

Six hundred fifty nine HIV positive individuals who were taking ART during the study period were participated in this study. The mean age and standard deviation of participants were (36$\pm$9) with range of 19-75 years old. Among the study participants, the majority (64.8%) of them were female. The educational qualification of the most of the respondents were below primary level of schooling; 30%,11.8% and 17.3% of the total respondents attended primary school, can read and write and illiterate respectively. On the other hand, 19.1% and 14.7% of respondents were divorced and widowed respectively. Orthodox religion followers constituted 60.2%, and urban dwellers were 97.6%. Nearly 39% of the respondents earn 200 and less ETB per month (Table1). Among study participants, government employee constituted 20% and daily laborers were 28%. Majority (58%) of the participants had more than two dependent family members.

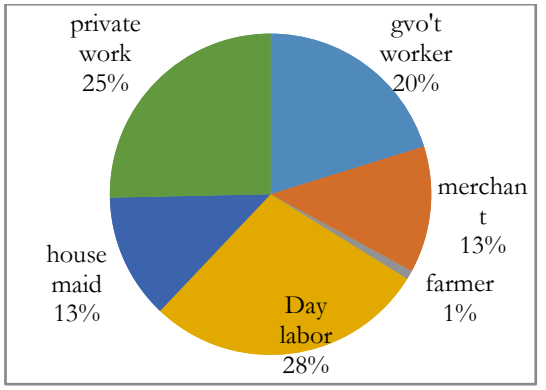


Figure. 1. Occupational status of study participants on QOL in 2012.

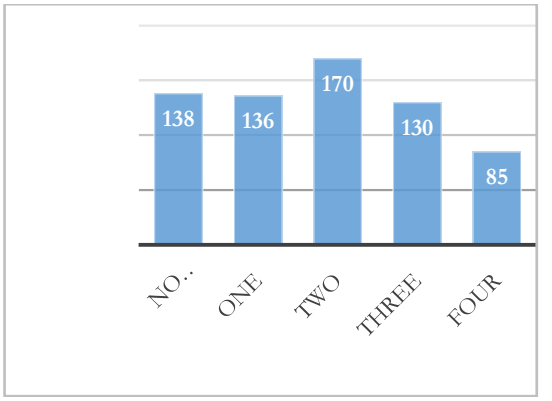


Figure2. Family memeber among study participant on QOL in 2012.

Table 2. Socio demographic and clinical related characteristics of study participants in QOL in 2012.

Variable		Frequency	Percentage
Sex	Male	232	35.2
	Female	427	64.8
Marital status	Not married	145	22.0
	Married	291	44.2
	Divorced	126	19.1
	Widowed/r	97	14.7
Religion	Orthodox	397	60.2
	Muslim	167	25.3
	Protestant	77	11.7
	Catholic	18	2.7
Residency	Urban	643	97.6
	Rural	16	2.4
Monthly income in Ethiopian birr	≤200	256	38.8
	200-499	181	27.5
	500-999	131	19.9
	1000-2000	78	11.8
	>2000	13	2.0
Current CD4 count	≤200	172	26.1
	>200	487	73.9
ART drug Adherence	Good	580	88.0
	Fair	56	8.5
	Poor	23	3.5
Opportunistic infection	Yes	120	18.2
	No	539	81.8
Disclose HIV status	Yes	384	58.3
	No	275	41.7

3.2. Disease Related Characteristics and Substances Use

Thirty three percent of the respondents were categorized under WHO clinical stage III (Fig 4). Mean length of month between diagnosis and treatment of ART was (11±14) with range of 0-92 months. And mean length of month on ART was (36±26) with ranges of 0-96 months. Mean of the most recent documented CD4 count among participants was (341±192) with rages of (19-1022). 88% of participants had good adherence on ART use. Current Mean weight of participants was (54.6±10) ranges from 30- 90 kG. 18.2% of the respondents had opportunistic infection during survey and 58.3% of HIV positive respondents were disclosed their status to other person (table 1). Seventy four, 57 and 91 individual drunk alcohol, smoke cigarette and chew khat, respectively (Fig. 3).

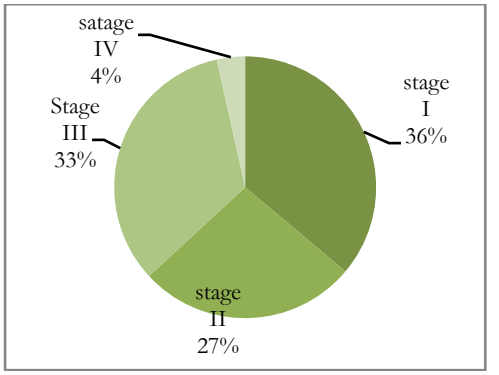


Figure 3. WHO clinical staging among HIV positive study participants on QOL in 2012

Quality of Life among HIV Positive Individual Taking ART

The WHOQOL-HIV BREF instrument with 26 questions was used to measure QOL among HIV positive individual. WHOQOL-HIV BREF instrument with 26 QOL was translated to Amahric and Afan Oromo by bilingual native speakers. The score of QOL in this study was transformed to 0-100 score. The mean score of QOL was highest in psychological domain followed by physical, environmental and social domain in decreasing order (table 3). All domain of QOL showed higher mean score in higher CD4 count (Fig. 4).

Table 3. Mean score, standard deviation and score range of QOL in different domain, 2012.

Domain or Item	N	Mean	SD	Score ranges
Domain				
Physical domain	659	58.2	13	21.4-100
Psychological domain	659	63.6	16	8.3-100
Social domain	659	52.4	19	0.00-100
Environmental domain	659	53.4	14	12.5-100
Item				
Item 1."general QOL"	659	3.75	0.9	1-5
Item 2. "Health"	659	3.66	1	1-5

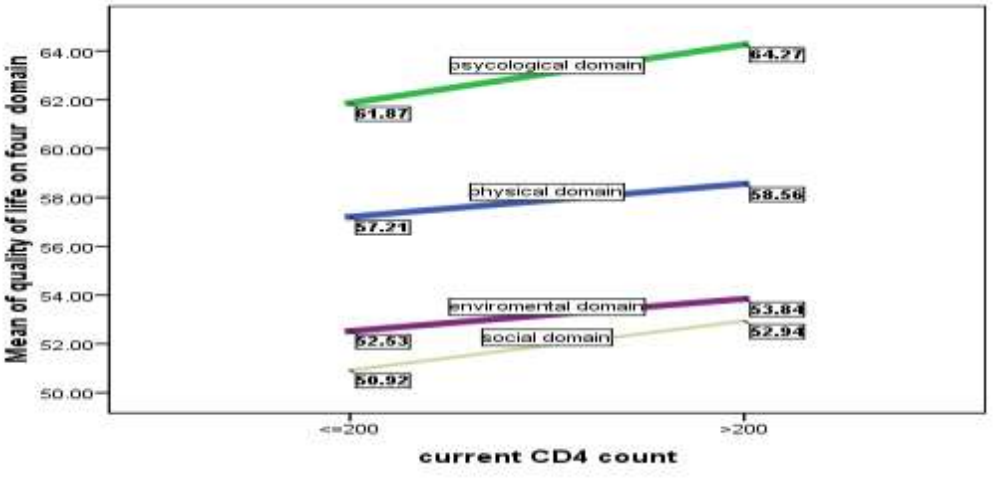


Figure 4. Relationship of QOL and CD4 count among study participants on QOL in 2012.

Table 4. Mean sore, SD and association of socio demographic variable and QOL domain among HIV positive patient in Dire Dawa administration, 2012

		N	Over all QOL	Physical domain	Psychological domain	Social domain	Environmental domain
Sex	Male	232	83.1±12	58.5± 14	65.5± 16	53.8± 20	53.8±14
	Female	427	82.7±11	58.0 ±13	62.6±16	51.6±18.	53.3±14
	T-test		*1.398*	*0.465*	*2.178**	*1.452*	*0.414*
Age	<=35	348	81.6±12	57.5±14	62.7±17	52.7±20	53.0±15
	>35	311	82.9±11	58.9±13	64.6±15	53.0±18	54.0±14
	T-test		-1.422	-1.325	-1.583	0.518	-0.866
Education status	Illiterate	114	77.5±11	54.6±13	58.5±15	48.3±18	47.8±14
	Read &write	78	80.7±9	57.3±13	61.1±14	52.3±18	51.6±12
	Primary	198	83.7±10	58.5±13	66.5±15	54.2±19	54.0±13
	Secondary	189	84.3±12	59.5±12	66.3±15	53.3±18	56.2±15
	Higher	80	81.8±12	60.0±11	59.8±18	51.6±19	55.7±14
	F-test		7.623*	3.122*	7.561*	1.845	7.403*
Marital status	Not married	145	80.6±12	57.9±12	60.2±17	48.4±19	53.1±15
	Married	291	82.9±12	58.4±14	63.9±16	57.0±19	54.0±14
	Divorced	126	81.7±11	57.4±11	65.8±15	48.6±17	52.1±14
	Widow/ widower	97	83.2±11	58.7±13	64.8±15	49.3±18	54.2±14
	F-test		1.620	0.276	3.141*	10.702*	0.638
Religion	Orthodox	397	83.0±12	58.9±13	64.9±15	53.2±19	53.8±14
	Muslim	167	80.2±12	56.7±14	60.9±17	50.4±21	51.8±15
	Protestant	77	82.1±11	57.0±11	61.0±17	51.5±19	55.1±13
	Catholic	18	83.5±11	61.1±14	69.9±15	56.9±19	54.6±14
	F-test		2.294	1.579	4.098*	1.216	1.234
Occupation	Government	133	83.8±12	60.6±12	64.2±17	53.3±18	57.2±14
	employee	84	84.2±12	61.9±15	65.8±16	54.4±21	57.5±16
	Merchant	192	79.7±12	55.7±13	61.1±16	51.4±19	49.0±13
	Day laborer	83	78.8±9	54.0±12	60.6±14	48.5±19	49.2±13
	House wife	167	84.5±11	59.1±13	66.4±16	53.6±19	55.6±14
	Private employee						
	F-test		7.091*	7.054*	3.585*	1.440	12.314*
Income	<200	256	79.3±12	55.3+14	60.8±15	50.2±20	49.3±13
	200-499	181	83.0±11	59.0+13	64.9±16	54.8±19	53.4±14
	500-999	131	84.5±12	61.0+12	66.3±16	51.9±18	56.7±14
	1000-2000	78	84.6±11	60.3+11	63.7±17	53.2±19	59.1±12
	>2000	13	92.7±11	61.2+16	74.3±17	61.5±23	69.9±9
	F-test		9.320*	5.624*	4.679*	2.378	15.806*
dependent family	no dependent	138	84.0±12	59.0±14	66.0±17	53.5±19	56.2±14
No	family	136	83.2±11	58.7±13	64.5±15	53.0±20	54.4±14
	1	170	80.5±12	57.3±13	62.2±15	51.5±19	51.2±15
	2	130	81.5±12	58.2±13	61.6±18	51.6±20	52.6±14
	3	85	82.4±11	57.7±13	64.0±15	52.5±18	53.3±13
	4						
	F-test		2.132	0.397	1.676	0.277	2.562*

Table 5. Mean, SD and association factors between clinical factors and substance use within different QOL domain among HIV positive, in 2012

		N	All total QOL	Physical domain	Psychological domain	Social domain	Environmental domain
Duration before taking ART	0-4year	330	83.3±11	59.0±12	65.4±15	53.9±18	53.0±14
	≥5	329	81.2±12	57.3±15	61.8±17	50.8±20	53.9±15
	T-test		*2.294**	*1.606*	*2.875**	*2.057**	*-0.725*
Month on ART	≤1year	158	81.5±12	57.2±13	60.8±17	51.4±19	55.1±14
	1-3 year	198	80.7±12	57.6±14	61.9±16	50.1±19	52.9±14
	3-5year	150	83.0±12	58.6±15	65.5±17	54.1±20	52.9±15
	≥5year	153	84.1±11	59.4±11	66.8±15	54.6±19	53.0±14
	F-test		*2.818**	*0.906*	*4.947**	*2.181*	*0.939*
CD4 count	≤200	172	79.8+13	57.2+ 14	61.8+ 18	50.9±22	52.5±15
	>200	487	83.1+11	58.5±12	64.2+ 15	52.9±18	53.8±14
	T-test		*-2.954**	*-1.084*	*1.551*	*-1.083*	*-1.041*
Body weight	30-50Kg	238	80.9±12	57.0±14	62.1±17	51.0±19	52.8±14
	51-58Kg	218	81.5±11	57.7±13	62.5±16	51.6±19	52.7±15
	≥59kg	203	84.6±12	59.9±12	66.5±15	54.8±18	55.0±13
	F-test		*6.499**	*2.728*	*4.934**	*2.351*	*1.084*
WHO clinical staging	One	238	84.2±12	58.7±11	65.3±16	55.7±20	55.7±15
	Two	178	82.2±11	59.6±14	62.1±16	52.2±18	53.5±13
	Three	220	80.6±12	56.6±13	63.3±17	49.3±18	51.1±16
	four	23	78.3±14	57.4±14	61.0±18	49.6±21	51.7±14
	F-test		*4.594**	*1.849*	*1.570*	*4.528**	*4.053*
Adherence	Good	580	82.8±12	58.5±13	64.3±16	53.2±19	53.7±15
	Fair	56	78.8±11	55.9±12	58.7±16	48.0±19	51.8±12
	poor	23	76.4±14	54.5±15	58.6±22	41.3+21	50.4±14
	F-test		*5.868**	*1.979*	*4.146**	*6.025**	*1.030*
Disclosure	Yes	384	82.8± 12	58.7± 13	65.1± 16	54.2± 18	53.3±15
	No	275	81.3± 12	57.3± 12	61.6± 15	49.8± 19	53.7±14
	T-test		*1.617*	*1.348*	*2.753**	*2.973**	*-0.381*
Opportunistic infection	Yes	120	74.1±12	51.8±13	56.1±18	46.2±19	47.7±13
	No	539	83.8±11	59.6±13	65.3±15	53.7±19	54.7±14
	T-test		*-7.653**	*-6.011**	*-5.191**	*-3.954**	*-4.953**
Alcohol	Yes	74	79.2 ±13	55.6± 14	69.7±19	50.3±19	52.0±14
	No	585	82.6 ±12	58.5±13	64.1±16	52.6±19	53.6±14
	T-test		-2.370*	-1.754	-2.211*	-0.993	-0.914
Smoking	Yes	57	78.4±11	54.8±14	59.5±16	47.3±19	49.8±12
	No	602	82.6±12	58.5±13	64.0±16	52.8±19	53.8±14
	T-test		*-2.587**	*-2.035**	*-2.029**	*-2.093**	*-2.351**
Chewing Khat	Yes	91	77.9±13	55.6±15	58.4±19	47.5±20	51.2±15
	No	568	82.9±11	58.6±13	64.4±16	53 ± 19	53.8±14
	T-test		-3.791*	-1.999*	-2.906*	-2.642*	-1.630

3.3. Bivariate Analyses

The score of quality of life in all QOL domain was higher in males than females, but only psychological domain was statistically different between male and female. Respondents whose age was 35 years and older had better QOL in all QOL domain, but statistically no difference between groups. Educational status, occupation, and monthly income had significant differences in mean score of QOL in all total domain, physical domain, Psychological and environmental domain. Mean score QOL in psychological and social domain was significantly different among groups of marital status.

The mean score of individuals who started ART within four years after being diagnosed for HIV had better quality of life than those who started ART five years after being diagnosed for HIV, and it was statistically different in overall QOL and psychological domain. Those participants who were on ART for longer period of time showed good QOL than other groups and the difference was statistically significant in

overall QOL and psychological domain. Those individual whose CD4 count was greater than 200 showed good QOL in all domain of QOL than other group and statistically different in overall QOL. Those individual whose weight was ≥59 KG showed better QOL in all domain of QOL and statistically significant in overall QOL and psychological domain. All domain of QOL were statistical different between the group that had opportunistic infection and not had opportunistic infection, those who had no opportunistic infection score high QOL than those who had opportunistic infection. In the same way all domain of QOL were statistically different between groups of smoker and none smoker, smoker had less QOL mean score than none smoker.

4. Discussion

Of all study participants, the majority (73.7%) of them were 19-40 years old. This indicated that majority of the infected groups were working age group. Females constituentd the majority (64.5%) of the participants. The Mmajority (59.1%) of HIV positive participants achieved below primary school and 39% of them earn 200 ETB and less per month. This indicated that HIV infected peoples were mainly uneducated and economically disadvantageous groups. These HIV positive individuals had also used alcohol, *khat* and cigarettes.

The mean score and standard deviation of QOL among HIV positive individual was 58.2±13 in physical domain, 63.6+16 in psychological domain, 52.4+19 in social domain and 53.4+14 in environmental domain. The participants score low QOL in environmental and social domain. This may indicate HIV positive individual in our set up had social problems that may be manifested by stigma and discrimination. In the same way, these participants had challenges in environmental domain. This indicated that our study participants may be unable to fulfill their leisure and related activities which was associated with income. There are many studies which are in congruent with the findings of our study. According to study conducted in North India, physical and environmental domain score was low (Wig N. *et al*., 2006). The study which was conducted in Iran showed low mean score of QOL in psychological and social domain (Nojomi M., Abery K. and Ranjibar M., 2008). The study in China also indicates low score in psychological and environmental domain (Shan. D.*et al.* 2011). It would have been better if health education is comprehensively given for community in order not to discriminate and stigmatize HIV positive individual and also it is better if income of HIV positive individual is secured in order to increase their lively hood and QOL.

In this study female respondents have poor QOL in all QOL domain than male, the difference was statistically significant only in psychological domain. This might indicate that females may suffer with different social, gender based, and cultural influence that may compromise their QOL. There are other studies that support this finding (Mannheimer *et al*., 2005,Nojomi M.,Abery K. and Ranjibar M.,2008). Other study in India contradicts this finding (Wig N., *et al*., 2006).

It seems that older than 35 years old persons had better QOL in all QOL domain than 35 years old and younger but statistically no difference between groups. The study by Wig N., *et al*., 2006, Mannheimer *et al*., 2005 contradict ours finding by stating that individuals younger than 35 years old had better QOL.

Educational status, occupation, and monthly income had significant differences in mean score of QOL in all total domain, physical domain, Psychological and environmental domain. Mean score QOL in psychological and social domain was significantly different among groups of marital status.

Those persons who completed higher grade schooling have better quality of life and also marchant had better QOL than other group, mean while those individual who earn more than 2000 ETB per month score better QOL than other groups. Individuals who were divorced and widowed/r had score poor QOL than other group in psychological and social domain. This indicates that achieving higher schooling, having secured job, earning better income per month and engaging in marital tie had playing a great role in QOL among HIV positive person. There are also many studies which support this findings (Wig N.*et al*., 2006, Anis *et al*.,2009,Nojomi M.,Abery K. and Ranjibar M.,2008, Shan. D.*et al*., 2011,Lulseged T.,2006,Manoj K., Saroj V., Dipti A. and Heena., 2009, Shan. D.*et al*., 2011)

Those who start ART within short period of time after diagnosed for HIV and those who were on ART for more than five years score better mean QOL than other groups. This indicated that being on ART for longer period of time and starting ART soon after diagnosed for HIV improve all total QOL and psychological domain of QOL. Therefore, starting ART soon and being on ART were playing a great role on improvement of QOL. Those HIV positive who were taking ART and have good adherence have better QOL than other groups in all domain of QOL and statistically different in overall domain, psychological domain and social domain. Thus, adherence on ART is important on health improvement and better QOL. This study is in agreement with the study conducted by Mannheimer *et al*.,2005

Having more than 200 CD4 count contribute to higher score of QOL in all domain but the differences is not statistically significant, this finding is incongruent with other study (Wig N.*et al*., 2006, Shan. D.*et al*., 2011). on the other hand, there are studies which contradict our study (Manoj K., Saroj V., Dipti A. and Heena., 2009. Anis *et al*.,2009Lulseged T.,2006).

Those individuals whose weight was ≥59 KG had showed better QOL in all domain of QOL and statistically significant in overall QOL and psychological domain. Commonly, body weight was associated with stage of AIDS in HIV positive person therefore having better body weight might be improve QOL. All domain of QOL were statistical different between the group that had opportunistic infection and not had opportunistic infection, those who had no opportunistic infection score high QOL than those who had opportunistic infection. In the same way, all domain of QOL were statistically different between groups who were smokers and none smokes. Smokers had less QOL mean score than none smokers. Being acquired opportunistic infection and using some types of substances including cigarate, *Khat* and alcohol decrease QOL. From this finding, one can get lesson as infecting with opportunistic infection and using substances affect QOL. This finding is in agreement with other studies (Lulseged T.,2006, Shan. D.*et al*., 2011).

5. Conclusion

Quality of life among HIV positive individuals is an indicator for quality care that may improve QOL among chronic ill patient. The study participants had high mean sore of QOL in psychological domain and low QOL mean score in social and environmental QOL domain. In relation to associated factors for QOL, many socio demographic variable, clinical related variables and substances use were identified. Among socio demographic variables, sex, age, educational status, marital status, occupation and monthly incomes were associated with different QOL domain. Similarly, months on ART, CD4 count, WHO AIDS clinical staging, having opportunistic infection, smoking, alcohol use and chewing *Khat* were associated with QOL.

Being in marital tie, being educated, having secure job, and getting better monthly income improve QOL. On top of this, being on ART for less than 5 year, CD4 count less than 200, suffering with opportunistic infection, drinking alcohol, smoking cigarette and chewing chat compromise QOL among HIV positive individual.

6. Reference

Addington-Hall J, Kalra L. 2001. Measuring quality of life: Who should measure quality of life? *BMJ* 322: 1417 - 1420.

Anis. 2009. Quality of Life of Patients with Advanced HIV/AIDS: Measuring the Impact of Both AIDS-Defining Events and Non-AIDS Serious Adverse Events. *Journall of Acquir Immune Deficiency Syndr*om 51 (5): 631 - 70.

Aranda - Naranjo B. 2004. Quality of life in HIV - positive patients. *Journal of the Association of Nurses in the AIDS Care*15: 20 - 27.

Boer-van D. 2010. Health-Related Quality of Life and Survival among HIV-Infected Patients Receiving Highly Active Antiretroviral Therapy: A Study of Patients in the AIDS Therapy Evaluation in the Netherlands (ATHENA) Cohort. *HIV/AIDS.CID*. 50: 254 - 255

CDC.1981. Pneumocystis pneumonia–Los Angeles.Morb Mortal Wkly Rep. 30: 250 - 252.

Hansen N. 2009. Health-Related Quality of Life in Bereaved HIV-Positive Adults: Relationships between HIV Symptoms, Grief, Social Support, and Axis II Indication.*Health Psycho*. 28 (2): 249 - 257.

Idler EL, Benyamini Y. 1997. Self-rated health and mortality: A review of twenty seven community studies. *Journal of Health and Social Behaviour*.138: 21 - 37.

Jocham HR, Dassen T., Widdershoven G., Halfens R. 2006. Quality of life in palliative care cancer patients: a literature review. *Journal lof ClinNurs*. 15 :1188 - 1195.

Le, *et al*., 2010. Antiretroviral Therapy Adherence among Patients living with HIV/AIDS in Thailand. *Nurs Health Sciences*. 12 (2): 1 - 2.

Lorenza Nogueira Campos L., César C. and Guimarães M. 2009. Quality of life among HIV-infected patients in brazil after initiation of treatment. *Clinics*. 64 (9) : 867 - 75.

Louwajie G. 2007. Highly active antiretroviral treatment and health related quality of life in South African adults with human immunodeficiency virus infection: A cross-sectional analytical study. BMC Public Health, 7 (244) : 15 - 20.

LS.. 2011. Assessment of factors influencing health-related quality of life in HIV-infected patients. *HIV Medicine.*12: 22 - 30.

Lulseged T. 2006. Measuring the Quality Of Life (QOL) of People Living With HIV/AIDS (PLWHA) With Highly Active Antiretroviral Therapy (HAART) in Addis Ababa Zenebework Hospital. A thesis submitted to the school of graduate studies Addis Ababa University.45 - 50.

Mannheimer. 2005. Quality of life in HIV-infected individuals receiving antiretroviral therapy is related to adherence. *AIDS CARE*. 17 (1): 10 - 22.

Manoj K., Saroj V., Dipti A. and Heena. 2009. Quality of Life of Patients with HIV Infection. *Indian Journal of Social Science Researches*. 6 (2): 79 - 86.

MOH.. 2004. Strategic plan for intensifying mult-sectoral HIV/AIDS response (2004-2008).

Mrus. 2006. HRQOL in HIV/AIDS.JGIM . 21: 39 - 47.

Nedjat. 2008. Psychometric properties of the Iranian interview-administered version of the World Health Organization's Quality of Life Questionnaire (WHOQOL-BREF): A population-based study .BMC Health Services Research. 8: 61: 234 - 39.

Nojomi M., Abery K. and Ranjibar M. 2008. Health-Related Quality of Life in Patients with HIV/AIDS. Arch Iranian med. 11 (6): 608 - 612.

Oliva-Moreno. 2010. Health related quality of life of Canary Island Citizens. BMC Public Health .10:675.

PRB. 2002. Facing the HIV/AIDS pandemic. Population BULLETIN.57 (3).

Selman .2011. Quality of life among patients receiving palliative care in South Africa and Uganda: a multi-centred study Health and Quality of Life Outcomes JGIM .9 (21).

Shan. D. 2011. Quality of Life and Related Factors among HIV-Positive Spouses from Serodiscordant Couples under Antiretroviral Therapy in Henan Province.ChinaPLoSONE 6(6): 67 - 70.

Sullivan M. 2003. The new subjective medicine: taking the patient's point of view on health care and health. *Social Science & Medicine*.56: 1595 - 1604.

UNAIDS. 2007. AIDS Epidemic Update Geneva.

USAID. 2010. .HIV/AIDS health profile, Ethiopia.

Watchel, T., Piette, J., Mor. V., Stein, M., Fleishman, J. & Carpenter, C. 1992. Quality of life in persons with human immunodeficiency infection; measurement by the Medical outcomes study instrument. New York: Oxford University Press. *Annals of Internal Medicine*,116, 129 - 37.

WHOQOL Group. 1995. The World Health Organization Quality of Life assessment (WHOQOL): Position paper from the World Health Organization. *Soc Sci Med.* 46: 1569 - 1585.

Wig N.*et al.*, 2006.The Impact of HIV/AIDS on The Quality of Life: A Cross Sectional Study in North India. *Indian J Med Sci.*60 (1): 987 - 92.

13. Risk Factors for Unsuccessful Tuberculosis Treatment Outcome (Failure, Default and Death) in Selected Public Health Institutions, Eastern Ethiopia, 2012

Tariku Dingeta[1*], Tekabe Abdosh [2]

[1] Department of Public Health, College of Health and Medical Sciences, Haramaya University, Ethiopia
[2]School of Medicine , College of Health and Medical Sciences, Haramaya University, Ethiopia

Abstract

Unsuccessful TB treatment outcome is a serious public health concern. It is compelling to identify and deal with factors determining unsuccessful treatment outcome. Therefore, this study aimed to determine pattern of unsuccessful TB treatment outcome and associated factors in eastern Ethiopia.

A case control study was used. Cases were records of TB patients registered as defaulter, dead and/or treatment failure where as controls were those cured or treatment complete with a total of 990 sample size (330 cases and 660 controls). Multivariate logistic regression models were used to derive adjusted odds ratios (OR) at 95% CI to examine the relationship between the unsuccessful TB treatment outcome and recorded patients' characteristics.

About 802(82.2%) of the study participants were pulmonary Tuberculosis (PTB) among which 447(55.7%) were smear positive. The majority of unsuccessful treatment outcome, 212(64.2%), was because of death. Having contact person(OR 0.54; 95% CI 0.20-0.91, P, .02) and sputum smear negative(OR 1.83; 95% CI 1.3-5.51,P, .02) were associated with high successful TB treatment outcome; whereas HIV positive status(OR 2.3; 95% CI 1.34-5.73, P, .002) and positive sputum test result at second month of treatment initiation (OR 14.2; 95% CI 5.52-36.46, P, .001) were significantly associated with increased risk of unsuccessful TB treatment outcome.

Death was the major cause of unsuccessful TB treatment outcome. TB patients of smear positive on second month of treatment initiation and HIV positive were significantly associated with unsuccessful treatment outcome. Having contact person and negative sputum smear were factors significantly associated with successful TB treatment outcome. TB patients with HIV and smear positive on second month of treatment initiation need strict follow up throughout DOTs period.

Keywords: TB treatment outcome; Unsuccessful TB treatment outcome; Risk factors; Failure Default death

1. Introduction

Tuberculosis (TB) is a global health concern. It is a major cause of illness and death worldwide; especially in low and middle-income countries where it is fuelled by human immune deficiency virus/acquired immune deficiency syndrome (HIV/AIDS) (WHO, 2008). Tuberculosis (TB) is also one of the leading causes of morbidity and death in adults in sub- Saharan African countries. Ethiopia ranks seventh among the world's 22 high-burden tuberculosis (TB) countries (*USAID, 2010)*. According to the World Health Organization's (WHO's) Global TB Report 2009, the country had an estimated 314,267 TB cases, with an estimated incidence rate of 378 cases per 100,000 population and stands 3rd among sub-Saharan African countries. This burden is exacerbated by the spread of HIV infection. The number of TB cases is likely to increase as Ethiopia's HIV/AIDS epidemic expands; while 16 percent of notified TB patients tested for HIV, 40 percent are HIV positive (USAID, 2009; Ethio-Focus Global Times, 2011; WHO, 2011).

Ethiopia's National Tuberculosis and Leprosy Control Program (NTLCP) began to implement Directly Observed Treatment, Short Course (DOTS) (the internationally recommended strategy for TB control) in two zones in 1991.In 2007, WHO reported that DOTS coverage reached 95% of the population (WHO, 2007). The country is undertaking free TB diagnosis and treatment at 1,448 state-owned health service institutions and more than 230 private health facilities (Ethio-FocusGlobal Times, 2011). According to the proposal of World Health Organization (WHO), treatment outcome is an important indicator of tuberculosis control programs (WHO, 2007). In Ethiopia, some study revealed following the implementation of DOTS, treatment outcomes were improved over time (Manuel *et al*, 2010). However, while treatment is integrated into general health services and DOTS geographical coverage is 95%, TB remains a major health problem in Ethiopia. Cure rate of 67% remains well below the 85% rate of WHO recommendation (U.S Global Health Initiative, *2010*). A five - year retrospective Study in Gondar University Teaching Hospital also depicts the treatment success rate of tuberculosis patients was unsatisfactorily low (29.5%) with increasing proportion of all unsuccessful treatment outcome throughout the five year period(Tesema *et al*,2009).

Unsuccessful treatment outcome is a serious public health concern that needs to be addressed (Tesema *et al*, 2009). Default is one of a serious problem in the TB program of Ethiopia and occurs mostly during the intensive phase of the treatment. According to the retrospective study in rural hospital in South Ethiopia defaulting from treatment rate was 11.4% among which 37.1% of them did so by the end of the intensive phase (Manuel *et al*, 2010; Chandrasekaran *et al*, 2005). Patients who interrupt treatment are more likely to become infectious again and acquire drug resistance (Chiang *et al*, 2009). For example, a study from Ghana showed 50% defaulter patients had multi drug resistance TB (MDR-TB). Because of this, one can understand TB treatment defaulter which is one of unsuccessful TB treat outcome and great concern, as not only can it lead to break down of global TB control programs, but it also can lead to wide spread MDR TB which is harder to diagnosis, harder/more expensive to treat, and has greater mortality rates (Chiang *et al*, 2009, Forson *et al*, 2010). Moreover, defaulting patients remain infectious and

constitute a danger to their families and the community, a situation that is exacerbated by the organism being resistant to first line drugs (Farah *et al*, 2005).

Ideally, treatment outcome in all patients should be routinely monitored by the epidemiological surveillance system .An earlier study on the impact of DOTS in the Southern Ethiopia reported a significantly declining trend in treatment non completion. However, one in five patients still continued to result with unsuccessful treatment outcome, and its predictors are not well understood (Biru and Lindtjørn, 2007; Manuel *et al*, 2010). Opposite to this, study from north Ethiopia showed the proportion of default rate was increased across the years from 9.2% in 2003 to 42.9% in 2008. This study also reveals of all patients, among unsuccessful treatment outcome defaulted 18.3%, died 10.1% and treatment failed 0.2% the patients (Tesema *et al*, 2009).

In effort to reach the global target of 85% treatment success, it is compelling to identify, describe, and deal with factors determining poor treatment outcome. Several reasons and risk factors for unsuccessful TB treatment outcomes have been reported from different countries. High age, male sex, distance from home to the treatment centre, smear negative pulmonary tuberculosis, and rural residence found to be related to unsuccessful treatment outcomes (Manuel *et al*, 2010, Shargie and Lindtjørn, 2005, Ai X. *et al*, 12010, Tesema *et al*, 2009). A study also revealed outcomes of treatment with a Category II regimen are suboptimal (Dooley *et al*, 2011). The relationship between HIV status and treatment non-completion also could not be clearly known, since people who defaulted often did so prior to HIV testing being offered. However, few studies showed the HIV+/TB+ co-infection had a similar with overall likelihood of treatment success. A study from Nigeria Ogun state showed that there was no statistically significant difference in the rate of default between HIV positive and HIV negative TB patients (Pontororing *et al*, 2010; Amoran *et al*, 2011, Hasker *et al*, 2008). On the other hand a case control study from Spain showed HIV infection is statistically significant predictors of defaulter and fatality among TB treatment outcome (Caylà *et al*, 2004). A study also revealed many consider TB patients to be unclean and link TB with AIDS, which leads to social stigmatization and discrimination and these factors may cause people with TB to hide their illness from families and the community (Wu *et al,* 2009*)*. However, up to the researches awareness it is not clear which factors are major contributors to the unsuccessful TB treatment outcome of TB patients in the eastern part of Ethiopia.

Generally, we know how to diagnose it, we know how to treat it, and yet TB is far from being eradicated anywhere in the world and also in our country Ethiopia. Failure to treatment completion or cure is the main reason for these difficulties in controlling a disease that is far from new. For these reasons, determination of the level of treatment completion, particularly the percentage of patients who are default, died, recorded as treatment failure and factors predictors is the most important public health indicator for evaluating the current situation and the possible future of TB treatment and control in a community. Nevertheless, this indicator has rarely been analyzed and very few programmes have data available on completion. In similar way, there is also no clear information concerning treatment outcome and risk factors for unfavorable treatment outcome in Eastern part of Ethiopia.

Through assessing the unsuccessful pattern of TB treatment outcome, this study highlighted programmatic weakness, assessed the overall effectiveness of the tuberculosis control program and indicated specific adjustments to be made. This would make it possible to recognize and amend system failures before the incidence and proportion of drug resistant isolates rise. This information would be useful to decide resource planning and distribution in TB treatment and control priority. Also the Federal Ministry of Health (FMOH) started new approach of DOTS provision in Harari and Dire Dawa administrative council with plan for scale up into the other regions of the country. Therefore, the result of this study might contribute much since this study included the region in which the new approach has not yet initiated. The aime to determine factors associated with unsuccessful TB treatment outcome among public health institutions providing DOTS in east Hararghe, Harari region and Dire Dawa Administrative counsel.

2. Methods and Materials

2.1. Study Area and Period

The study was conducted in selected public health institutions providing DOTS in East Hararge of Oromia Region, Dire Dawa Administration and Harari Regional State from July 15 to August 30, 2012. Easter Hararge Zone is among the 13 zones in Oromia regional state. East Hararge is bordered on the southwest by the Shebelle River which, on the west by West Hararghe zone, on the north by Dire Dawa City AdministrativeCouncil and on the north and east by the Somali National Regional State. The Zone has 22 woredas with a total population of 2,723,850 of which 1,383,198 are male and 1,340,652 female (CSA, 2010). The information obtained from zonal health office also indicated that the zone has 85 health center and three hospitals. Harari Natyional Regional State is bordered by East Harge Zone of Oromia regional state in all direction. Harari region has an estimated total population of 209,000, consisting of 107,000 male and 102,000 female (CSA, 2010). According to the 2000 (EFY) Health and Health Related Indicators Publication, Harari region has four Hospitals and three Health Centers (FMOH, 2008). Dire Dawa is located in the eastern part of the Ethiopia enclosed by the Somali and Oromia National Regional States. It is 515 Kilometers away from Addis Ababa. Based on the 2007 Census conducted by the Central Statistical Agency of Ethiopia (CSA), Dire Dawa has a total population of 341,834, of which 171,461 are male and 170,461 female (CSA, 2010). According to the information from the regional health office, one public Hospital and 16 health centers are found in Dire Dawa Administrative Council (CSA, 2010).

Despite the close cultural, geographical and other social interconnection, people live in these areas use the Dilchora and Hiwot Fana Hospital as referral hospitals and many of the TB patients are sent to local health centers after they are diagnosed in these Hospitals. Because of this, involving this neighbors and interconnected areas is mandatory to obtain real picture of the problem. However, since the study was designed to see the unsuccessful treatment outcome in the last five year and DOTS service was started in all health posts for the past two years, hence only hosptal and health centers were included in this stud.

2.2. Study Design

Case control study with one case to two controls using the data in the TB clinic in three public hospitals and 7 health centers. Cases were those individual who registered as defaulter, death or treatment failure on the TB registration log book. For each case, a control that was enrolled in the same week or one week later or earlier and declared as cured or treatment complete will be selected. All new TB patients coming to the health institutions were source of population, and the study population constituted of new TB patients who came to health institutions registered in study institutions starting from September 11, 2006 to September 30, 2011.

2.3. Sample Size and Sampling Procedures

We calculated the sample size by using Open Epi with 5% level of significance and 80% power. Records of TB patients who did not complete treatment since September 2006 (cases) and records of patients who did complete treatment (controls) during similar period of time were reviewed. We calculated the sample size based on the assumption that treatment after default was an important risk factor for poor treatment outcome. In an earlier study, we found that the proportion of successful treatment outcome among those who started treatment after defaulting in southern Ethiopia was 46% whereas 55% of the defaulters returned with unsuccessful treatment outcome and 10% for non-resondants is added to the samle size (Shargie and Lindtjørn, 2005). Based on the above assumption, the final sample size was 423 cases and 846 controls with the total of 1,269 sample size to demonstrate with 95% certainty that return after default is a statistically significant risk factor for not to complete treatment successfully.

Five public institutions were selected randomly from the two regions (one Hospital and two health centers from Dire Dawa and one Hospital and one Health center from Harari). However, among 22 health centers serving more than two years in East Hararge Zone, four health centers were selected randomly after considering their accessibility and availability of transportation services to the health centers. Additionally, from the two hospitals that provide DOTS service for more than two years in the Zone, Bisidimo hospital was randomly selected. Accordingly, the selected health institutions were Karamele Health Center, Water Health Center, Gursum Health Center, Garawa Health Center and Bisidimo Hospital from East Hararge Zone. Similarly, Dilchora Hospital, Lega Hare Health Center and Melka Jebdu Health Center were selected from Dire Dawa City Administration. From Harari Regional State Hiwot Fana Hospital and Dire Tiyara Health Center were selected. All records of TB patients in the selected TB clinic since September 11, 2006 to Sptember 10, 2011 (Meskerem 1, 1999 E.C to Pagumae 5, 2003 E.C) in the selected public institutions were reviewed. The total sample size was proportionally allocated for each regions and zones based on the total patient Started TB treatment in the last five years as indicated in Table 1 below.

Table 1. Shows the sample size allocation for the regions, 2012.

Year in E.C	Dire Dawa	Harar	East Hararge
1999	360	163	3629
2000	519	174	3783
2001	538	186	4040
2002	542	206	4354
2003	568	225	4747
Total	2527	954	20553
Sample size	132 (44 Cases: 88 Cont.)	51(17Cases: 34 Cont.)	1086 (362 Cas:724 Cot.

Moreover, the sample size allocated for the regions and zone was proportionally allocated for selected health institutions during data collection based on the total number of TB patients treated in the selected institutions in the last 5 years. Additionally, the total sample size allocated for each institution was also allocated for each year based on the total number of TB patient started treatment during each year (1999-2003 E.C) (Fig1). The researchers decided to allocate the sample size for the selected institutions and years when they went for data collection The list of defaulter, dead or treatment failure patients was prepared separately and randomly reviewed until the sample size was met. From defaulter, death or treatment failure, the number of case required was selected randomly since all of them were categorized as unsuccessful treatment outcomes. To improve the comparison of cases and controls, for one case two controls those who started the treatment in the same week in the same institution were included. If more than two controls started in the same week, the one with the closest recoded with the case was selected.

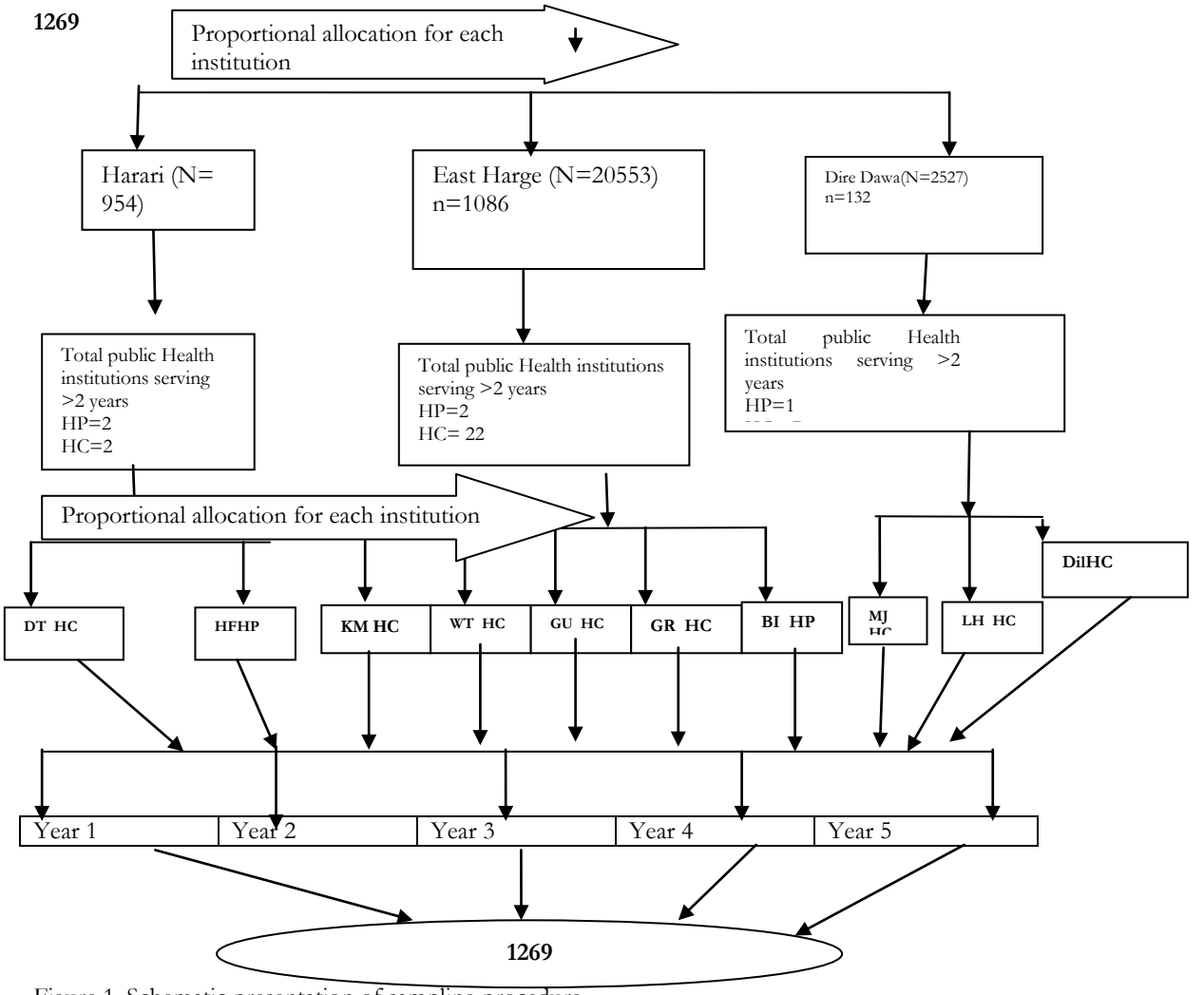


Figure 1. Schematic presentation of sampling procedure

2.4. Inclusion and Exclusion Criteria

All records of TB patients registered as new TB patients at the beginning of DOTS during September 11, 2006 to September 10, 2011 (Meskerem 1, 1999 E.C to Pagumae 5, 2003 E.C)were included. But, the hospitals and health centers in the study area providing DOTS services for less than two years were excluded. Recordes of patients registered as defaulter, relapse, and treatment failure at the begging of treatment were excluded. Additionally, the record of patients registered as new and end with transfer out were removed since the outcome is unknown.

2.5. Data CollectionTool and Method

Using a check list prepared from TB registration form developed by the Ministry of Health, socio-demographic, and clinical records were retrieved from patient records. It was filled out by health workers working in the TB clinic.

A checklist adopted from TB registration form in the hospitals was used to extract data for both groups of patients. The data were collected by nurses or other health professional working in TB clinic in the institutions. The data collectors were trained on data collection tools. They were also supervised by the principal investigators.

2.6. Data Quality Control

To ensure the quality of data, pre-test of data collection tools was done in one hospital and one health centre not included in the study. The pre-test would help us determine the clarity of the checklist and the time required to complete the checklist. Following the pre-test, checklist formats were evaluated and improved. Training was given for data collectors and data collection process was supervised by investigators every week for quality of the data. Every checklist was checked for its completeness during data collection.

2.7. Data Analysis

The collected quantitative data were coded by investigators and entered to Epi data and transferred to SPSS Version 17.0.for analysis by data clerk. Descriptive statistics was used to explore the socio-demographic characteristics. A bivariate analysis was also carried out to examine the relationship between the outcome variables and selected determinant factors. Factors for which the significant associations found were retained for subsequent multivariate analyses using multiple logistic regressions. Also the line graph was used to see the pattern of unsuccessful treatment outcome in the last five years by using crude data from each institution.

2.8. Ethical Considerations

The study protocol was approved by Institutional Research Ethics Review Committees of the College of Health Sciences of Haramaya University. Official letters of co-operation were written to East Hararge Zone Health Bureau, Harari Regional Health Bureau, Dire Dawa Administration Health Bureau and selected public health institutions. In order to protect the confidentiality of the information, names or IDs was not included in data extraction check list. Identification of the clients was only be possible through numerical codes.

3. Results

3.1. Socio-Demographic Characteristics

A total of 976 case records were reviewed. Among these,,the majority 584(59.8%) the study participants were female. Majority 588(60.4%) of them were found within age group of 20-34 years old with mean age of 32.23(SD=16.3). The maximum and minim age of the patients were one month and 88 years respectively. Moreover, more than half 651(66.7%) had contact person. More than two third 641(71.1%) were offered HIV test among which 179(28%) were Sero positive and 144(76%) of those sero positive were Eligible for ART (Table…?).

Table 2. Socio-demographic characteristics of patients started DOTs in selected health institutions in eastern Ethiopia, 2012.

Variables	Frequency	Percentage
Sex		
Male	584	59.8
Female	392	40.2
Age in Year		
9 and below	62	6.4
10-19	108	11.1
20-29	293	30.1
30-34	295	30.3
45 and above	215	22.1
Have contact person		
Yes	651	66.7
No	325	33.3
HIV test offered		
Yes	641	71.1
No	261	28.9
If HIV test offered test result		
Sero positive	179	28.0
Sero negative	460	72.0
If sero positive ART		
Eligible	114	76.0
Not eligible	36	24.0

3.2. Treatment History

The record analysis 330(33.8%) of the record reviewed were cases (those with unsuccessful treatment outcome) and 646(66.2%) were record of those with successful outcome (treatment complete or cure). Among the total patients whoserecords were reviewed, most of them 802(82.2%) were pulmonary Tuberculosis (PTB), out of which 447(55.7%) were smear positive. Among the TB patients 13(4.2%) were smear positive during the second month of treatment and 4(1.3%) of them were smear positive again on fifth month of sputum test. About 851(87.2%) were new treatment category and 7(0.7%) were previous treatment failure. About 646(66.2%) were controls (those treatment completed or cured) and 330(33.8) were cases or those with unsuccessful treatment outcome (death, defaulter and treatment failure) (Table 2). Among the unsuccessful treatment outcome majority 212(64.2%) were because of death and followed by those who were defaulter which account 100(30.3%) and the rest 18(5.5%) cases or with unsuccessful treatment outcome were because of treatment failure.

Table 3. Treatment history of the study participants, in eastern Ethiopia, 2012.

Variables	Frequency	Percentage
Treatment category		
N-New	851	87.2
R-Relapse	59	6.0
F- Failure	7	.7
D-Defualter	27	2.8
T-Transfer our	32	3.3
Diagnosis Category		
Pulmonary Positive(P/Pos)	447	45.8
Pulmonary negative (P/Neg)	355	36.4
Extra pulmonary (EP)	174	17.8
Lab result during second month of treatment		
Positive	13	4.2
Negative	299	95.8
Lab result during second month of treatment		
Positive	13	4.2
Negative	299	95.8
Lab result during second month of treatment		
Positive	4	1.3
Negative	309	98.7
Treatment outcome(reason for treatment stopped)		
Cure	646	66.2
Default	100	10.2
Failure	18	1.8
Died	212	21.7
Treatment outcome categorized		
Successful	646	66.2
Unsuccessful	330	33.8

As indicated in the figure below, majority 77.8(%) of the patients within Defaulter (D) treatment category had history of successful treatment outcome whereas nearly three fourth (71.4%) of the patients with treatment failure (F) category resulted inunsuccessful treatment outcome.

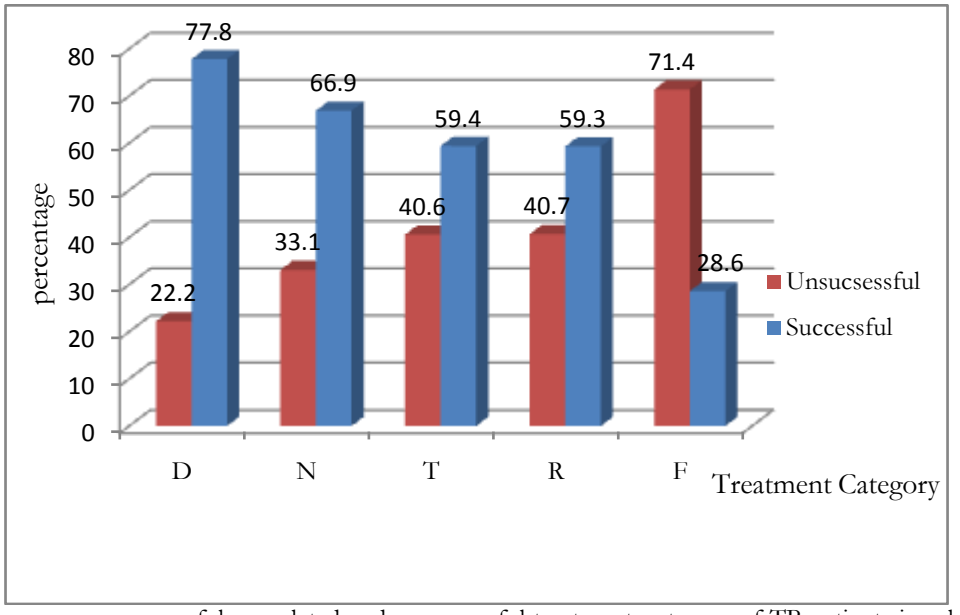


Figure 1. Treatment category among successful completed and unsuccessful treatment outcome of TB patients in selected Hopitals in Eastern Ethiopia, 2012,

The trend of unsuccessful outcome had no significant difference though the year as depicted on the figure below. .

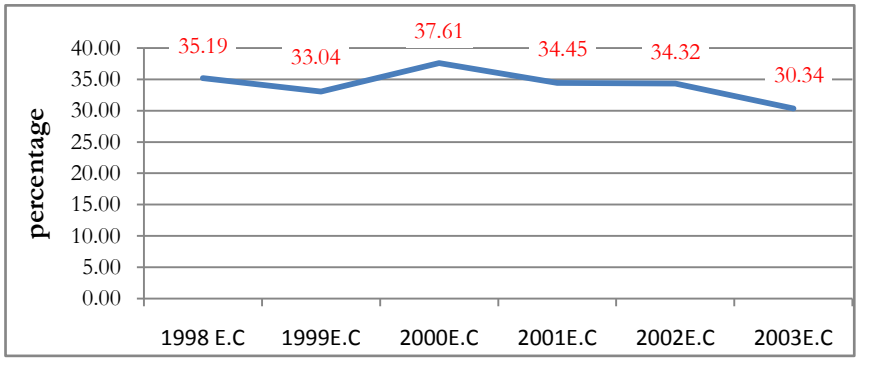


Figure 2. Line graph showing trend of unsuccessful treatment outcome

3.3. Factors Associated with Unsuccessful Outcome of TB Treatment

To evaluate any factors associated with unsuccessful TB treatment outcome, gender, age, presence of contact person, sputum smear result, treatment category, months treatment started, HIV sero- status and sputum result at second month after initiation of treatment were entered into multiple logistics analysis.

The factors significantly associated with unsuccessful treatment outcome after adjusted for other variables were having contact person, sputum smear result, sero-status and sputum test result at second month after initiation of treatment.

Table 3. Factors associated with unsuccessful TB treatment outcome among selected health institution in eastern Ethiopia, 2013.

Variables	Unsuccessful Treatment outcome.	
	COR , 95%CI	AOR, 95%CI
Sex		
Male	1.3(0.97-1.7)	1.0(0.53-2.20)
Female	1.00	Reference
Age		
15 and less	0.53(0.32-0.89)	0.8(0.14-3.90)
16-44	0.66(0.48-0.90)	1.3(0.23-7.60)
45 and above	1.00	Reference
Have contact person		
Yes	0.53(0.4-0.7)	0.54(0.20-0.91)
No	1.00	Reference
Sputum smear result		
Smear Negative	1.96(1.58-2.53)	1.83(1.3-5.51)
Smear positive	1.00	Reference
Treatment category		
New	0.79(0.54-1.1)	0.94(0.34-2.60)
Previously unsuccessful	1.00	Reference
Season at treatment Started		
Automen	1.00	Reference
Wintter	1.2(0.82-1.73)	1.67(0.67-4.86)
Spring	1.04(0.71-1.53)	0.83(0.38-2.64)
Summer	1.53(1.04-2.2)	2.60(0.93-7.71)
Sero-status		
Positive	1.81(1.32-2.52)	2.33(1.34-5.73)
Negative	1.00	Reference
Sputum result at 2nd month		
Positive	13.25(5.90-29.80)	14.23(5.52-36.46)
Negative	1.00	Reference

4. Discussion

This study describes the characteristics of patients with TB and their treatment outcome over the past 5-years period in a selected health institutions in eastern Ethiopia. Our finding shows that among the participant with unsuccessful treatment outcome the majority of them, 212(64.2%), were because of death. Among the total reviewed records of patients, 13(4.2%) were smear positive during the second month after initiation of treatment and 4(1.3%) of them were smear positive again on fifth month of sputum test. Nearly three fourth (71.4%) of those patients with previous history of treatment failure (F) category were resulted inunsuccessful treatment outcome. The trend of unsuccessful treatment outcome has no significant difference through the years. The HIV-co infection prevalence among those who get the HIV test was 28%. This study also demonstrated that having contact person, sputum smear result at the beginning of treatment, HIV sero-status and sputum test result at 2nd month after initiation of treatment were the factors significantly associated with unsuccessful treatment outcome after adjusted for other variables.

There were some limitations to this study. First, the retrospective nature of the study caused a methodological limitation. Second, we used only routine programme data; the Ethiopian health institution based TB log book has no enough checklist to identify full history TB patients' characteristics; therefore,it is possible that there might be another associated factors left to be examined such CD4 cell count among HIV positive patients,which may have significant effects on patients' TB outcomes. The analysis can only provide evidence of statistical association between those items and unsuccessful treatment outcome and cannot show cause-effect relationships. Despite these limitations, the findings of the study informed policy and programmes that aim to improve management of TB patients in Ethiopia and other comparable settings.

The main cause of unsuccessful outcome in the study area was deaths which account 64.2% of those with unsuccessful treatment outcome. A study conducted in Taipei, Taiwan on adults also showed that death was the main cause of unsuccessful treatment outcome of Tuberculosis patients(Yen 2012). in the contrary, a similar study was conducted in North Ethiopia from 2003 to 2008 showed defaulter wasthe main cause of unsuccessful treatment outcome than death(Tessema 2009). Studies showed TB patient individuals with HIV-infecteedwere more likely to die than HIV-uninfected individuals (p, 0.0001)(Shaweno 212; Jones-Lo´ pez 2011). Therefore, the difference between this study and the one done in northern Ethiopia might be because of the north Ethiopian study was conducted when HIV/IDS related death was not as such expanded. Moreover, the Health Extension worker program was not expanded by then, which had played a great role for the last five years

through increasing public awareness and the expansion of health facilities provide free TB diagnosis in last five years resulted with decreasing defaulter from TB treatment.

Patients who had contact person had significantly low unsuccessful treatment outcome (OR=0.54(0.20-0.91) compared to those who do not had contract person.

About 4.2% of smear positive TB patient were again smear positive at the second month after initiation of treatment. Moreover, sputum test result at second month after initiation of treatment had significantly high unsuccessful treatment outcome compared to those smear negative at second month of treatment initiation (OR= 14.23(5.52-36.46). This result was in line with a study from Yunnan, China which showed a positive two-month smear test result is one of the risk factors for unsuccessful treatment outcome(Jianzhao 2011).

A study from India showed unsuccessful, outcome was significantly high among re-treatment group compared to the new treatment cases((Pardeshi 2007). This study also showed nearly three fourth, (71.4%) of those patients with previous history of treatment failure (F) category resulted in unsuccessful treatment outcome. Unsuccessful treatment outcome was significantly less among new treatment group compared to the case with previous history of unsuccessful treatment outcomes(treatment failure or defaulter)(OR=0.94(0.34-2.60). Certainly, this result was also comparable with a study from Italy on which treatment failure was associated with previous treatment(Faustini 2008).

The HIV-co infection prevalence among those who got the HIV test was 28%. This figure is comparable with the study reported a high default rate or non-adherence to TB treatment (25.6%) among the TB/HIV co-infected patients. The main concern about TB/HIV co-infection is that , different study result from different part of the world showed the TB treatment outcome probability are significantly different between HIV+ and HIV negative patients. Many studies that evaluated TB treatment outcomes have found that HIV co-infections are associated with poorer outcomes compared to HIV-negative patients (Shaweno 212; Thuy 2007; Lorent 2011; Tweya 2013). The result of this study result also showed that patients with TB/HIV co-infection had significantly unsuccessful TB treatment outcome compared to HIV negative sero status (OR= 2.33(1.34-5.73) (Table-3).

Previous reports stated that a positive AFB result at the begininng of treatment (positive AFB smear) was one of the risk factors significantly associated for less unfavorable outcomes(Yen 2012). Our study also showed similar result that, sputum smear negative for AFB at the begging of treatment was one factor significantly associated with unsuccessful TB treatment outcome (OR 1.83, CI1.3-5.51). Similar study from North Ethiopia showedthat the highest unsuccessful treatment outcome was observed among smear negative tuberculosis patients(Tessema 2009). This mightbe because of miss diagnosis of the patients. This study also depicted having registered contact person was also the risk factor associated with unsuccessful treatment outcome. Significantly high unsuccessful treatment outcome was observed among those who had no contact person compared to those who had contact person. The trend of unsuccessful treatment outcome has no significant difference thought the years.

5. Conclusions and Recommendation

In summary, our study provided useful insights about factors influencing unsuccessful treatment outcome. Death was the major unsuccessful treatment outcome of tuberculosis patients in the study area. Significant proportion of patients were smear positive on second month after initiation of treatment. On the other hand, those who became smear positive on second month after initiation of treatment was significantly associated high unsuccessful treatment outcome. Our results also confirmed previous findings that TB/HIV co-infection was another factor associated with increased risk of unsuccessful treatment outcome. One can understand that HIV is the challenge in treatment of tuberculosis. Lack of contact person and negative sputum smear result at the begininng of treatment were also factors significantly associated with high unsuccessful treatment outcome. Based on the results, we recommend that special attention should be given for TB with HIV. Even though DOT is only for intensive cases, those who became smear positive on second or fivth month after initiation of TB treatment should be considered to be followed up on daily basis by health professionals. Prospective study is needed in the study area to identify main cause of unsuccessful outcome.

6. References

Faustini, A., J.Hall, A., Mantovani, J., Sangalli, M., and A. Perucci, C. 2008. Treatment outcomes and relapses of pulmonary tuberculosis in Lazio, Italy, 1999-2001: a six-year follow-up study. *International Journal of Infectious Diseases*. 12: 611 - 621.

Jianzhao, H., Hof, S., Lin, X., Yubang, Q., Jinglong, H., and Werf, MJ. 2011. Risk factors for non-cure among new sputum smear positive tuberculosis patients treated in tuberculosis dispensaries in Yunnan, China. *BMC Health Services Research*. 11: 79.

Jones-Lo´ pez, E., Ayakaka, I., Levin, J., Reilly, N., Mumbowa6, F., Dryden-Peterson, S., Nyakoojo, G., Fennelly, K., Temple, B., Nakubulwa, S., Joloba, ML., Okwera A., Eisenach, KD., McNerney, R., Elliott, AM., Ellner, JJ., Smith1,PG. and Mugerwa, RD. 2011. Effectiveness of the Standard WHO Recommended Retreatment Regimen (Category II) for Tuberculosis in Kampala, Uganda: A Prospective Cohort Study. *PLoS Medicine* 8 (3).

Lorent, N., Sebatunzi, O., Mukeshimana, G., Ende, JV. and Clerinx, J. 2011. "Incidence and Risk Factors of Serious Adverse Events during Antituberculous Treatment in Rwanda: A Prospective Cohort Study." *PLoS ONE*. 6(5).

Pardeshi, G., and Deshmkuh, D. 2007. Comparission of Treatment outcome Re-treatment versus New of smear-positive casees of Tuberclosis under RNTCP pulmonary. *Indian Journal of Public Halth*. 51 (4): 237 - 239.

Shaweno, D. a. W., A. 2012. Tuberculosis treatment survival of HIV positive TB patients on directly observed treatment short-course in Southern Ethiopia: A retrospective cohort study. *BMC Research Notes*. 5: 682.

Tessema, B., Muche, A., Bekele, A., Reissig, D., Emmrich, F. and Sack, U. 2009. Treatment outcome of tuberculosis patients at Gondar University Teaching Hospital, Northwest Ethiopia. A five - year retrospective study. *BMC Public Health* 9 (371).

Thuy, T., Shah, NS., Anh, MH., Nghia , DT., Thom, D., Linh, L., Ngoc Sy D., Duong, BD., Minh Chau, LT., Phuong Mai, PT., Wells, CD., Laserson, KF., and Varma, JK.. 2007. HIV-Associated TB in An Giang Province, Vietnam, 2001 - 2004: Epidemiology and TB Treatment Outcomes." *PLoS ONE*. 2 (6).

Tweya, H., Feldacker, C., Phiri, S., Ben-Smith, A., Fenner, L., Jahn, A., Kalulu, M., Weigel, R., Kamba, C., Banda, R., Egger, M. and Keiser, O. 2013. Comparison of Treatment Outcomes of New Smear- Positive Pulmonary Tuberculosis Patients by HIV and Antiretroviral Status in a TB/HIV Clinic, Malawi. *PLOS ONE* 8 (2): 1 - 6.

Yen, Y. Y., MY., Shih, HC. and Deng, ChY. 2012. Risk factors for unfavorable outcome of pulmonary tuberculosis in adults in Taipei, Taiwan. *Transactions of the Royal Society of Tropica*l *Medicine and Hygiene* 106 (5): 303 - 330.

14. Barriers of Mothers' Awareness about Obstetric Danger Signs and Health Care Seeking Practice at Haramaya District, Eastern Ethiopia

Tesfaye Assebe[1]*, Fekede Asefa[1]

Haramaya University, College of Health and Medical Sciences, School of Nursing and Midwifery, Harar, Ethiopia

Abstract

Women's awareness about potential obstetric danger signs during pregnancy, child birth and immediate post-delivery are crucial to influence their decisions to have immediate care seeking practice. However, barriers of their awareness and health seeking practice are not well known in study area. Thus, the objective of this study was to assess barriers of women's awareness of obstetric danger signs and their health care seeking practice.

A community based cross-sectional study was conducted in June, 2012 on women who gave birth for the last two years and resided in Haramaya district. Sample size was estimated by Openepi version 2.3 by taking proportion of mother's awareness of obstetric danger sign. Multistage sampling method was used to select study subjects. Data collection was carried out using structured questionnaires and analyzed by SPSS version 16.

A total of 757 mothers participated in the study. Awareness of key obstetric danger signs was low, only 13.1%, 14.4% and 16.1%, mentioned three and above key danger signs during pregnancy, delivery and postpartum, respectively. To this regard, 234 (31%) respondents experienced one or more key danger signs and 31.2% of them were not sought for medical treatment. Having ANC visit for the last recent pregnancy and giving birth at health institutions increases the likelihood of good awareness [AOR 11.3; 95% CI 4.2-16.1] and [AOR 5; 95% CI 2.3-17] respectively.

The study showed that awareness of mothers on obstetric danger signs in the study area was low. Community education about danger signs, ANC utilization and institutional delivery are important steps in improving the awareness and health seeking practice.

Keywords: Maternal health; ANC; Obstetric danger signs; Awareness,;Health seeking

1. Introduction

Maternal and newborn mortality remains a major public health challenge in developing countries, and the little progress made towards the achievement of millennium development goals(WHO 2012). The Maternal mortality ratio (MMR) in developing regions 240/100,000 live birth was 15 times higher than in developed regions. Sub- Saharan Africa had the highest MMR at 500 maternal deaths per 100 000 live births(UN 2013). In Ethiopia, 676 per 100 000 live birth maternal mortality is among the highest in the world(International, 2012).

The history of successes in reducing maternal and newborn mortalities showed that skilled professional care during and after childbirth can make the difference between life and death for both women and their newborn babies(W.H.O. 2005). Sharp decline in maternalmortality rates after 1930s in developed country were due to standard of maternal care provided by skilled birth attendants(Loudon .I 2000;; Chamberlain. G 2006) Evaluation of safe motherhood initiative program in 1997 also concluded that a skilled attendant to assist childbirth is the single most critical intervention to reduce maternal mortality(UNFPA, 1999).

Obstetric danger signs are the signs of life-threatening and other serious conditions related to pregnancy and results in loss of mothers and the babies.These life threatening complications are treatable and avoidable, if women with the complications are able to identify and seek appropriate emergency obstetric care which makes a difference between life and death. Awareness about the significance of symptoms and signs of obstetrics complications may lead to timely access to appropriate emergency obstetric care and crucial to prevent the first and second delay(JHPIEGO. 2004).

The government of Ethiopia in 2006 planned to ensure that 80% of all families recognize important obstetric danger signs;to increase the proportion of births attended by skilled health personnel from six percent to 60 %; Increase national antenatal care coverage levels from 28 percent to 70 percent; (FDEMOH 2006). However, Ethiopia remains one of the lowest (19 %) in the World in utilization of WHO recommended four and more antenatal care visit; delivery at a health facility by skilled health providers (10 %) in 2011(Africa 2013; International 2013); and 7 % of women received postnatal care in the first two days (Central Statistical Agency(W.H.O. 2005; W.H.O. 2011; International2012).

The study conducted in Northern part of Ethiopia also revealed a small proportion 10.9%, 2.2% and 5.2% of the respondents experienced vaginal bleeding, blurred vision and swollen hands/face as key danger signs during pregnancy, respectively. Key danger signs during labor/childbirth 16.5%, 11%, 7.1% and 0.6%, of the respondents spontaneously mentionedsevere vaginal bleeding, prolonged labor, retainedplacenta and convulsions as danger signs respectively. 16.7%, 1.1% and 1.5% of the respondents spontaneously mentioned severe vaginal bleeding, high fever, and foul smelling vaginal dischargeas danger signs during post partum period, respectively (Hiluf. M 2007). The gap between the planned and expected in awareness on danger sign and maternal health care seeking practice in the country need investigation.

Therefore, this research assesses barriers of women's awareness on obstetric danger signs andtheir health care seeking practice when they experienced obstetric complication in the study area.

2. Methods and Materials

2.1. Study Area and Period

A community based cross-sectional study was conducted in June, 2012 at Haramaya district, East Hararghe, Oromia Region, Eastern part of Ethiopia which is located 507 KM East of Addis Ababa.

2.2. Sample Size and Sampling Technique

Sample size was estimated by OpenEpi version 2.3 by taking proportion of mother awareness of obstetric danger sign(p=0.36) (Mesay Hailu, Abebe Gebremariam *et al.* 2010), 5% marginal of error, 95 % confidence level, design effect of two and by considering 10% non-response rate the final sample size was 779. Multistage sampling method was used to select study subjects. Four kebeles (the lowest units of administration in Ethiopia) were selected randomly (one from urban and three from rural). Then, women who gave birth in the last two years were reviewed from health extension records in selected kebeles and simple random sampling were used to select the study subject.

2.3. Data Collection Tool and Method

Data collection was carried out using questionnaire which was adapted from safe motherhood questionnaire developed by the Maternal Neonatal Program of (JHPIEGO 2004). The questionnaire consisted of socio-demographic data; reproductive health characteristics; awareness about obstetric danger sign and health care seeking practice. Women who spontaneously mention at least three danger signs considered as having awareness on obstetric danger signs. Data collection procedures were supervised by supervisors and principal investigator and checked for completeness and coherence.

2.4. Data Analysis

The data was entered and cleaned using Epi-info version 3.5.1 and analyzed by SPSS version 16. First descriptive statistics of percentages and frequency distributions were carried out to explore the mothers' related characteristics. Binary logistic regression was used to assess the association of mothers awareness about obstetric dander signs with exploratory variables. Factors for which significant ($P \leq 0.2$) bivariate association observed were retained for subsequent multivariate analyses using logistic regressions.Adjusted odds ratios (OR) with 95% confidence intervals (CI) were calculated. Ethical approval was obtained from the Institutional Research and Ethical Review Committee (IRERC) of College of Health and Medical Sciences.

3. Results

3.1. Socio-Demographic Characteristics

A total of 757 mothers participated in the study with a response rate of 97.2%. The age of respondents ranged from 16 to 40 years (mean ± SD =24.6±4.3 years). Almost all respondents were Muslim (97.1%), married (93.4%) and Oromo (95.6%). About three quarter (74%) of the respondents were not attended any formal education. The respondents numbers of children ranged from 1 to 11 (mean ± SD =3.3±1.9) (Table 1).

3.2. Reproductive Health Characteristics

Out of 757 mothers, 323 (42.7%) had ANC follow up at least once for the last recent pregnancy. WHO recommended four and above ANC wereattended only by 77 (23.8%) mothers, and only about one tenth (13%) were gave birth at health institutions (Table 2).

Table 1. Socio-Demographic Characteristics mother at Haramaya district, Eastern Ethiopia, June 2012.

Characteristics	Numbers	Percentages
Gravidity		
1-4	530	70.0
≥5	227	30.0
Parity (742)		
1-4	552	72.9
≥5	205	27.1
Previous ANC visits		
Yes	323	42.7
No	434	57.3
Number of ANC visit		
Partially followed	246	76.2
Fully followed	77	23.8
Presence of complications		
Yes	245	31
No	512	69
Place of delivery		
Home	657	87
Health institutions	100	13
Modes of delivery		
Spontaneous vaginal delivery	725	95.7
Cesarean section	14	1.9
Instrumental delivery	18	2.4

3.3. Mothers' Awareness on Obstetric Danger Signs

Awareness of key obstetric danger signs was low during pregnancy, delivery and postpartum, only13.1%, 14.4% and 16.1%, mentioned three and above key danger signs respectively. The most frequently mentioned key danger signs was severe vaginal bleeding; during pregnancy 23.5%, delivery 29.8% and postpartum 32.7%. Moreover, 53%, 52.2% and 47.2% of respondents didn't have awareness about at least one obstetric danger signs (Table 3).

Table 2. A reproductive health characteristic of Women's at Haramaya district, Eastern Ethiopia, June 2012

Characteristics	Numbers	Percentages
Gravidity		
1-4	530	70.0
≥5	227	30.0
Parity (742)		
1-4	552	72.9
≥5	205	27.1
Previous ANC visits		
Yes	323	42.7
No	434	57.3
Number of ANC visit		
Partially followed	246	76.2
Fully followed	77	23.8
Presence of complications		
Yes	245	31
No	512	69
Place of delivery		
Home	657	87
Health institutions	100	13
Modes of delivery		
Spontaneous vaginal delivery	725	95.7
Cesarean section	14	1.9
Instrumental delivery	18	2.4

Table 3. Proportion of Women's answered key obstetric danger signs at Haramaya district, Eastern Ethiopia, June 2012 (N = 757).

Obstetric danger sign	Awareness of danger signs					
	Pregnancy		delivery		after delivery	
	n	%	n	%	N	%
Vaginal bleeding	178	23.5	232	29.8	255	32.7
Convulsion	84	11	121	15.5	104	13.4
Sever head ache	97	12.5			131	16.8
Blurred vision	88	11.6			34	4.4
Hand/face edema	26	3.3				
retained placenta			98	12.8		
prolonged labour			188	24.1		
Offensive vaginal discharge					25	3.2
high grade fever	115	14.8			231	29.7
others*	74	9.7	58	7.7	38	5.02
I don't know	402	53	395	52.2	357	47.2

3.4. Factors Associated with Mothers' Awareness on Obstetric Danger Signs

Multivariate analyses were carried out to identify the factors associated with awareness on obstetric danger signs. As illustrated in Table 4, marital status significantly associated with mothers' awareness about obstetric danger signs. Divorced, widowed and separated had more odds of good awareness of danger signs of pregnancy and delivery than married [AOR 2.8; 95% CI 1.7-6.8] and [AOR 1.6; 95% CI 1.04-2.9] respectively. Having ANC visit for the last recent pregnancy increases the likelihood of good awareness during pregnancy, delivery and postpartum [AOR 11.3; 95% CI 4.2-16.1], [AOR 4.6; 95% CI 2.4-9.3] and [AOR 7.81; 95% CI 2.9-12.3] respectively. Those who had four or more ANC visit were 2.4 times more cognizant about pregnancy danger signs than those who had less than four ANC visit. Giving birth at health institutions and delivering by caesarian section in the last recent pregnancy was associated with higher likelihood of good awareness [AOR 5; 95% CI 2.3-17]. Educational status had no statistical significance with awareness of obstetric danger signs during pregnancy.

3.5. Proportions ofMothers Experienced Obstetric Danger Signsand Health Care Seeking Practice

From the total participants of the study, 31% of them reported that they experienced one or more key danger signs. Study participants who experienced key danger signs were 30(13%), 115(49.2%) and 89(37.8%) during pregnancy, child birth and postpartum period, respectively. Out of 234 mothers who experienced complication, 159 (68.8%) sought treatment at health institutions, 58 (25.1%) were not treated or stayed at home and the rest 14 (6.1%) went to cultural or religious healers. As shown in Figure 1, out of 72 mothers who did not seek help for medical treatment, 21 (29.3%) were due to lack of money while 16(22.2%) were due to perceiving that problem was harmless.

Table 4. Factors associated with mothers' awareness on obstetric danger sign at Haramaya district, Eastern Ethiopia, June 2012.

Characteristic	AOR (95% CI) Awareness about danger signs of pregnancy	AOR (95% CI) Awareness danger signs of	AOR (95%CI) Awareness danger signs of postpartum
Marital status			
Married	1	1	1
Others *	2.8[1.7-6.8]	1.6[1.04-2.9]	2.3[0.9-4.1]
Educational status			
No formal education	1	1	1
Primary	1.4[0.83-4.2]	2.1[1.07-3.7]	1.7[0.8-2.9]
Secondary and above	1.6[0.81-3.7]	1.82[0.96-3.4]	3.1[1.3-5.3]
Gravidity			
1-2	111		
3-4	0.7[0.5-2.3]	1.4[0.73-4.8]	0.92[0.61-5.3]
≥5	1.3[0.83-3.1]	2.1[0.88-3.7]	1.7[0.94-3.9]
Previous ANC visits			
Yes	11.3[4.2-16.1]	4.6[2.4-9.3]	7.81[2.9-12.3]
No	1	1	1
Presence of complications			
Yes	5.2[2.3-7.1]	3.6[1.2-10.7]	6[3.4-7.9]
No	1	1	1
Number of ANC visit			
Partially followed	1	1	1
Fully followed	2.4[1.6-8.2]	2.8[1.4-10.3]	3.5[1.7-9.3]
Place of delivery			
Home	1		
Health institution	1.8[0.91-3.9]	3.7[1.9-8.3]	3.1[1.6-7.3]
Modes of delivery			
SPV**	1	1	1
Instrumental delivery	2[0.9-6.1]	3.3[1.07-11.3]	2.7[1.3-9.5]
Cesarean section	5[2.3-17]	7.3[2.4-13.2]	4.2[1.4-10.2]

**widowed, divorced, separated ** spontaneous vaginal delivery.*

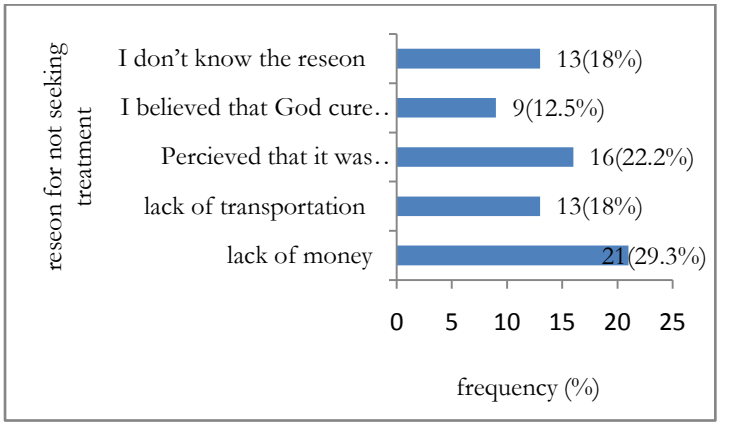


Figure 1. Reasons of mothers not seeking medical treatment for experanced obstatric danger signs,at Haramaya district, Eastern Ethiopia, June 2012 (N = 72).

4. Discussion

Awareness of the danger signs of obstetric complications is the essential first step in accepting appropriate and timely referral to obstetric and newborn care. But, awareness of respondent on danger sign in this study was low, only 13.1%, 14.4% and 16.1%, mentioned three and above key obstetric danger signs during pregnancy, delivery and postpartum, respectively. This is lower than a study in Uganda (18.7%) mentioned three and above key danger signs (Jerome K Kabakyenga, Per-Olof Östergren *et al.* 2011). And, almost half of the women were not aware of at least one obstetric danger sign. Similar finding was also reported from Egypt (Wafaa A. Rashad and Rasha M. Essa 2010). But, in Ghana, 86.7% (Udofia., Obed. *et al.* 2013) of mothers mentioned at least one obstetric danger sign. These differences in awareness level could be due to a difference in socio- demographic, cultural, and health interventions.

Vaginal bleeding was the most recognized danger sign, and it was mentioned by 23.5%, 29.8% and 32.7% of respondents during pregnancy, delivery and after delivery, respectively. Similar to our study, higher awareness of vaginal bleeding was reported by different studies (Andrea B Pembe, David P Urassa *et al.* 2009; Jerome K Kabakyenga, Per-Olof Östergren *et al.* 2011; Hadayat A. Amasha and Manar F. Heeba 2013). Additionally, about 24% of mothers were aware of prolonged labor as obstetric danger sign and it was the most recognized danger sign during delivery as reported in Haiti (Chia-Y u Kuo 2006). The reason excessive vaginal bleeding and prolonged labor most commonly recognized as a danger sign may be due to their most visible signs.

In this study, 42.7% of mothers were having at least once ANC visit. This is much less than studies in Uganda (68%) (Jerome K Kabakyenga, Per-Olof Östergren *et al.* 2011), Sudan (83.3%) (Ali., Rayis. *et al.* 2010), Tanzania (94%) (Declare Mushi, Rose Mpembeni *et al.* 2010) and Ghana (95%) (Udofia., Obed. *et al.* 2013) of mothers had at least once ANC visit. And, only 10% of the mothers fully followed ANC as per WHO recommendation, but it was 16.2% in Sudan(Ali., Rayis. *et al.* 2010) and 62.1% in Nepal (Gyawali., Paneru. *et al.* 2013). Having ANC follow up for the last recent pregnancy increased the likelihood of good awareness on obstetric danger signs by 11 folds, 5 folds and 8 foldsduring pregnancy, delivery and after delivery, respectively. Similarly, different studies reported ANC attendance increases mothers' awareness of obstetric danger signs (Renu Sangal, Reena Srivastava *et al.* 2012; Henry V. Doctor, Sally E. Findley *et al.* 2013). In addition to having four or more, ANC visit increases the odds of mothers' awareness on obstetric danger signs. This finding is consistent with another study (Andrea B Pembe, David P Urassa *et al.* 2009). This might be because ANC provide opportunity to educate women and their family about danger signs related to pregnancy (phillip Nieburg 2012). Evidences also revealed that information obtained during effective implementation of ANC enhances the awareness of maternal danger signs (Andrea B Pembe, David P Urassa *et al.* 2009; Abdou Jammeh, Johanne Sundby *et al.* 2011; Mesay Hailu, Abebe Gebremariam *et al.* 2010).

Age did appear to have an effect on awareness of obstetric danger signs. This is similar with studies by(Chia-Y u Kuo 2006; Renu Sangal, Reena Srivastava *et al.* 2012; Mesay Hailu, Abebe Gebremariam *et al.* 2010). On the other hand, educational status was not found to be a determinant of awareness on obstetric danger signs. Similar findings were reported by different studies (Mesay Hailu, Abebe Gebremariam *et al.* 2010). But, some studies reported contradictory finding. Higher level of education was associated with increased awareness of obstetric danger signs (Andrea B Pembe, David P Urassa *et al.* 2009; Wafaa A. Rashad and Rasha M. Essa 2010; Jerome K Kabakyenga, Per-Olof Östergren *et al.* 2011).

Only 13% of the respondents gave the last recent birth at health institutions. This is very low, and it is even incomparable with other African countries: 99.8% in Ghana(Udofia., Obed. *et al.* 2013), 97% in Kinshasa(Kabali E, Gourbin C *et al.* 2011) and 57.2% in Kenya (Wanjira C, Mwangi M *et al.* 2011). Giving birth at health institution was associated with increased likelihood of good awareness on obstetric danger signs. Moreover, mothers who gave birth by caesarian section and instrumental delivery were more aware of obstetric danger signs than who gave birth by spontaneous vaginal delivery. This might be due to mothers gave birth by caesarian section and instrumental delivery when they faced obstetric complication. Therefore, they easily remembered the problem they faced. Facing pregnancy related complication for the last pregnancy increases the likelihood of good awareness of obstetric danger signs. Study in Egypt also indicated similar finding (Wafaa A. Rashad and Rasha M. Essa 2010).

Out of mothers who faced obstetric complication, significant number of mothers (31.2%) did not seek help for medical treatment. This might be due to the awareness of mothers on obstetric danger signs in the study area, which is low. The reasons raised were financial obstacles, lack of transportation, and perceiving that problem was harmless. This finding is consistent with another study(Lubbock. and Stephenson. 2008).

5. Conclusions

Awareness of mothers on obstetric danger signs in the study area is low. Having ANC follow up, having four or more ANC visit, presence of pregnancy related complication in the last pregnancy and giving recent birth by caesarian section and instrumental delivery were associated with higher likelihood of mothers' awareness of obstetric danger signs. Significant number of mothers did not seek for medical treatment when they experienced obstetric complications. Financial obstacles, lack transportation and perceiving that the problem was harmless were the major barriers for not seeking medical treatments.

6. Recommendations

Health professionals and health authorities need to focus on community-based education about obstetric danger signs and importance of care during pregnancy and delivery and after delivery. Mothers' education on appropriate ANC utilization and institutional delivery are important steps in improving the awareness of obstetric danger signs and health seeking practice.

7. References

Abdou Jammeh, Johanne Sundby. 2011. "Barriers to Emergency Obstetric Care Services in Perinatal Deaths in Rural Gambia " ISRN Obstetrics and Gynecology.

Africa, U. N. E. C. 2013. Assessing Progress in Africa towards the Millennium Development Goals Food security in Africa: Issues, challenges and lessons. New York

Ali., A. A. A., D. A. Rayis. 2010. Awareness of danger signs and nutritional education among pregnant women in Kassala, Eastern Sudan. *Sudanese journal of public health* 5 (4): 179 - 181.

Andrea B Pembe, David P Urassa. 2009. Rural Tanzanian women's awareness of danger signs of obstetric complications. *BMC Pregnancy and Childbirth* 9 (12) : 1 - 8.

Chamberlain. G. 2006. British maternal mortality in the 19th and early 20th centuries. *Journal of the Royals Socity of Medicine* 99.

Chia-Y u Kuo. 2006. Community Awareness of Maternal and P erinatal Danger Signs in Rural Haiti . University of Connecticut Health Center Graduate School, University of Connecticut. Masters: 96.

Declare Mushi, Rose Mpembeni. 2010. Effectiveness of community based safe motherhood promoters in improving the utilization of obstetric care. The case of Mtwara Rural District in Tanzania. BMC Pregnancy and Childbirth10 (14) : 1 - 9.

FDEMOH. 2006. National Reproductive Health Strategy 2006 - 2015. Addis Ababa, MOH.

Gyawali., K.., D. P. Paneru. 2013. Knowledge and practices on maternal health care among mothers: A Cross sectional study from rural areas of mid-western development region Nepal. J*ournal of the Scientific Society* 40 (1) : 9 - 13.

Hadayat A.,Amasha and Manar F. Heeba. 2013. Maternal Awareness of Pregnancy Normal and Abnormal Signs: An Exploratory Descriptive Study. *Journal of Nursing and Health Science* 2 (5) : 39 - 45.

Henry V. Doctor, Sally E. Findley. 2013. awareness of Critical Danger Signs of Pregnancy and Delivery, Preparations for Delivery, and Utilization of Skilled Birth attendants in nigeria. *Journal of Health Care for the Poor and Underserved* 24: 152 - 170.

Hiluf. M, F. M. 2007. Birth Preparedness and Complication Readiness among women in Adigrat town:.*Ethiopian Journal of .Health Development* 22 (1): 14 - 20.

International, C. S. A. E. a. I. 2012. Ethiopia Demographic and Health Survey 2011. Addis Ababa, Ethiopia and Calverton, Maryland, USA.

International, I. 2011. Trends in Demographic and Reproductive Health Indicators in Ethiopia Data from the 2000, 2005, and 2011 Demographic and Health Surveys. Calverton, Maryland, USA:, ICF International Inc.

Jerome K Kabakyenga, Per-Olof Östergren. 2011. Knowledge of obstetric danger signs and birth preparedness practices among women in rural Uganda. Reproductive Health8 (33).

JHPIEGO. 2004. Monitoring birth preparedness and complication readiness: tools and Indicators for maternal and newborn health, John hopking unversity.

JHPIEGO. 2004. Monitoring birth preparedness and complication readiness: tools and indicators for maternal and newborn health Baltimore, Maryland 21231-3492, USA, JHPIEGO.

Kabali E, Gourbin C. 2011. Complications of childbirth and maternal deaths in Kinshasa hospitals: testimonies from women and their families. BMC Pregnancy and Childbirth11 (29).

Loudon .I. 2000. Maternal mortality in the past and its relevance to developing countries today. *The Americal Journal of Clinical Nutrition* 72.

Lubbock., L. A. and R. B. Stephenson. 2008. Utilization of maternal health care services in the department of Matagalpa, Nicaragua. *Pan Am J Public Health* 24 (2): 75 - 84.

Mesay Hailu, Abebe Gebremariam. 2010. knowledge about obstetric danger signs among pregnant women in aleta wondo district, sidama zone, southern Ethiopia. *Ethiop J Health Science* 20 (1).

phillip Nieburg. 2012. Improving Maternal Mortality and Other Aspects of Women's Health: The United States' Global Role. Oslo, Center for strategic & International studies, Global Health Policy Center: 1-21.

Renu Sangal, Reena Srivastava. 2012. Knowledge and Practices regarding Obstetric danger signs in Women attending Ante-natal care Clinic at BRD Medical College Gorakhpur. *Indian Journal of prev. soc. Med.*43 (1): 12 - 18.

Udofia., E. A., S. A. Obed. 2013. Birth and Emergency Planning: A Cross Sectional Survey of Postnatal Women at Korle Bu Teaching Hospital, Accra, Ghana. *African Journal of Reproductive Health* 17 (1): 27 - 40.

UN. 2013. The Millennium Development Goals Report. Newyork UN.

UNFPA. 1999. Evaluation Finding. New York 220 East 42nd Street.

WHO. 2005. Make every mother and child count. 1211 Geneva 27, Switzerland, World Health Organization.

W.H.O. 2011. District Planning Tools for Maternal and Newborn Strategy Implementation. A practical tool for strengthening Health Management System Making pregnancy safer. Geneva WHO.

Wafaa A. Rashad and Rasha M. Essa. 2010. Women's Awareness of Danger Signs of Obstetrics Complications. *Journal of American Science* 6 (10): 1299 - 1306.

Wanjira C, Mwangi M. 2011. Delivery Practices and Associated Factors among mothers seeking Child Welfare Services in Selected Health Facilitie in Nyandarua South District, Kenya. *BMC Public Health* 11 (360).

WHO. 2012. Trends in maternal mortality: 1990 to 2010. Geneva 27, Switzerland, WHO.

15. Drop Out of Newly Diagnosed HIV-Infected Adults from Routine Pre-ART Care in Public Hospital, Harar Town, Eastern Ethiopia. A Retrospective Cohort Study

Tesfaye Digaffe

Haramaya University, College of Health and Medical Sciences, Department of Medical Laboratory, Harar, Ethiopia

Abstract

Compared to patients in high-income countries, patients in low-income countries are at higher risk of death in the early months of treatment. To avoid such early deaths, the identification of possible risk factors and potential causes of deaths, and strengthen the pre-ART and ART follow up program are very important.The general objective this study was to determine the rate of early drop out of newly diagnosed HIV infected adults not yet eligible for ART and to identify baseline predictors associated with pre-ART drop out in public hospitals in Harar town, Eastern Ethiopia.

A facility based retrospective cohort study was conducted among 432 HIV infected individuals in Hiwot Fana Specialized University Hospital. These HIV infected individuals were registered in pre-ART program between the accrual period [between January 1, 2008 and December 31, 2010] and randomly selected from the selected ART clinic. Appropriate analyses were done using Epi info 3.5.1 and SPSS version 16.0. Baseline characteristics of the cohort were described. Cox Bivariate and multivariate analysis were performed to assess for individual predictors of drop out. Kaplan-Meier (KM) method and log rank test were also used to estimate the survival probability and to compare survival curves, respectively.

Of the total 432 patients included in the study, 67.6% (n=292) were female. Age of study participants ranged from 16 to 74 years with median age of 30.0 years (IQR=25.0, 36.80). The average CD4 cell count was 315.8 cells/ul. The mean Body Mass Index (BMI) was 20.3kg/m2. The cohort was followed for 1605 Person-Months of Observation (PMO). During the follow up period, 163 (37.7%) patients were drop out the pre-ART follow up. Total drop-out rate over the follow up period was 10.16 per 100 person-months (163/1605). Non follow-up and Lost to Follow-ups were 18.1% (n=78/432) and 19.7% (85/432), respectively.Kaplan Meiersurvival function test showed that sex (Log rank=8.72, p=o.oo3) and base line HIV disclosure status (Log rank=17.5, p=<o.oo1) of the patient had strong association with drop out. Baseline Educational and Marital status were also significantly associated with drop out [Log rank of 24.9 (p=0.003) and 17.4 (p<0.001), respectively]. During the multivariate analysis,four baseline factors could be independently identified as predictors of pre-ART dropouts by a Multivariate Cox Model:[Sex (being female) (HR=1.52; 95% CI=1.01-2.3, p=0.04); Educational status (no formal education) (HR=2.63; 95% CI=1.32-5.23, p=0.006); HIV status disclosure (nobody knows) (HR=1.63; 95% CI=1.14-2.32, p=0.006), and Marital status (Being Never Married) HR=1.86; 95% CI=1.27-2.72, p=0.001)].

The study showed that HIV counseling and testing scale-up is likely to significantly increase the number of diagnosed HIV-infected individuals in care but not yet in need of ART. Intensive plan should be designed for the promotion of early HIV diagnosis and for strengthening of the patient care pathway of pre-ART follow up through which the patient would be benefited by initiation of ART on the optimum time. Emphasis should also be given to female and uneducated individuals. Additionally, there should be subsequent, preferably, prospective observational studies in the area of pre-ART dropout rate should be conducted.In summary, to achieve satisfying ART coverage, monitoring of pre-ART patients need to be improved and strategies to increase retention in care need to be implemented.

1. Introduction

In many settings, especially in Sub-Sahara Africa (SSA), there is a growing concern that patients who have been diagnosed with HIV infection and registered for HIV care drop out, only to present themselves later with advanced HIV infection necessitating immediate ART initiation. Studies following patients from time of ART initiation show high rates of early attrition and mortality, which has mostly been attributed to the late access for ART.The ART scale up program is largely dependent on different factors. These include the ability to identify HIV-infected individuals, linking these individuals to HIV care, determining ART eligibility, monitoring those not yet eligible for ART to facilitate timely transition to treatment, initiating care among those eligible, and ensuring sustainable access to care (for both ART eligible and ineligible patients) over time. As access to these services grows, attention is now shifting from the immediate need to get patients into care, to the long term challenges of keeping patients in care and on treatment (Rosen *et al.,* 2007; Brinkhof *et al.,* 2008; and Lawn *et al*., 2008;Tassie *et al*., 2010).

Among the different age groups, HIV/AIDS is more prevalent in non-pregnant females > 14 years and males > 14 years (MoH, 2007). Additionally, in Ethiopia it is estimated that HIV is responsible for about a third of all adult deaths in the age group >14 years and leaves nearly three-quarters of a million orphans age 0-17 years and over 30,000 newborns with the virus (WHO/UNAIDS/UNICEF, 2007). Hence, adults are the most severely affected age groups by HIV/AIDS so that our interest of the study will focus on this age group.

Pre-ART care is given to PLWHA before they are eligible for ART. It constitutes psychosocial support, nutritional care, ongoing counseling, cotrimoxazole prophylaxis to prevent opportunistic infections and routine monitoring of PLWHA to assess their eligibility for ART. PLWHA should access this service through regular visits and clinical check-ups at health facilities (Hallett *et al*., 2010, Losina *et al*., 2010). Although the

global proportion of PLWHA under pre-ARV care is not comprehensively documented, UNAIDS estimates that 15% of all PLWHA have AIDS and are hence eligible for ART. By implication, therefore, 85% (28.3 million) of all PLWHA are supposed to be under pre-ART care (UNAIDS, 2010). Few of them;however, enroll and adhere to the continuum of pre-ARV care, and loss to follow-up is high, especially in Sub-Saharan Africa (11). Consequently, many PLWHA lost to follow-up do not benefit from the public health advantages this care is meant to provide.

Not all patients who present at earlier stage of their illness are eligible for ART. Even when they are eligible for ART, prompt initiation of treatment will depend on several factors including availability of medicines and trained health workers. It is therefore likely that in settings with high disease burden and limited resources, some patients will either default from treatment or will even die before they are started on ART. Such pre-ART patient outcomes including death and loss rates are not adequately documented, as most of the literature has focused on outcomes after ART initiation (Rosen *et al*., 2007).

From a cost versus benefit perspective, loss to follow-up is therefore a major challenge because tracing patients is evidently resource-intensive and often unsuccessful. Given that most of these patients may have already died, it has been suggested that preventing loss to follow-up by directing major efforts towards earlier HIV diagnosis, effective linkage to care and timely initiation of ART may be more effective at improving outcomes.

Whereas outcomes relating to ART programs have received most attention, a better understanding of pre-ART dynamics is also necessary. While most studies describe the rates of drop out after ART initiation, little is known about drop out of recently diagnosed HIV infected adults ineligible for ART after enrolment into care but prior to starting ART in resource limited settings. Understanding the predictors of pre-ART attrition are critical towards designing interventions aimed at retaining these patients in care and ensuring timely initiation of ART.

Understanding the predictors of pre-ART attrition are critical towards designing interventions aimed at retaining adult patients >14 years of age in care and ensuring timely initiation of ART. In addition, this study provideed an overview of pre ART dropout rate and its determinants in the study area by using routinely available clinical data. It also provideed empirical evidence for program planner, decision makers and pre-ART and ADT follow up program implementer at the different level by enabling them to access a base line data on pre- ART dropout rate In addition, since it is crucially important to hold back the scenario of the disease, this study offers baseline information that can assist in the development of a system for improving the quality of life and survival of PLWHA. The objective of the study was to determine the rate of early drop out of newly diagnosed HIV infected adults not yet eligible for ART and to identify baseline predictors associated with pre-ART drop out in public hospitals in Harar town, Eastern Ethiopia.

2. Methods and Materials

2.1. Study Area

Harar, one of the ancient cities in Ethiopia, is located 525 kilometers away from Addis Ababa. Based on the 2007 census conducted by the Central Statistical Agency of Ethiopia (CSA), Harari region had a total population of 183,344, of whom 92,258 were males and 91,086 were females; 99,321 or 54.17% of the population were urban inhabitants. With an estimated area of 311.25 square kilometers, this region had an estimated density of 589.05 people per square kilometer. For the entire region, 46,169 households were counted which resulted in an average for the Region of 3.9 persons to a household, with urban households having on average 3.4 people and rural households 4.6 people.

Currently, there are seven ART clinics in Harar. Among these clinics, this study was conducted in the two selected public hospital ART sites. They are Hiwot Fana Specialized University Hospital and Misrak Arbegnoch Hospital.

2.2. Study Period

The study was conducted from April 1 to 30, 2013.

2.3. Population

2.3.1. Source population

All adults living with HIV /AIDS and in the pre-ART follow program in selected Harar public hospitals.

2.3.2. Study population

All adults (age >14 years) PLWHA who attended the selected ART centers but not yet started treatment were the study population. Individuals who registered and involved in pre-ART follow-up service between January 1, 2008 and December 31, 2010, were not included in the study. Then, the study participant data was reviewed for the 12 months.

2.3. Study Design

A retrospective institutional based study was conducted among a cohort of PLWHA who registered on pre-ART follow up service in selected public hospitals. All adults (>14 years old) registered at the selected hospitals for HIV care from January, 2008 to December, 2010; and who were not yet eligible for ART.

2.4. Inclusion and Exclusion Criteria

2.4.1. Inclusion criteria

For this present study, inclusion criteria were determined by HIV infected patients > 14 years of age;

Patients not eligible for antiretroviral therapy;
Patients who are not pregnant;
Patients whose CD4 count ≥200; and
WHO stage I or II in the absence of a CD4 count.

2.4.2. Exclusion criteria

Patients having a previous treatment history;
Patients without a baseline CD4 count and basic personal information;
Patients who were diagnosed with HIV infection greater than three months before registration into care as our interest was with newly diagnosed patients and not patients who may have previously registered, dropped out and were now resuming care were all excluded from this study..

2.5. Sample Size

Due to a scarcity of data on pre-ART drop out, the sample size was estimated using drop out data from ART programs. A systematic review on patient retention in antiretroviral treatment programs in SSA reported weighted mean retention of 79.1% at 6 months (Rosen *et al*., 2007), which means, 20.9% dropout rate was observed. Assuming a pre-ART dropout rate of 20.9% at 6 months in our setting, the risk of newly diagnosed adults registered for HIV care dropping out for a size of 246 patients were estimated with a precision of ±5% at 95% confidence interval.

$$n= \frac{(Z\alpha/2)^2 x\ p\ (1-P)}{d^2}$$

Where, n is the sample size
Zα /2= Standard normal variable at 95% confidence level = 1.96.
P= proportion of dropout within six months= 0.209
d= Precision (marginal error) = 0.04.
Then, the sample size will be

$$n= (1.96)^2\ (0.209x0.719)/\ (0.04)^2=361$$

By considering a 20 % loss to follow-up the final sample size was 433.

2.5. Variables

2.5.1. Independent variables

The independent variables are socio-demographic characteristics:

Age, religion, sex, educational level, ethnicity, marital status, dependent children at home , employment

Baseline clinical and laboratory information:

Opportunistic illness, TB testing, diagnosis and treatment, CD4count, chemoprophylaxis (E.g. cotrimoxazole), BMI, WHO clinical staging, Hemoglobin level, Total lymphocytecell count.

2.5.2. Dependent variables

Loss to follow-up from pre-ART service was the main outcome. The loss to follow up was determined to be 60 days after the next appointment visit.

2.6. Definition of Outcome

The primary outcome of this study was pre-ART drop out over a 12 month follow up period following first registration into HIV care. Based on the evidence above, we defined 'drop out' as patients who are more than two months (60 days) late for a scheduled appointment. We further assess drop out from two end points of interest; (i) Patients who registered for HIV care but never returned over the given follow up period of two months (referred henceforth as 'non-follow ups'), and (ii) Patients who made at least one follow up after registration but dropped out subsequently (referred henceforth as 'lost to follow up'), where drop out has the same definition as above.

2.7. Person Time at Risk

Person-time at risk begins on the date of registration into HIV care. All patients who are in follow up six months after registration were censored at six months of follow up. To facilitate survival analysis, we assume non-follow up patients contributed one day of follow up each; the first day spent on registration and care. Lost to follow up (LTFU) patients were recorded at their last attended visit date. Patients who had died or transferred out to other health facilities were included in the analysis and were censored at their last attended visit date. In addition, since we are interested in determining pre-ART drop out, all patients who initiated ART during the follow up period were censored at the date they started ART.

2.8. Data Collection

Data was extracted from medical records using the available standard national registers which have been adopted by the Federal Ministry of Health (FMoH). The primary register was the Pre-ART register in which confirmed HIV positive clients are registered at their first presentation.

The study was conducted through reviewing secondary data. The data was collected by two ART trained nurses, one at each ART center. A total of two-day intensive training was given for all data collectors and data clerks. During data collection only patients' pre-ART follow up card number was used for patient identification purpose. The code was also given by the trained nurses for every recruited patient. Data collection and the overall activity were supervised by the principal investigator.

2.9. Data Analysis

Baseline characteristics of the cohort were described in tables and charts. Cox proportional hazard regression analysis was used since the rate of drop out varied rapidly over time and the registration/drop out times are well defined. A univariable analysis was done to assess for individual predictors of drop out. Hazard ratios (HR), 95% Confidence Intervals (C.I), and p-values were also presented. The Kaplan-Meier (KM) method was used to estimate the survival probability of dropping out from HIV care within 12 months of follow up time. We further assessed for differences in time to drop out by CD4 count and by any other predictor that was determined to be associated with drop out using the KM curves and a log rank test.

A multivariable Cox proportional hazard regression analysis was used to estimate adjusted HR and 95% C.I for predictors of early drop out of newly diagnosed HIV infected adults from pre-ART care.

2.10. Data Quality Management

Data collectors were nurses at ART clinic who had been trained on ART and understand the comprehensive care of HIV/AIDS patients. The data collectors were also given training on how to extract data from patient medical records using the data collection format. This data collection format was adopted and prepared by the principal investigator from the pre- ART forms being used in the ART clinics at the national level. Pre-testing of data collection tools were conducted in one of the randomly selected hospitals in Harar town before the actual data collection takes place. Then, necessary modifications were made on the format. A total of two-dayof intensive training was given to all data collectors and data clerks. The overall activity was controlled by principal investigator of the study. Data quality was controlled by designing the proper data collection materials and pretesting, through continues supervision. All completed data collected was examined for completeness and consistency during data management, storage, cleaning and analysis. The data was double-entered and cleaned by trained data clerks and the principal investigator, respectively.

2.11. Ethical Consideration

Ethical clearance was obtained from Institutional Research Ethics Review Committee of Harar Campus of Haramaya University. The selected hospital was informed about the objective of the study through a supporting letter from Haramaya University and written permission was obtained from the hospital administrations.

3. Results

3.1. Socio-Demographic Characteristics

From the total of 432 patients included in the study, 67.6% (n=292) were female. Age of study participants ranged from 16 to 74 years with median age of 30.0 years (IQR=25.0, 36.80). Table 4.1 describes the detailed socio-demographic characteristics of the study subjects.

3.2. Clinical Characteristics at Baseline

The average CD4 cell count was 315.8 cells/ul, with a minimum and maximum counts of 200 cells/ul and 1707 cells/ul(IQR= 142cells/ul, 426 cells/ul), respectively. The mean Body Mass Index (BMI) was 20.3kg/m^2 with minimum and maximum value of 13.0kg/m^2 and 36.0 kg/m2 (IQR=18.0 kg/m^2 ,22.3 kg/m^2), respectively.

Table 1. Socio-demographic Characteristics of newly diagnosed HIV infected adults not yet eligible for ART in public hospitals in Harar town, Eastern Ethiopia.

Characteristics	Total, n(%) N=432	Dropout, n(%) Total=163 (37.7%)	Non- Dropout, n(%) Total=269(62.3%)
Sex			
Female	292 (67.6)	136 (56.9)	154(53.1)
Male	140 (32.4)	27 (19.0)	115(81.0)
Age in years			
15-24	86(19.9)	40(46.5)	46(53.5)
25-34	188(43.5)	72(38.3)	116(61.7)
35-44	123(28.5)	41(33.3)	82(66.7)
>44	35(8.1)	10(28.6)	25(71.4)
Religion			
Muslim	129(29.9)	69(53.5)	60(46.5)
Orthodox	277(64.1)	88(31.3)	188(68.2)
Protestant	26(6.0)	6(23.1)	20(76.9)
Educational Status			
No education	94(21.8)	53(56.4)	41(43.6)
Primary Education	168(38.9)	62(36.9)	106(63.1)
Secondary Education	118(27.3)	38(32.2)	80(67.8)
Tertiary Education	53(12.0)	11(19.2)	42(80.8)
Marital Status			
Never Married	94(21.8)	51(54.3)	43(45.7)
Married	201(46.5)	64(31.8)	137(68.2)
Separated	60(13.9)	20(33.3)	40(66.7)
Divorced	23(5.3)	9(39.1)	14(60.9)
Widowed	54(12.5)	19(35.2)	35(64.8)
Occupational Status			
Farmer	25(5.8)	16(64.0)	9(36.0)
Merchant	45(10.4)	17(37.8)	28(62.2)
Governmental Employee	67(15.5)	17(25.4)	50(74.6)
Non-Gov. Employee	3(0.7)	2(66.7)	1(33.3)
Day Laborer	118(27.3)	50(42.4)	68(57.6)
Jobless	66(15.3)	23(34.8)	43(65.2)
Driver	9(2.1)	1(11.1)	8(88.9)
Other	99(22.9)	37(37.4)	62(62.6)

Table 2. Base line Clinical Characteristicswith proportion of dropout/non-dropout statusof newly diagnosed HIV infected adults not yet eligible for ART in public hospitals in Harar town, Eastern Ethiopia.

Characteristics	Total, n(%) N=432	Dropout, n(%) Total=163 (37.7%)	Non- Dropout, n(%) Total=269(62.3%)
CD4 Count			
200-300	228(52.8)	61(26.8)	167(73.2)
301-500	123(28.5)	63(51.2)	60(48.8)
>500	81(18.8)	39(48.1)	42(51.9)
BMI (N=432)			
<18.5kg/m2	125(28.9)	44(35.2)	81(64.8)
≥18.5kg/m2	307(69.9)	119(38.8)	188(307)
Functional Status			
Working	347(80.3)	132(38.0)	215(62.0)
Ambulatory	67(15.5)	24(35.8)	43(64.2)
Bed Ridden	18(4.2)	7(38.9)	11(61.1)
WHO Clinical Stage(N=432)			
Stage I	215(49.8)	88(40.9)	127(59.1)
Stage II	86(19.9)	32(37.2)	54(62.8)
Stage III	96(22.2)	32(33.3)	64(66.7)
Stage IV	35(8.1)	11(31.4)	24(68.6)
Medication at Registration (N=432)			
No	272(63.0)	118(43.4)	154(56.6)
Yes	160(37.0)	45(28.1)	115(71.9)

3.2. Cohort Characteristics

During the follow up period, 163 (37.7%) patients droped out the pre-ART follow up. The cohort was followed for 1605 Person-Months of Observation (PMO). Total drop-out rate over the follow up period was 10.16 per 100 person-months (163/1605). Non follow-up and lost to Follow-ups were 18.1% (n=78/432) and 19.7% (85/432), respectively.

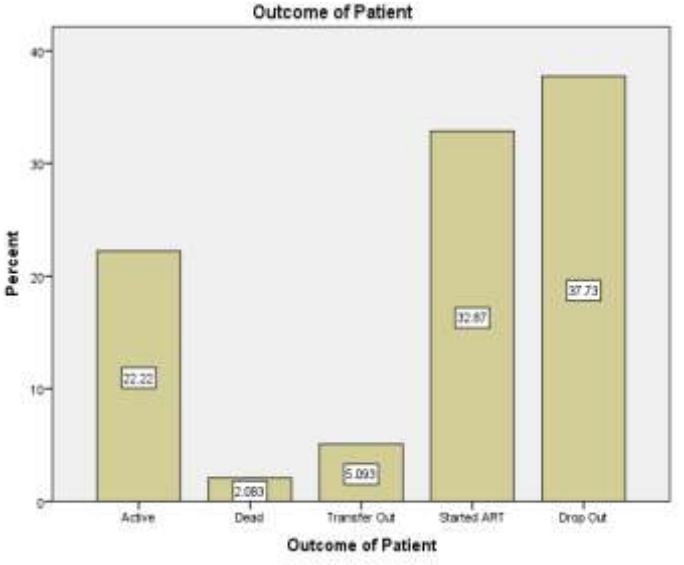


Figure 1. Outcome of patient during the follow up period.

3.3. Predictors of Mortality

During the analysis, survival function test was done by using *Kaplan Meier*survival function test to see the relationship between the covariates and the main outcome of interest, dropouts. Accordingly, sex *(Log rank=8.72, p=0.003)* and base line HIV disclosure status *(Log rank=17.5,*

p=<0.001) of the patient had strong association with drop out. Baseline Educational and Marital status were also significantly associated with Log rank of 24.9 (p=0.003) and 17.4 (p<0.001), respectively (see fig 2-4).

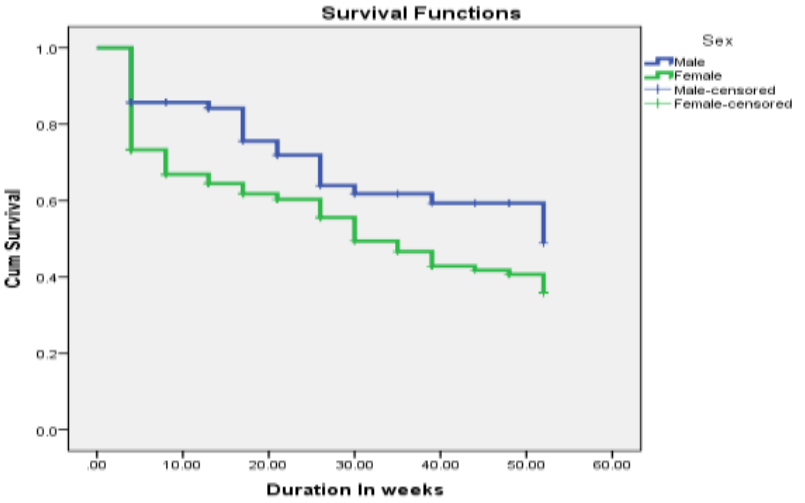


Figure 2. Kaplan Meier plot for comparison of sex status of the patients with Drop Outs at base in Pre-ART Care Unit.

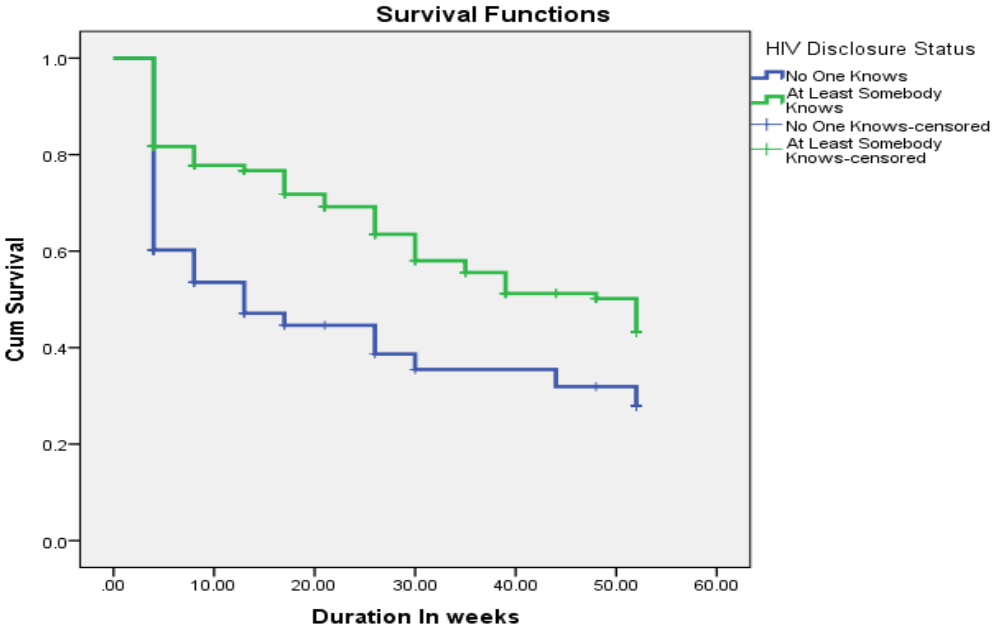


Figure 4. Kaplan Meier plot for comparison of HIV Disclosure Status with Drop-Out of Pre- ART care unit at base line

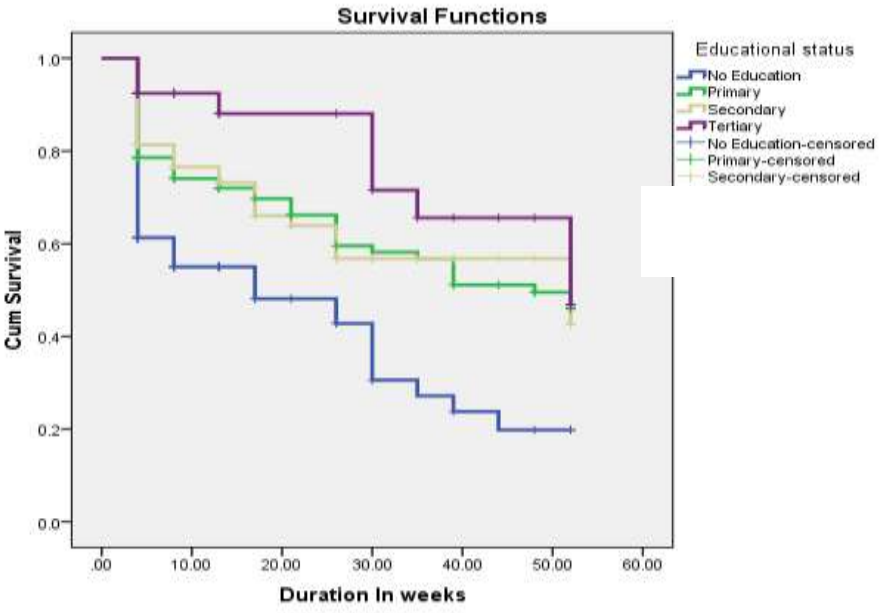


Figure 4. Kaplan Meier plot for comparison of Educational Status with Drop-Out of Pre-ART care unit at base line.

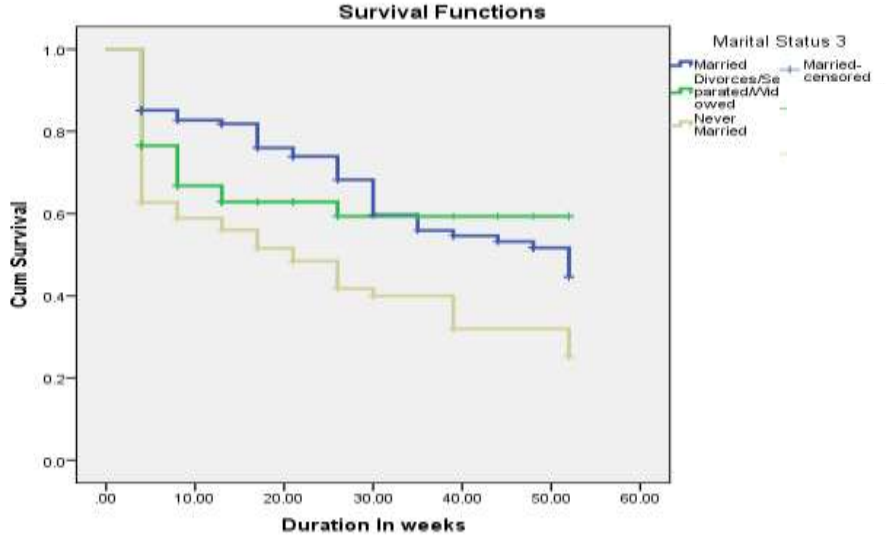


Figure 5. Kaplan Meier plot for comparison of Marital Status with Drop-Out of Pre-ART care unit at baseline.

To reveal the independent predictors of drop out in pre ART program, bivariate and multivariate Cox regression models were used. Among different base line variables incorporated in bivariate model Sex, Educational, and Marital status showed significant association with dropouts.

During the multivariate analysis,four baseline factors could be independently identified by a multivariate Cox model:[Sex (being female) (HR=1.52; 95% CI=1.01-2.3, p=0.04); Educational status (no formal education) (HR=2.63; 95% CI=1.32-5.23, p=0.006); HIV status disclosure (nobody knows) (HR=1.63; 95% CI=1.14-2.32, p=0.006), and Marital status (Being Never Married) HR=1.86; 95% CI=1.27-2.72, p=0.001).]

Table 3. Cox regression offactors with Lost to Follow-Ups, Non follow-Ups, and Drop Outs in Pre-ART Care Unit.

	LTFU			NFU			DOs		
	Crude HR	p	95% CI	Crude HR	p	95% CI	Crude HR	p	95% CI
Sex Male	1	0.17	0.86,2.27	1	0.01	1.14,3.54	1	0.007	1.14,2.38
Female	1.39			2.01			1.65		
Age 14-24	0.83	0.46	0.51,1.34	8.89	0.83	0.30,2.58	1.62	0.35	0.58,4.45
25-34	0.91	0.74	0.51,1.6	1.09	0.86	0.39,3.05	1.61	0.34	0.59,4.43
>35	1			1			1		
Educational Status									
No Formal Education	2.74	0.02	1.17,6.39	4.13	0.08	1.44,11.79	3.26	<0.001	1.7,6.2
Primary	1.50	0.32	0.66,3.37	2.12	0.16	0.74,6.07	1.72	0.09	0.90,3.28
Secondary	1.44	0.40	0.60,3.43	2.17	0.15	0.73,6.3	1.71	0.11	0.875,3.35
Tertiary	1	-	-	1	-	-	1	-	
Medication at reg.									
No	1			1	-		1		
Yes	0.89	0.63	0.56,1.41	1.90	0.02	1.10,3.28	1.25	0.19	0.88,1.78
Job Status									
Have a Job	1			1			1		
Don't have a Job	1.45	0.14	0.89,2.36	1.64	0.04	1.01,2.67	1.54	0.013	1.09,2.18
HIV Status Disclosure									
No one knows	1.38	0.21	0.82,2.34	2.51	<0.001	1.59,3.97	1.91	<0.001	1.36,2.68
At least someone knows	1			1			1		
Religion									
Muslim	2.21	0.19	0.67,7.23	2.55	0.11	0.78,8.27	2.38	0.04	1.03,5.50
Orthodox	1.32	0.63	0.41,4.25	1.12	0.84	3.64,3.65	1.32	0.62	0.53,2.82
Protestant	1			1			1		
Marital Status									
Married	1			1			1		
Divorced/Separated/Widowed	0.99	0.97	0.55,1.77	1.62	0.06	0.96,2.71	1.30	0.16	0.89,1.91
Never Married	1.65	0.03	1.02,2.67	1.57	0.12	0.88,2.77	1.62	0.01	1.12,2.33

LTFU: Loss to Follow up; NFU: Non follow-ups; DOs: Drop-Outs.

Table 4. Multivaraite Cox regression shows factors independently associated with the outcome variable.

Variables	Loss to Follow-ups			Non Follow-Ups			Drop Outs		
	HR	P	95% CI	Crude HR	P	95% CI	HR	p	95% CI
Sex									
Male	1			1			1		
Female	1.42	0.21	0.81,2.50	1.63	0.12	0.87,3.05	1.52		1.01,2.30
Age in Years									
14-24	1			1			1		
25-34	0.96	0.90	0.56,1.66	1.06	0.84	0.58,1.92	0.99	0.99	0.66,1.47
35-44	1.19	0.60	0.61,2.31	1.25	0.50	0.64,2.45	1.21	0.41	0.76,1.93
>44	0.90	0.86	0.29,2.79	0.83	0.71	0.31,2.22	0.85	0.66	0.41,1.77
Educational Status									
No Formal Education									
Primary	2.40	0.05	1.01-5.89	3.08	0.04	1.03,9.21	2.63	0.006	1.32,5.23
Secondary	1.37	0.45	0.59,3.19	1.68	0.33	0.57,4.90	1.50	0.22	0.77,2.90
Tertiary	1.28	0.58	0.52,3.12	1.79	0.29	0.60,5.34	1.47	0.26	0.74,2.9
	1			1			1		
Job Status									
Have a Job	1			1					
Don't have a Job							1		
	1.12	0.62	0.69,2.05	1.33	0.25	0.80,2.19	1.22	0.26	0.86,1.74
HIV Status Disclosure									
No one knows	1.19	0.52	0.69,2.05	2.13	0.002	1.31,3.45	1.63	0.006	1.14,2.32
At least someone knows									
	1			1			1		
Marital Status									
Married	1			1			1		
Divorced/Separated/Widowed	0.82	0.56	0.43,1.56	1.21	0.52	0.67,2.18	1.03	0.86	0.68,1.57
Never Married									
	1.85	0.02	1.10,3.12	1.90	0.02	1.07,3.37	1.86	0.001	1.27,2.72

4. Discussion

The findings from this routine pre-ART care unit in public facility revealed that 37.7% (163/432) droped out the service. This finding is supported by other studies done in Uganda (Amuron *et al*., 2009) which showed public sector's HIV care retention before eligibility for ART is poor. Therefore, an improved pre-ART package of care may serve not only to enhance retention but also to slow disease progression, treat intercurrent infections, enable timely initiation on ART for those eligible, reduce early mortality after starting ART and thus prolong overall survival.

Non formal educational status at base line had strong association with Drop outs, LTFUS, and NFUs; similar finding *in Kenya* (Amin *et al.,* 2012). Better educated clients were likely to return to the pre-ART follow-up care. Unlike our study's result which showed the strong association between being female and Drop outs, another study (Catrina *et al.,* 2010) revealed that being male is as an independent predictor for LTFU.

Our findings also disclosed that '*Never Married'* Patients were more likely to be drop out from HIV care which is similar with Amin *et al.,* 2012 in Kenya. This may be due to the fact that single individuals do not have people who support and give care to them; hence more likely to be negatively affected by HIV-related stigma. This has been shown to be an important barrier to adherence and retention in care in Malawi (McGuire *et al.,* 2010).

Lower CD4 count and lower BMI did not predict pre-ART LTFU in our setting. Most previous studies on loss to HIV care in clients on ART have identified these factors as independently associated with LTFU , and one meta-analysis study in SSA (Catrina *et al*., 2010) associated with pre-ART LTFU. Our findings, together with another study from South Africa (Losina *et al*., 2010), suggest that the risk factors for pre-ART retention differ considerably from those found among clients who have started ART.

Generally, some limitations were observed during conducting our research. First, sufficient studies were not available to review and analyze the dropout rate of pre-ART patients. Secondly, some vital clinical base line data (Like Hgb) were not recorded appropriately or totally not recorded. Lastly, all limitations linked with using secondary data were may be encountered in this study.

4. Recommendations

- HIV counselling and testing scale-up is likely to significantly increase the number of diagnosed HIV-infected individuals in care but not yet in need of ART.
- There should be intensive plan for promotion of early HIV diagnosis, strengthening of the patient care pathway of pre-ART follow up, which supported timely initiation of ART. Emphasis should be given to Female and uneducated individuals.
- Since our study was retrospective observational study, there should be subsequent, preferably, prospective observational studies in the area of pre-ART dropout rate, should be conducted.
- Health workers and data clerks in ART centre should be supported to appreciate the importance of properly recorded information

As a summary, our study showed that linkage from HIV diagnosis to HIV care is poor in resource-limited settings. To achieve satisfying ART coverage, monitoring of pre-ART patient needs to be improved, and strategies to increase retention in care need to be implemented.

5. Acknowledgements

I would like to acknowledge Haramaya University for funding this research project.

6. References

Amin S. H., Katherine L. F., Nahashon M. T., Helen M. N., Eduard J. S., and James A. B. 2012. Early loss to follow-up of recently diagnosed HIV-infected adults from routine pre-ART care in a rural district hospital in Kenya: a cohort study. *Tropical Medicine and International Health*. 17 (1) : 82 - 93.

Amuron B., Namara G., Birungi J., Nabiryo C., Levin J., Grosskurth H. 2009. Mortality and loss- to- follow- up during the pre-treatment period in an antiretroviral therapy program under normal health service conditions in Uganda. *BMC Public Health* 9 : 290.

Brinkhof MW., Dabis F., Myer L., Bangsberg DR., Boulle A., Nash D. 2008. Early loss of HIV- infected patients on potent antiretroviral therapy programmes in lower-income countries. *Bull World Health Organ*; 86 (7):559 - 67.

Catrina M., Janne E., Gilles W., NicoleB., MatthiasE., ThomasG., Olivia Keiser. 2012 . Loss to programme between HIV diagnosis and initiation of antiretroviral therapy in sub-Saharan Africa: systematic review and meta-analysis *Tropical Medicine and International Health* doi:10.1111/j.1365 - 3156.2012.03089.

Hallett, T. B., Gregson, S., Dube, S. & Garnett, G. P. 2008. The impact of monitoring HIV patients prior to treatment in resource-poor settings: insights from mathematical modeling. *PLoSMed* 5, e53.

Lawn SD., Harries AD., Anglaret X., Myer L., Wood R., 2008. Early mortality among adults accessing antiretroviral treatment programmes in sub- Saharan Africa. *AIDS*. 22 (15):1897-908.

Losina, E., Bassett, I. V., Giddy, J., Chetty, S., Regan, S., Walensky, R. P., Ross, D., Scott, C. A., Uhler, L. M., Katz, J. N., Holst, H. &Freedberg, K. A. 2010. The "ART" of linkage: pre-treatment loss to care after HIV diagnosis at two PEPFAR sites in Durban, South Africa. *PLoS One* 5, e9538.

McGuire M, Munyenyembe T, Szumilin, E. et al. 2010. Vital status of pre-ART and ART patients defaulting from care in rural Malawi. *Tropical Medicine and International Health* 15, 55 - 62.

Ministry of Health. 2007. Guidelines for Implementation of the Antiretroviral Therapy Programme in Ethiopia. Addis Ababa: Federal HIV/AIDS Prevention and Control Office (FHAPCO).

Rosen S., Fox MP, Gill C.J. 2007. Patient retention in antiretroviral therapy programs in sub- Saharan Africa: a systematic review. *PLoS Med* 4(10):e298., 9-11.

Tassie JM., Baijal P., Vitoria MA., Alisalad A., Crowley SP., Souteyrand Y. 2010. Trends in Retention on Antiretroviral Therapy in National Programs in Low Income and Middle- Income Countries. *J Acquir Immune Deficiency Syndromes*. 54, 437 - 441.

.UNAIDS. 2010. Global report on the global AIDS epidemic Geneva, UNAIDS. (www.unaids.org/documents/).

UNAIDS. 2009. AIDS epidemc update: Joint United nations programme on HIV/AIDS, Geneva, UNAIDS/WHO.

WHO/UNAIDS/UNICEF. 2007. Towards Universal Access. Scaling up priority HIV/AIDS interventions in the health sector. Progress Report.

16. Assessment of Health and Socio-Demographic Problems of Early Marriage among ever Married Women in Kersa District, Eastern Ethiopia

Wondimye Ashenafi

Department of Public Health, College of Health and Medical Science, Haramaya University, Haramaya, Ethiopia

Abstract

Marriage is legally considered early if adolescents marry below the age of 18. A considerably high proportion of Ethiopian women marry before 18 with a much lower age for sexual debut. Early marriage associated with this early sexual debut and limited use of contraceptive methods increases risks for reproductive health. However, the practice of early marriage having harmful effects on the well being of women is not understood to the greater extent in the country.The objective of the study was to examine the health and socio-demographic problems and associated factors among ever married women in Kersa district, Eastern Ethiopia, from February 15 to March 31, 2012.

A cross-sectional study design that combines both quantitative and qualitative study methods was applied. The selection of the study subjects for the quantitative study was made using a systematic random sampling method. A purposive sampling technique was used to select subjects for focus group discussion and in-depth interview.

Of the total, only 18.4% were firstly married within the legal age of marriage. The mean age at first marriage was 16.04 years. More than half (56%) of the married women reported being pressured into marriage, most of the urging (74.2 %) comes from parents or relatives. Even 60% of the women reported that they were not informed about the wedding as well as the person they would marry before the decision was made. This indicates a serious abuse of human rights. Women who married earliest (ages 12-14) encountered more health problems than those married between 15 – 17 years (8.1%versus 5.5%). The results of the multivariate analysis showed a strong association between different covariates and early age marriage.

The overarching issue showed in this study is a woman's role in family as implicated by having no influence or decision makings on their marriage life as well as a breach of their human and reproductive rights.

Keywords: Age at first marriage; Early marriage; Family; Women;, Sexual and reproductive rights

1. Introduction

Marriage is a social institution that unites people in a special form of mutual dependence for the purpose of forming and maintaining a family. As a social practice entered into through a public act, religious or traditional ceremony, it reflects the purposes, character, and customs of the society in which it is found. Intrinsically, every society has its own norm and/or legal limitation that bind the age of young girls to get involved in marriage. Marriage is legally considered early if children and adolescents marry below the age of eighteen (FHI/Youth Net, 2004).

The practice of early marriage is most common in sub-Saharan Africa. Particularly marriage before puberty is most usual in West Africa, East Africa and South Asia. In North Africa, the Middle East and other parts of Asia, marriage shortly after puberty is common among those living traditional life styles. Marriages of female adolescents between sixteen and eighteen years of age are also common in parts of Latin America and Eastern Europe (Path finder International, 2006). According to UNICEF (2001), 40 % and 49 % of girls under age of 19 in Central and West Africa respectively are married compared to 27% in East Africa and 20 percent in Northern and Southern Africa.

Ethiopia is home to more than 73 million people and 45% of its population is under age 15(CSA, 2007). The "Essential Conditions of Marriage" (section 2,Article 6-16) of the Revised Family Code (FDRE, Proclamation of 2000), Article 7,, the legal marriage age of both boys and girls as follows :"Neither a man nor a woman who has not attained the full age of eighteen years shall conclude marriage." Despite this law, the country is known for one of the most severe crises of child marriage in the world. The EDHS 2011 reports that 30% of girls in Ethiopia are married by age 15 but those married before 18 remained high (63%) The median age also remained at about 16.5 years for the nation. In Oromiya region, the median age at first marriage is 16.9 years (CSA and ORC Macro, 2011).

Early marriage has a negative consequence both for young girls and the society in which they live. It is a violation of human rights in general and of girl's rights in particular. For both girls and boys, early marriage has profound physical, intellectual, psychological and emotional impacts; cutting off educational and employment opportunities and chances of personal growth (UNICEF, 2001).

The practice of early marriage having harmful effects on health, psychological, physiological and socio-economic well being of women and of the society at large is not understood to the greater extent. The slight knowledge of the associated problems of early marriage is not even broadly shared across most of the population, especially to the rural community of Ethiopia where the problems are highly prevalent. Unless measures are taken to address the problem, it will continue to be a major stumbling block to the achievement of human, sexual and reproductive health rights. It is hoped that the findings of this study would, therefore, provide information that can be used to end the silent misery of thousands of girls in the district and contribute to the development of policies, programs and advocacy to bring this about. Hence, this study in general intended to contribute to fill the gap in knowledge about the cause and impact of early marriage on adolescent girls and in particular devoted to address the health and socio-demographic challenges women face because of their early marriage and associated factors in

Kersa district, Eastern Ethiopia. Thus, the objective of the study was to examine the health and socio-demographic problems of early marriage and associated factors among ever married women in Kersa district, Eastern Ethiopia.

2. Methods and Materials

2.1. Study Area and Period

A cross-sectional study design with both quantitative and qualitative data collection techniques was used. The study was conducted in Kersa Demogrphic and Sureveillance –Health research Center (KDS-HRC) of Kersa district, in eastern Hararghe zone. The DSS comprises of 12 kebeles, 2 urban and 10 rural kebeles (Kebele being the smallest administrative unit in Ethiopia). The study population was all ever married women from Kersa district who were under the follow up of Kersa Demographic Surveillance and Health Research Center (KDS-HRC). The study was conducted from February 15, 2012 to March 31, 2012.

2.2. Sample Size and Sampling Procedure

A single population proportion sample size estimation techniques was used for sample size estimation with the assumptions that the proportion of the population possessing this characteristic (early marriage) is assumed to be 50% in order to get the maximum possible sample size . The estimate of the sample in this study was desired to be precise at confidence level of 95% and margin of error of 5% (d); and with 10% non response, a total of 423 study participants.

The total sample size determined was then distributed among these 12 kebeles of the study area according to the proportion of ever married women aged 10 to 49 years residing in each kebele. Then the eligible woman from each stratum kebeles was selected using systematic random sampling method. In the process of the sampling procedure, more than one eligible woman from a given household was also included in the sample.

Focus group discussions (FGDs) and the key informant interviews (as qualitative data collection instrument) were carried out to gather in-depth information from individuals who are considered as knowledgeable and can provide information that supports or substantiates the findings that was obtained through quantitative research methods. Accordingly, the participants of FGDs was selected by purposive basis and 4 FGDs was administered with parents (who are married men and non sampled women in the quantitative technique), and unmarried adolescents (boys and girls separately). The participants in the FGDs constituted between 8 and 12 informant members.

The key informants' interviews were carried out with religious and other community leaders, different sector officers including women affairs office, school teachers/heads as well as with health workers (particularly community-based reproductive health agents). Eight purposively selected key informant interviews were conducted, taking two each from the aforementioned key informants.

2.3. Data Collection

Based on the review of international, national, regional and district level documents and research reports, three types of instruments were developed to collect qualitative and quantitative information on the health and socio-demographic problems of early marriage and its associated factors. These included a structured individual questionnaire, key informant interview guides, and FGD topic guides. Structured questionnaire was used as an instrument to collect the required quantifiable information. The questionnaire was originally prepared in English and was later translated into the Afan Oromo for easy understanding and communication between the data collectors and the respondents. The translated version was pre-tested in the field to assess the instrument for content and clarity of the questions. Based on the results of the pilot survey, the questionnaire was edited and revised.

A total of 17 data collectors and 4 supervisors were recruited for the quantitative data collection process. All of them were well qualified and experienced employees of KDS-HRC and have completed grade 10 and above. Prior to the actual field work started, the recruited data collectors and supervisors were givenatwo-day intensive training so as to enable them effectively administer the data collection process. FGD guide was developed to elicit on issues regarding the major causes and consequences of early marriage. A total of four FGDs, segregated by sex (the 1st group= male married parents, 2nd group= male adolescents, 3rd group= female married parents and the last group= female adolescents) were conducted to collect qualitative data. The parents provided information about their experience regarding early marriage, and unmarried adolescents shared their attitudes about the practice. The two male groups of participants were moderated by well trained male moderator while a female moderator led the female's focus group discussions. Both the FGD moderators were diploma holders in clinical nursing. Moreover, one assistant moderator was assigned for each group to handle tape recording and note- taking activities during each discussion. The principal investigator facilitated (without taking part in the discussion) until a point of information saturation is reached. Key informant interviews were also used to substantiate the information obtained from the structured questionnaire.

2.4. Data Analysis

In analyzing the data, descriptive statistical techniques were employed to describe important study subjects' features. Bi-variate and multivariate logistic regression with odds ratio along with 95% confidence interval were used to ascertain the association between different covariates and early age marriage. P value <0.05 was considered for statistical significance. Only covariates that had strong association (P<0.2) at the bivariate level were included in the multivariate logistic regression to control for confounding. Analysis was carried out using SPSS Version 16.

2.5. Ethical Considerations

The Institutional Research Ethics Review Committee of Haramaya University's College of Health and Medical Sciences provided ethical clearance. Permission was also obtained from local officials and a written and signed informed consent was obtained from all study subjects prior to data collection. Issues of confidentiality and the rights of participation were also assured.

3. Results

A total of 423 women in the reproductive age group participated in the study. The overall response rate was 100%. First, marriage was intact for 67.8% of the ever-married women. Women whose first marriage was not intact were asked about the main reasons for the dissolution of their first marriages. About 85% of terminated first marriages was ended either because of early engagement in marriage (49.3%) or due to lack of interest in the marriage (18.4% percent) or due to domestic violence (16.9%). Only 2.9% of first marriages were broken due to death of husband and 1.5% t due to infertility. In addition to the reasons for the dissolution of first marriages, information was also collected on their duration. A significant proportion of women (46.3%) whose marriages terminated said that the first marriage ended after ten or more years of married life. One third of the failed first marriages (both in urban and rural areas) were dissolved during the first three years.

To shed light on the previous marital experience of husbands, respondents were asked whether or not their first husbands had been married before. About sixteen percent reported that their husbands had been previously married, which was more common in urban than in rural areas. An attempt was also made to collect information on the number of previous marriages of the husbands for assessing the extent of vulnerability of young girls marrying older men. About sixteen percent of the husbands of women interviewed had been married before. Of these, 78% had been married once and 18% had been married two or more times. None of the husbands of women in the urban areas married two or more times. About 4% of the women reported that they had no idea about the number of previous marriages of their first husband.

More than half (about 56%) of the married women reported being pressured into marriage, including 57% of those in rural areas and 47% in urban communities. Young girls are being influenced to get into marriage without their consent and interest. Most of the urging (74.2%) comes from parents or relatives, and this does not show variations in residences (74 % for urban and 74.2 for rural). About seven percent reported influence from others like community elders, who in most cases act as intermediate negotiators between the brides' and grooms' families and work to get themselves heard and respected.

Urban areas appear to be slightly better compared to rural areas, as a higher proportion of the women choose their husbands (53% for urban versus 43% for rural) and make the decision whether or not to marry. Surprisingly 15 percent of the married women in the rural areas reported that they were abducted in to marriage.

More than 60% of the women reported that they were not informed about the wedding before the decision was made. Even in urban areas, 32.8% of the women reported that they were not informed about the wedding (albeit many of them could be migrants from rural areas). Married women were also asked if they knew the bridegroom prior to the wedding. Surprisingly, 56% of the women in rural areas did not know the man prior to the wedding and were forced into union with a man about whom they knew nothing. Only 18.4% of the ever-married women were married within the legal age of marriage (18 and above years); the proportion of women who entered marriage at an appropriate age is only 17% in the rural areas and 27.6% in urban areas. The mean age at first marriage was 16.04 & the modal age was 15 years. More than half (about 56%) of the married women reported being pressured into marriage, including 57% of those in rural areas and 47% in urban communities. Moreover, 15% of respondents particularly those residing in rural areas of the study area were abducted into marriage.

The situation of age at first marriage was also assessed using the qualitative approach of study in addition to the quantitative one. Information was obtained from the respondents (key informants and members of FGDs) and from documents provided by some of the key informants, particularly government officials.

Even though it is hard to find a statistical data that shows the pattern and trends of the practice of early marriage in the study area, key informants and members of FGDs reported a significant positive change and decline in the practice. They held that currently a considerable proportion of girls are entering into union at the age of 18 years. Almost all informants expressed the belief that the practice of early marriage has decreased over the last four years, most significantly in the last one year. However, there were some differences of opinion on the scope of the decrease among the key informants and members of FGD's. A few key informants were reluctant to admit that the practice of marrying young has decreased, while most of them were particularly definite on its recent decline. For instance, according to one key informant from the Office of Women's Affairs at the district, early marriage was not described as truly decreasing, especially compared to the efforts exerted to that end. She says, "People seem to have accepted the idea, but all of a sudden they return back to the old practice".

One informant from Justice office of the district noted, "Early marriage is not decreasing as expected in the study area due to the cultural dancing and feasting practices performed at night, during harvest time and specially at an intended marriage ceremony, which is known as 'SHEGOYE'. This traditional dancing practice for the preparation of marriage ceremony starts 5 or 6 months before the marriage and during these times young people get to know each other and unintentionally indulge into sexual intercourse which by itself contributes to the prevalence of HIV/AIDS and other sexually transmitted diseases. These young people who are involved into unintended sex finally decide to get married particularly in cases where the young girl gets pregnant and after performing a cultural marriage promise or vow known as 'NICKA'. However, in most instances, these young couples end up their marriage and the young boy who damped the girl and her child cannot be legally held responsible as he is under 18 years of age. So, the responsibility of raising children would fall on the shoulder of the young mother that compounded street beggary and other social evils in the district.

The other informant from the school indicated 'The practice of 'SHEGOYE' dancing and feasting resulting in unintended sexual intercourse and the consequent prevalence of early age at marriage in the district is due to its societal or cultural acceptance for long time regardless of the

effort made to create awareness about its bad effect in the district. Actually, it takes a concerted effort to eradicate such bad social norms and practices in the district'.

The members of the FGDs in each group also raised the issues of 'SHEGOYE' dancing and feasting emphasizing its negative effects or associations with early and unintended indulgence into sex and of marrying at young ages. The members of the group emphasized that the consequence of the practice has tremendous impact on the lives of the young girls involved. Parental resistance to the legal age at marriage also contributes to early age at marriage. The resistance is in a sense that they consider they have all the right on the matter of their daughter and that the government interference in their domestic lives cannot be justifiable and unnecessary. In this regard a key informant from the Justice office reported that out of 162 illegal marriages of under-aged girls in the wetter town of the district, they were able to cancel only 8 marriages mostly due to parental resistance.

Age differences result in significant differences in life experience and outlook. It also affects the balance of influence and control within the family, giving an older man considerably more control than that held by his young wife. Consequently, ever-married women were asked for information on the age difference between themselves and their spouses at the time of first marriage. Nearly 92% of the ever-married women were married to older men, and about 6% were of the same age. None of them married younger husbands. Of those who married older husbands, the age difference was 10 years or more in a quarter of the cases. The result shows no variation by place of residence. It is a normal and accepted norm among many ethnic groups in Ethiopia that husbands are slightly older than the wife. But in certain cases much older men are married to younger girls due to economic and associated reason.

Age difference was also an issue during the FGDs. Discussants confirmed that early marriage usually involves large spousal age differences, which in most cases limits the autonomy and decision-making ability of married girls.

It may be argued that parents approve early marriage because they donot realize its negative consequences upon their daughters. However, from key informants and FGD discussants account, lack of knowledge about the negative impacts can never be an excuse for its prevalence in the district. For example, a key informant from Women's affair office and a member of one of the married women's FGDs explained that they knew a number of persons (even respected elders of the community) who disapprove of early marriage with extreme conviction in public gatherings, but they nevertheless pursue the practice in their own homes. A key informant from the Justice Office of the district reported that these people who often disapprove of early marriage hypocritically but do it later even in their homes because of the strong cultural and traditional values attached to the practice.

The fact that tradition and cultural values are the most important causes of early marriage is also highly supported by the findings of quantitative data as described in the table below. Tradition is listed or ranked first as 63% of the respondents claimed it the primary cause for their involvement in to early marriage (see table1).

Table 1. Women respondents by reason of marriage and place of residence in Kersa district, Eastern Ethiopia, 2012.

Reason of marriage	Urban		Rural		Total	
	No	%	No	%	No	%
-It is a tradition in the area	44	75.9	221	60.5	265	62.6
- To avoid premarital affair	0	0	7	1.9	7	1.7
-To enjoy love life together	5	8.6	7	1.9	12	2.8
-To collect dowry	0	0	5	1.4	5	1.2
- Difficult to get married if older	0	0	36	9.9	36	8.5
- To strengthen relationship	7	12	87	23.8	94	22.2
-Other	2	3.4	2	0.5	4	0.9
Total	58	100	365	100	423	100

One of the many sufferings early married women face is the physical pain associated with sexual intercourse due to the physiological immaturity of the sexual organs. Physical pain during intercourse, obstetric fistula due to youthful delivery, when girls are not physically matured, and other complications due to pregnancy are among the many health-related problems faced by young married women. Considering these facts, empirical data was gathered on the health-related consequences encountered by early-married women. Women married before the age of 18 were asked if they had encountered any health problems as a result of early marriage and the type of health problems encountered for those who reported poor health outcomes. The type of sexual and reproductive health problems included were injury as a result of assault, excessive menstruation, pregnancy or delivery related problems including prolonged or obstructed labor during delivery, experience of abortion as well as frustration or tension experienced in the marriage.To have a better picture of the situation, the responses were organized by age at first marriage, (12-14 and 15-17 years).

As expected women who married earliest (ages 12-14) encountered more health problems than those married between 15 – 17 years (8.1 percent versus 5.5 percent). Those residing in urban areas are more likely to report such incidences than their rural counterparts.

3.1. Factors Related with Age at First Marriage

The religion of respondents was found to be highly significant in determining the age at first marriage of the respondent women. The table below indicates Muslim women have high likelihood of marrying at an early age when compared to the Christians in the study area. In other words, the odds of marrying at early age(less than 18 years of age) are 4 times higher among Muslim women as compared to the Christians(OR=4.006; P≤0.05). As to the consent of marriage, those who married by their own consent has a lower chance of getting married at an early age than those who pressured for the marriage. The likelihood of marrying at an early age is reduced by 49% to those consented for the marriage as compared to those pressured to marry (OR=0.509; P≤0.05).

The effect of reasons to get involved at an early marriage was the other factor that was assessed with a multi-variable analysis by taking tradition as a reference category. The results in the table indicates that the odds of getting married at an early age is reduced by 82% for those married due to fear of difficulty to get married if older(OR=0.183; P≤0.05), by 62% for those whose parents opted to have a strengthened relationship with the bridegroom's family (OR=0.379; P≤0.05) and by half for those who claimed to have a enjoyable love life together (OR=0.504; P≤0.05) as compared to those who mentioned tradition as a cause for marrying at their early ages.

As shown in the table, age difference with husbands is negatively related to early age at marriage. The chance of early marrying is reduced by 82% for those who married their age mates as compared to those who married older husbands. (OR=0.175; P≤0.05).

As to the respondent's level of education, the likelihood of marrying at an early age is reduced by 80.6% to those with secondary and above level of education as compared to those with no education (OR=0.194; P≤0.05).

Table 2. Socio-demographic factors related with early marriage in Kersa district, Eastern Ethiopia, 2012.

	AOR	95%CI
Religion		
Christian(RC)	1.000	
Muslim	4.006	(1.201,13.356)
Consent for marriage		
No(RC)	1.000	
Yes	0.509	(0.276,0.939)
Reasons to get married		
Tradition(RC)	1.000	
Difficult to marry if older	0.183	(0.036, 0.925)
Avoiding premarital sex	1.950	(0.229, 16.567)
To collect dowry	0.174	(0.025, 1.238)
To strengthen relationship	0.379	(0.149, 0.959)
Enjoy love life	0.504	(0.253, 1.005)
Respondent's level of education		
No education(RC)	1.000	
Primary	3.716	(1.080, 12.793)
Secondary and above	0.194	(0.025, 1.483)
Age gap with first husband		
Older(RC)	1.000	
Same age	0.175	(0.073,0.421)

**P≤0.05, RC=Reference category*

4. Discussion

Marriage is legally considered early if adolescents marry below the age of 18. In this study, only 18.4% of the ever-married women were married within the legal age of marriage (18 and above years).This shows that the majority of ever-married women were first married in the ages when these young girls were neither physiologically nor psychologically ready for the union. This was in agreement with the Ethiopian Demographic and Health Survey(EDHS 2011) report which revealed that 63% of girls in Ethiopia were married before 18. The modal and the median age at marriage for this study were also very low, i.e., 15 years. The EDHS 2011 reported median age at first marriage was 16.9 years for Oromiya region (the region where the study area of this study found) &16.5 years for the nation which showed a relatively higher age at first marriage when compared to the median age at first marriage in the study area. The median age of sexual debut for girls is also reported as low as 16 years. Early marriage associated with this early sexual debut and limited use of contraceptive methods increases the risks of unwanted pregnancy, STI/HIV infection and maternal and child morbidity. More on that physical pain during intercourse, obstetric fistula due to youthful delivery & other complications due to pregnancy are among the many health-related problems faced by young married women. In line with this fact, the report of Ethiopian Ministry of Health indicated that 54% of pregnancies to girls under age 15 are unwanted compared to 37% for those ages

20-24. In most instances, unplanned and unwanted pregnancies are often end up in abortion which usually conducted under unsafe conditions .In Ethiopia, girls under age 15 are three times more likely to end their pregnancies in abortion compared to those aged 20-24(MOH, 2006a). According to the Ministry of Health report, abortion accounts for nearly 60% of gynecological and almost 30% of all obstetric and gynecological admissions (MOH, 2006b).The EDHS (2005) also showed that girls, age 15-19 years, are twice as likely to experience obstetric fistula compared to other women of reproductive age. A study done in Latin America as well showed that adolescents aged 15 or younger had higher odds of anemia and death, and of having a child died within its first week of life compared to young mothers, aged 20-24 (Conde-Agudelo *et al.*2005).

The results of this study were also in agreement with the aforementioned study results and reports revealing that women who married earliest (ages 12-14) encountered more reproductive health and related problems in general than those married between 15 - 17 years (8.1%versus 5.5%).

According to the Revised Family Code (Proclamation of 2000), consent and age are the two most "Essential Conditions of Marriage". Hence, the practice of early marriage violates the rights that are legally and constitutionally regarded as the first two most "essential conditions of marriage". Many believe that an exemplary marriage is characterized by the mutual understanding and respect the couple has for each other. This normally happens when the couples have entered into the marriage willingly and without the influence of a third party. Willingness reflects the individual's commitment and readiness to keep the marriage intact (Path finder International, 2006). Accordingly, an effort was made to see if respondents entered the marriage with or without the influence of a third party ,i.e.; whether they were pressured to get into the union without their consent and who provided that pressure. More than half (about 56%) of the married women reported being pressured into marriage, including 57% of those in rural areas and 47% in urban. This is in agreement with the survey report on causes and consequences of early marriage in Amhara region of Ethiopia where 55% were married forcefully without their consent (Path finder international, 2006). The results of multivarate analysis showed also that the likelihood of marrying at an early age is reduced by 49% to those consented for the marriage as compared to those pressured to marry (OR=0.509; P≤0.05). In most instances, for those marrying at early ages, somebody else provides consent on the child's behalf as they are young to make an informed decision to the engagement. The child does not have the opportunity to exercise her right to choose her mate. As a result, early marriages could be regarded as forced marriages. Young girls are forced or pushed into marriages by their parents, relatives, friends, local elders, and the like. In this study nearly three-fourth (74.2%) of first marriages were performed with the sole influence of the girls' parents/relatives. The survey report on causes and consequences of early marriage in Amhara region of Ethiopia as well revealed a relatively higher finding that 85% of the adolescents' marriages were chosen by parents.

The practice of marriage by abduction is considerably high in Ethiopia accounting to a national average of 69% even though it is considered a criminal act (NCTPE, 2003). In this study 15 percent of the married women in the rural areas of the study area reported that they were abducted in to marriage. This large percentage variation from the national may be because the national is an aggregate or average report that may conceal the regional variations in the practice.

This study showed the presence of a strong association between age difference with husbands and their being married at an early age. It showed that age difference with husbands is negatively related to early age at marriage. The chance of early marrying is reduced by 82% for those who married their age mates as compared to those who married older husbands. (OR=0.175; P≤0.05).This is also consistent with the EDHS 2005 report that the mean age difference between spouses in Ethiopia was revealed as high as 10.1 years.

Education was identified as the most important factor in increasing age at marriage for women (UNICEF, 2001; Ingrid Lewis, 2009; Jeannette Bayisenge, 2010). The results of this study indicated that women with no formal education married at relatively early ages than their educated counterparts. The likelihood of marrying at an early age is reduced by 80.6% to those with secondary and above level of education as compared to those with no education (OR=0.194; P≤0.05). In this regard, UNICEF evidently argued that the lack of education adolescent girls experience in their life restricts them to use the capacity to make their own life choices including the when and whom to marry (UNICEF, 2001). Lack of education also affects the possibility for getting information from print media (in most cases from mass media including from radio) which motivates positive change of behavior among listeners. In this survey, about 87% of respondents claimed to be illiterate with as much as 62% of them never listened to radio (65% for rural women and 40% for urban women)

According to the results from quantitative survey, 63% of first marriage was reported by cause of tradition. This would imply that community members follow norms without critically questioning the essence of the practice.

5. Conclusion

Findings of this study indicate that early marriage is highly prevalent in the study area (81.6 percent of respondents' first marriage was performed at ages younger than 18) and that it can be considered the most serious harmful traditional practice in the district.

The majority of the women (56%) entered into marriage as a result of someone's pressure, and more than 74% of the marriages were arranged by parents/relatives. More on that a considerable proportion of women particularly those residing in rural areas of the study area were abducted into marriage. These show the severity of the problem and shed light on the extent of violation of individual human rights.

Sixty five percent of rural women never listened to radio compared to 40% of urban women. This suggests that rural women are disadvantaged in terms of access to information through radio that helps them motivate for a positive change of behavior towards the practice of early marriage. Moreover, as the majority of them are illiterate, the access to print media is also very limited.

A considerably high proportion of women (about 92%) married older husbands with a gap of 10 or more years. These large age differences limit the young girls' autonomy and control of their reproductive life, thus resulting a series of breach in their sexual and reproductive rights. It also poses major reproductive health risks including their vulnerability to contracting STIs and HIV.

The fact that tradition and cultural values are the most important causes of early marriage is highly supported by the findings of both quantitative data and qualitative information (both in FGDs and in-depth interviews with key informants) of this study. Particularly the traditional dancing feast in the district known as 'SHEGOYE ' which often practiced during nights prior to an intended marriage ceremony(or sometimes during harvest times) was cited as one contributing cultural practices for the young girls early indulgence to sex and a consequent early marriage.

Over all, the overarching issue showed in this study was a subdued woman's role in community and society at the expense of norm or culture in general, as well as that women hold a lesser place and influence, and that they have gotten less recognition and respect in the family particularly in issues related to the control of their sexual lives and marital union.

6. Recommendations

Early marriage is recognized as a violation of human rights and a critical social problem with multifaceted consequences - particularly for women and children. In view of these facts, and based on the findings of the study, the following programmatic recommendations are set forth to help design interventions that may reduce and ultimately eliminate the practice of early marriage and lessen the misery of thousands of girls in the district.

- Empower the youth through the youth associations by providing them with information and knowledge they can use to convince family and community members that early marriage has a negative effect on all of them,
- Create sensitization forums for community/religious leaders, kebele administrations, and women and youth association members about effect of too much feasting on 'SHEGOYE' cultural ceremonies, yet keeping its practice in a decent manner.
- Forming and strengthening anti-Harmful Traditional Practice clubs in schools, as they have proven to be very effective and efficient in fighting against the practice.
- Efforts must be made to convince community leaders of the importance of girl's education by stressing its positive impact at the household level - especially on the well being of mothers, children, and the family.

7. Acknowledgements

This research was funded by Haramaya University. Thank you for the financial resources to conduct the study.

8. References

Bankole A, Singh S, Woog V, Wulf D. 2004. Risk and Protection: Youth and HIV/AIDS in Sub-SaharanAfrica.NewYork; Allen Guttmacher Institute. (http://www.guttmacher.org/pubs/riskandprotection.pdf).

Clark L. and Berington A. 2000. Socio-demographic predictors of divorce. Family policy studies center and London School of Hygiene and Tropical Medicine.London.

Clark S. 2004. Early Marriage and HIV Risks in Sub-Saharan Africa. 35 (3): 149 - 160.

Conde-Agudelo A,, Balizan JM., and Lammers C. 2005. Maternal-Perinatal morbidity and mortality associated with adolescent pregnancy in Latin America, cross-sectional study: *American Journal of Obstetrics and Gynecology* 2006; 192 (2) : 342 - 349

CSA (Central Statistical Authority). 1993. The 1990 National Family and Fertility survey report. Addis Ababa, Ethiopia.

CSA (Central Statistical Authority) and ORC Macro. 2005. Ethiopia Demographic and Health Survey, 2005. Addis Ababa, Ethiopia.

CSA (Central Statistical Authority). 2007. Summary and Statistical Report of the 2007 Population and Housing Census Results. Addis Ababa, Ethiopia.

Federal Democratic Republic of Ethiopia, Ministry of Health. 2003. Adolescent reproductive health extension. Addis Ababa, Ethiopia.

Federal Democratic Republic of Ethiopia, Ministry of Health. 2006a. National reproductive health strategy: 2006 - 2015. Ethiopia.

Federal Democratic Republic of Ethiopia, Ministry of Health. 2006b.Technical and procedural guidelines for safe abortion services in Ethiopia.

Federal Democratic Republic of Ethiopia. 2000. The Revised Family Law (Proclamation number.213/2000). Issue number 1, Addis Ababa, Ethiopia.

FHI/ YouthNet. 2004. Assessment of youth reproductive health programs in Ethiopia. Addis Ababa, Ethiopia: Family Health International

(http://www.waltainfo.com/Profile/SpecialReports/2003/June/report1.htm. Haile, 2003 "Population and Development in Ethiopia")

International Women Health Program. 2009. The Society of Obstetricians and Gynaecologists of Canada, (http://iwhp.sogc.org/index.php?International women health program.htm).

Jeannette,B. 2010. Assistant lecturer in Department of Social Sciences,National University of Rwanda. Early marriage as a barrier to girl's education: A Developmental Challenge in Africa.

Kumlachew, Y. 2001. Socio-demographic determinants of marital dissolution in Ethiopia: the case of Amhara region., Demographic Training and Research Center, Addis Ababa University.

Marriage and the Rights of Women and Girls.UK. UNICEF Innocenti Research Centre. 2001. Early Marriage: Child Spouses. Florence, Italy:

National Committee on Traditional Practices of Ethiopia(NCTPE). 2000. Harmful Traditional Practices in Relation to Reproductive Health. Addis Ababa, Ethiopia.

National Committee on Traditional Practices of Ethiopia(NCTPE). 2003. Harmful Traditional Practices. Addis Ababa, Ethiopia.

Pathfinder International. 2006. Causes and consequences of early marriage in the Amhara Region of Ethiopia.

Population Council. 2000. Facts about adolescents from the demographic and health survey: Statistical tables for program planning. Ethiopia

Reiner Georges. 2003. Divorce and remarriages in rural Malawi. Demographic research, 1 (6): 191 - 193.

The World Bank Group, Africa Region Human Development & Ministry of Health. 2005. Ethiopia A Country Status Report on Health and Poverty (In Two Volumes) Volume II: Main Report, July 2005.

UNICEF. 2000. Early marriage: whose right to choose? Mission Statement of the Forum on
(www.unicef-icdc.org/publications/pdf/digest7e.pdf).

Zhuzhi M, Pav Govindasamy, Julie Davanzo, Genenebuzunehe and Albert Themme. 2008. Trends in Youth Reproductive Health in Ethiopia. Calverton, Maryland, Macro-International Inc.

17. Epidemiological study on Soil Transmitted Helminthes and Albendazole Efficacy among Elementary Schoolchildren at Selected Weredas and Town Administrations of Eastern Hararghe Administrative Zone of Oromiya Regional State, Ethiopia

Zelalem Tekelemariam[1], Desalegn Admassu[1], Abrahm Nigusse[2], Habitamu Mitiku[1]

[1, 2] Haramaya University, College of Health and Medical Sciences, Department of Medical Laboratory Sciences, Harar, Ethiopia

Abstract

Soil Transmitted Helminths (STH) are among the world's most common infectious disease. The greatest number of STH infections occurs in sub-Saharan Africa where majority of school children are infected. The effects of STH can be reverted by the regular administration of antihelminthic drugs. The objective of the study was to assess the epidemiology of Soil Transmitted Helminthes and Albendazole efficacy among Elementary schoolchildren at selected weredas and town administrations of Eastern Hararghe Administrative Zone of Oromiya Regional State, Ethiopia.

A cross-sectional study was conducted at selected seven elementary schools from Haramaya and komlocha Waredas, and Awadey and Haramaya town administration. A total of 1527 stool specimen from systematically selected school children were collected and processed by MacMaster techniques.The efficacy of Alebendazole for the treatment of Soil Transmitted Helminthes was evaluated by Cure Rate (CR) and Fecal Egg Counts Reduction(FECR) after 14 days of treatment.

The overall prevalence of STH was 6.4%. Ascaris lumbericoides (1.1%), Hook worm (4.6%), and Trichuris trichiura (0.6%). Those school children who used open field defecation were 1.8 times more likely to be affected by STH than those who used private or public latrine. Those school children who did not wear shoes at time of interview were 1.8 times more likely affected by hook worm infection than those who wear shoe. The overall CR and FECR for hook worm was 95.7% and 98.6%, respectively.

In this study the prevalence of STH was low. Hookworm was the highest STH. Albendazole was found effective for treatment of light infection of hook worm. Therefore, these studies recommend health information dissemination about identified risk factors of STH, screening and treatment of infected children. It was also recommended that the efficacy single brand of Albendazole should be evaluated in areas of with different intensity STH.

Keywords: Soil Transmitted Heliminths (STH), Albendazole

1. Introduction

Soil Transmitted Helminthes (STH) are among the world's most common infectious disease. They are more prevalent throughout the tropical and sub-tropical part of developing world (De Silva *et al*., 2003). World Health Organization (WHO) estimates that almost 2 billion people are infected with one or more of STH, accounting for up to 40% of the global morbidity from infectious diseases, exclusive of malaria. Approximately 300 million infections result in severe morbidity, which are associated with the heaviest worm burdens (Hotez *et al*., 2003). Globally more than 1.2 billion, around 800 million and more than 700 million people might be infected with *Ascaris lumbricoids*, *Trichuris trichiura* andhookworm, respectively (Bethony *et al*.,2006).

Epidemiologic studies conducted throughout the developing world point to school-aged children as the population at greatest risk for acquiring heavy infections with Ascaris and Trichuris infections. These children suffer the consequences of acute Ascaris intestinal obstruction, hepatobiliary ascarisiasis, Trichuris dysentery syndrome, or rectal prolapsed (Hotez *et al*., 2003). Hook worm infection also common among school children that causes intestinal blood loss leading to iron deficiency and protein malnutrition (Beasley *et al*.,2005; Stoltzfus,2001). However, even more significant are the physical growth retardation, cognitive and educational impairments caused by heavy chronic infection (Hotez *et al*., 2003; Beasley *et al*.,2005; Stoltzfus,2001).

The effects of intestinal helminthes can be reverted by the regular administration of antihelminthic drugs. Four anthelminthics are currently on the WHO model list of essential medicines for the treatment and control of STH: albendazole, mebendazole, levamisole, and pyrantel pamoate (World Health Organization,1997). Albendazole (ALB) and mebendazole are the most widely used broad spectrum antihelmintic drugs. Single dose of ALB is more effective than mebendazole for hookworm infection (Bennett and Guyatt ,200; Keiser and Utzinger ,2008; Steinmann *et al*., 2011).

In Ethiopia, intestinal helminthic infection is also more common among school children and their prevalence varies in different parts of the country (Jemaneh , 2000; Legesse and Erko,2004; Tadesse, 2005; Erko and Tedla,1993). Like other countries that have high prevalence of intestinal helminths; low level of sanitation, open field defecation, low socio economic status and influx of people and overcrowding favor transmission of infection in Ethiopia (De Silva *et al*., 2003; Erko and Tedla,1993). There are two recent study on efficacy of Albendazole against STH in Ethiopia (Vercruysse*et al*.,2011; Legesse *et al*. ;2004).But there is no published report about the magnitude of STH and Albendazole efficacy in Eastern Hararghe. Therefore this study tried to assess the epidimology of Soil Transmitted Helminths(STHs) and Albendazole efficacy among Elementary schoolchildren at selected weredas and town administrations of Eastern Hararghe Administrative Zone of oromiya Regional State, Ethiopia

2. Methods

2.1. Study Area, Design and Period

Eastern Hararghe is one of Oromyia's zones, which has 22 weredas/town administrations. It has total population 3,039,680 people (Eastern Hararghe zone Health bureau report, 2012). Haramaya town administration is located 14 km west of Harar on the road to Dire Dawa. It has 28,835 populations in 3 kebeles. It has 1 district hospital, 6 lower and 1 medium clinics. Haramaya wereda is the wereda which surrounding Haramaya town. It has 265,815 populations in 34 kebels, 5 health center, 32 health posts and 2 medium clinics. Awadya town administration is located 10 kms West of Harar on the road to Dire Dawa. It is one of the large Khat market in Ethiopia. It has a total population of 9057 and 1 health centers. Kombolcha wereda is located 15kms north of Harar.It has a total population of 156,421 and 4 health centers.

The number of elementary school are 6 in Haramaya town administration, 62 Haramaya wereda,6 Aweday town administration, and 35 elementary schools were found, , , Kombolcha wereda. Cross- sectional study was conducted in selected elementary schools in Haramaya town administration, Haramaya werada, Aweday town administration and Kombolcha wereda from March 15 - May 8, 2013.

2.2. Source and Study Population

All elementary school children in the selected weredas and town administrations in Eastern Hararghe were source of population. School children in selected elementary schools in Haramaya town administration, Haramaya wereda, Awaday town administration and Kombolcha wereda were study population. Study participants included in the studyof STH were all school children. Participants who experienced sever concurrent medical conditions or had diarrhea at time of first stool collection was excluded from antihelminthic efficacy study (Vercruysse J. *et al*, 2008). In addition, participants if they took another medication like antihelminthic and/or antibiotics at time of first sampling were excluded from study.

2.2.1. Sample size and sampling techniques

Sample size for prevalence of STH was determined by single population proportion formula using P=0.27 was taken from study carried in Babile (Tadesse, 2005), $Z\alpha/2 = 1.96$, $d = 0.03$, design effect of 2 and 10% non response were used. The final sample size was 1852. Then, it was distributed proportionally based on total number of students in Haramaya town, Haramaya wereda, Aweday town and kombolcha wereda.

The two woredas were clustered in 17 clusters (Haramaya 11 and Kombolcha 6 clusters). Each cluster has a number of schools. One school was randomly selected from Tinike, Adeli and Negaya cluster of Haramaya Woreda. Kombolcha has six clustered areas. Similarly, one school was selected at random from Cibilu and Melka Rafu cluster of Kombolcha Woreda. But Aweday and Haramaya town adminstarion did not have clusters. They were considered as individual cluster. One school from Aweday and Haramya town administration were randomly selected. To select the sample children from each selected school, the students were first stratified according to their educational level (grade). A quota was then allocated for each grade and each classroom. Finally, the sample children were selected using systematic random sampling techniques by using class rosters as the sample frame. For antihelminthic treatment efficacy study, a maximum of 250 or not less than 50 school children were included (Vercruysse *et al*.,2011).

2.3. Data Collection Method

A pre-tested structured questionnaire was used for face-to-face interview by trained Nurse. To ensure reliable information, children/parents or the guardians were interviewed in their mother tongues. The interview included information such as age, sex, existence of latrines in their homes, shoe wearing habit, water source, hand washing habit, and eating soil. Yes or no questions for common signs and symptoms of parasitic infections during the past month were also asked. At the time of conversation, interviewers also inspected whether the fingernails of the child contain dirt and their foot wears.

2.4. Stool Sample Collection and Examination

Stool samples were collected by trained laboratory technician. Children were supplied with labeled plastic containers and applicator sticks, and instructed to bring proper stool samples the next day. All the specimens had been checked for their label and quantity. Then the entire samples were transported to Haramaya University, department of Medical Laboratory Sciences laboratory. All stool samples were processed using the McMaster technique [analytic sensitivity of 50 Egg per gram of feaces (EPG)] for the detection and the enumeration of infections with *A. lumbricoides, T. trichiura* and hookworms (Levecke *et al*., 2009). Two grams of fresh stool samples were measured using analytical balance. Then it was mixed and suspended in 30 ml of saturated salt solution (density = 1.2). The suspension was poured three times through a wire mesh to remove large debris. Then 0.15 ml aliquots were added to each of the 2 chambers of a McMaster slide. Both chambers were examined under a light microscope using a 100x magnification and the EPG for each helminth species were obtained by multiplying the total number of eggs by 50 (Vercruysse J. *et al*. ,2008). Children 's who were positive for STH were treated by an experienced nurse with Albendazole tablet 400mg (Bendex-400) B.No X21200, CIPLA LTD Verna indi. Estate Goa 403 722 India. A single dose albendazole and water was given to students in order to swallow it. No placebo controls was used for ethical reason. Those with 150 or more EPG pre treatment for one or more STH were recruited for albendazole efficacy study. This cut of value was used by Vercruysse, 2011 for albendazole efficacy (Vercruysse *et al*., 2011). After 14 days of treatment, stool samples were collected from treated subject and processed by Mac Master Techniques (Vercruysse J. *et al*. ,2008).

2.5. Data Processing and Analysis

Data were coded, entered, cleaned and analyzed using SPSS version 16. Results were presented by using mean, standard deviation and simple frequencies tables. The prevalence of STH was determined as the proportion of STH positive students. To show the magnitude of the difference of proportion, STH infection with different variables Pearson chi square test was used. Multivariate logistic regressions were employed to identify the possible risk factors of STH. A statistical test result was reported as significant when its value was less than 0.05.

The intensity of each STH was expressed in EPG and interpreted as light, moderate and heavy intensities of infection as described Montresor *et al.* For *A. lumbric*oides these were 1–4,999 EPG, 5,000–49,999 EPG and 50,000 EPG; for *T. trichiura* these levels were 1–999 EPG, 1000–9,999 EPG and 10,000 EPG; and for hookworms these were 1–1,999 EPG, 2,000–3,999 EPG and .4,000 EPG, respectively(Montresor *et al.*1998).

The efficacy of the treatment for STH have been evaluated qualitatively based on the reduction in infected children cure rate (CR) and quantitatively based on the reduction in fecal egg counts (FECR). The outcome of the FECR was calculated by using the formulae recommended for antihelminthic efficacy study by Vercruysse *et al.*, 2011 (Vercruysse *et al.*,2011).

2.6. Ethical Considerations

Ethical clearance was obtained from the Institutional Health Research and Ethics Review Committee of the Haramaya University. Only volunteer's schools and students/parents or the guardians were involved in the study. Those students/ parents or the guardians signed on the consent form for their willingness to participate in this study. The procedure for stool sample collection was not invasive. Information obtained from every participant had been kept confidential and only intended for research purpose. Standard antihelminthic treatments were given free of charge to all positive individuals for helminths.

3. Results

3.1. Characteristics of Study Participants

A total of 1527 school children participated in this study, which was an overall response rate of 82.5%. Out of which 816(53.4%), 499(32.7), 130(8.5) and 82(8.4) of participants were selected from Kombolcha and Haramaya wereda ,Haramaya and Aweday town administration respectively. Nicolas ,Ciblu and Genede Adem(which is under Ciblu) elementary school from kombolcha wereda; Tiniki, Negaya and Adele elementary schools were from Haramaya wereda; Fendisha elementary school from Aweday town administration and Geda elementary schools were selected from Haramaya town administration. A total of 440(28.8%) , 318(20.8%) ,58(3.8%), 186(12.2%), 98 (6.4%) , 215 (14.0%), 82(5.4%) and 130(8.5%) school children from Nicolas, Ciblu , Genede Adem, Tiniki , Negaya, Adele, Fendisha and Geda elementary school , respectively were participated in this study. The mean age of the students were 9.8(SD ±2.4). The minimum and maximum age of the students was 5 and 20, respectively. Majority of the study participants were male (55.1%).

3.2. Prevalence of Soil Transmitted Helminthes (STH)

The overall prevalence of STH was 6.4%. The most common STH identified were Hook worm. Hook worm and *Hymenolepis nana* combination were the highest double infection reported in this study (Table 1)

Table 1. Prevalence of STH and double helminthes infection among elementary schoolchildren at selected weredas and town administrations of Eastern Hararghe Administrative Zone of Oromiya Regional State, Ethiopia , 2013

Soil transmitted helminthes	*No (%)*
Soil transmitted helminthes (STH) n= 1527	
Ascaris lumbericoides	*17(1.1)*
Hook worm	*71(4.6)*
Trichuris trichiura	*9(0.6)*
Double helimnths	
Hookworm and Hymenolepis nana	*10(0.7)*
Ascaris and Hymenolepis nana	*2(0.1)*
Hookworm and Enterobius vermicularis	*5(0.3)*
Enterobius vermicularis and Hymenolepis nana	*4(0.3)*

The highest prevalence of STH was found at Genede Adem elementary school in Kombolcha wereda and the lowest was found at Fendisha elementary school from Aweday town administration. The prevalence of STH was statistically different when compared between studied elementary school ($p < 0.05$). The highest STH was reported from Kombolcha wereda. The lowest were reported from Aweday town administration. The prevalence of STH was not statistically different when compared between studied wereda ($p > 0.05$) (Table 2).

Table 2. Prevalence of STH by school, Wereda among elementary schoolchildren at selected weredas and town administrations of Eastern Hararghe Administrative Zone of Oromiya Regional State, Ethiopia, 2013.

Name of the school	Positive No(%)	Negative No(%)	P value
Ciblu	39(12.3)	279(87.7)	0.000
Nicolas	14(3.2)	426(96.8)	
Fendisha	1(1.2)	81(98.8)	
Geda	8(6.2)	122(93.8)	
Tiniki	9(4.8)	177(95.2)	
Gende Adem	8(13.8)	50(86.2)	
Negaya	6(6.1)	92(93.9)	
Adele	12(5.6)	203(94.4)	
Woreda/town school found			
Kombolcha Wereda	61(7.5)	755(92.5)	0.106
Haramaya Wereda	27(5.4)	472(94.6)	
Haramaya Town	8(6.2)	122(93.8)	
Awaday town	1(1.2)	81(98.8)	

In this study, other intestinal helimnths ; *Enterobius vermicularis* and*Hymenolepis nana* were also detected from stool examination. *Hymenolepis nana* was found at the highest prevalence rate. The overall prevalence of intestinal heliminths including STH was found 18.5% (Table 3).

Table 3. Prevalence of Intesinal helimnths among elementary schoolchildren at selected weredas and town administrations of Eastern Hararghe Administrative Zone of oromiya Regional State, Ethiopia, 2013

Intesinal heliminths (N=1527)	No(%)
Enterobius vermicularis	54(3.5)
Hymenolepis nana	152 (10)
Hook worm	71 (4.6)
Trichuris trichiura	9 (0.6)
Ascaris lumbericoides	17(1.1)

3.3. Risk Factors for Soil Transmitted Helminthes

Soil Transmitted Helminthes was found highly prevalent among male school children in the age group 15-20. . It wasalso highly prevalent among school children who used well as water source, did not know about the purpose of hand washing, without digital sucking habits and did not eat soil. But the high prevalence in all of the above variables was not statistically different ($p > 0.05$). While the prevalence of STH was highly prevalence among school children who used open field defecation and sometimes used latrine. The difference was statistically different with type of latrine and frequency latrine usage ($p < 0.05$) (Table 4).

In crude odds ratio, those school children who used open filed defection [COR: 2.175(1.390, 3.403)] and sometimes used latrine [COR: 1.946(1.246, 3.042)] were more likely to be affected by STH. After adjustment, those school children who used open field defecation were 1.8 times more likely to be affected by STH than those who used private or public latrine [AOR: 1.793(1.054,3.05)] ($p < 0.05$) (Table 5).

Table 4. Assessment of risk factors of STH among elementary schoolchildren at selected weredas and town administrations of Eastern Hararghe Administrative Zone of oromiya Regional State, Ethiopia, 2013.

Variables	No (%pos)	p value
Age		
5-9	758(6.6)	0.862
10-14	709(5.9)	
15-20	60(6.7)	
Sex		
Male	842(6.4)	0.821
Female	885(6.1)	
Sources water supply		
Private /public pipe	1338(6.4)	0.788
River	159(5)	
Well	30(6.7)	
Type of latrine		
Public/private latrine	1242(5.3)	0.001
Open field	285(10.5)	
Frequency of latrine usage		
Always	1218(5.4)	0.006
Sometimes	309(9.7)	
Know about the purpose of hand washing		
Yes	1267(6.1)	0.457
No	260(7.3)	
Digital sucking habit		
Yes	290(4.5)	0.160
No	1237(6.7)	
Soil eating habit		
Yes	186(4.3)	0.234
No	1341(6.6)	

Table 5. Regression analysis for prevalence of STH among Elementary schoolchildren at selected weredas and town administrations of Eastern Hararghe Administrative Zone of Oromiya Regional State, Ethiopia, 2013.

Type of latrine	N0(% pos)	Crude odds ratio(95% CI)	P value	Adjusted odds ratio(95% CI)	P value
Public/private latrine	1242(5.3)	1	0.001	1	0.031
Open field	285(10.5)	2.175(1.390,3.403)		1.793(1.054,3.05)	
Frequency of latrine usage					
Always	1218(5.4)	1	0.003	1.447(0.851,2.459)	0.172
Sometimes	309(9.7)	1.946(1.246,3.042)		1	

The prevalence of hookworm was highly prevalent in the age group 15-20 and male school children. But it was not statistically different by age and sex ($p>0.05$). Those school children who walk bare foot and not wear shoe at time of interview were highly affected by hookworm ($p<0.005$). In addition those school children who responded as walking bare foot occasionally were more affected than those never and always walk bare foot. But the difference was not statistically different by frequency of walking bare foot ($p>0.05$) (Table 6).

In crude odds ratio, those school children who walk bare foot [COR: 1.740(1.076, 2.813)] and not wearing shoe at time of interview [COR: 2.009(1.194, 3.379)] were more likely to be affected by hook worm. After adjustment , those school children who did not wear shoes at time of interview were 1.8 times more likely affected by hook worm infection than those who ware shoe [AOR: 1.812(1.065,3.084)] ($p < 0.05$) (Table 7).

Table 6 . Prevalence of hookworm in relation to age ,sex shoe wearing and frequency of walking bare foot among Elementary schoolchildren at selected weredas and town administrations of Eastern Hararghe Administrative Zone of oromiya Regional State, Ethiopia, 2013.

Variables	No (%pos)	p value
Age		
5-9	758(4.1)	0.502
10-14	709(5.1)	
15-20	60(6.7)	
Sex		
Male	842(5.1)	0.347
Female	685(4.1)	
Walking bare foot		
No	867(3.6)	0.022
Yes	660(6.1)	
Frequency of walking bare foot		
Never walk	867(3.6)	0.055
Occasionally	464(6.5)	
Always	196(5.1)	
Shoe wear at time of the study		
No	288(7.6)	0.007
Yes	1239(4.0)	

Table 7. Regression analysis for prevalence of hookworm infection among Elementary schoolchildren at selected weredas and town administrations of Eastern Hararghe Administrative Zone of oromiya Regional State, Ethiopia, 2013.

Walk bare foot		Crude odds ratio(95% CI)	P value	Adjusted odds ratio(95% CI)	P value
No	867(3.6)	1	0.024	1	0.069
Yes	660(6.1)	1.740(1.076,2.813)		0.634(0.388,1.037)	
Shoe wear at time of the study					
No	288(7.6)	2.009(1.194,3.379)	0.009	1.812(1.065,3.084)	0.028
Yes	1239(4.0)	1		1	

Cure rate (CR) and Fecal Egg Count Reduction (FECR) After Albendazole treatment: the mean fecal egg count of *Ascaris lumbericoides* was 132 (SD±57.5)EPG which ranges from 50 to 250EPG . The mean fecal egg count for *Trichuris trichiura* was 100 (SD±59.8) EPG which range from 50 to 200EPG. The mean fecal egg count for Hook worm was 421.7(SD± 215.7) EPG which ranges from 100 to 850 EPG. All infected school children in this study have light infection of *Ascaris lumbericoides* , *Trichuris trichiura* andhook worm.The CR and FECR were only calculated for Hook worm, which have 150 or more EPG in more than 50 individuals. The overall CR was 95.7%. The overall FECR was only calculated for hookworm which was 98.6%.

4. Discussion

In this study, the overall prevalence of STH among schoolchildren was 6.4%. This was lower than 82.4% report from Zarima , Ethiopia (Alemu *et al*.,2011) . It was also lower than other studies conducted abroad, which was 54.7% in Nigeria (O Andy and D. Palmer, 2005), 10% in Nepal (Shrestha *et al*., 2001), 65% in Ecuador (Andrade *et al*., 2001), 93.7% in Malaysia (Ahmed et *al*., 2011). This variation might be due to difference in handwashing habit, availability and usage latrine, soil type and humidity, methods of laboratory diagnosis and others which can affect the prevalence of STH.

Hookworm was one of the major STH identified in this study with the rate of 4.6%. This was slightly lower than report of 6.7% from Babile, Eastern Ethiopia (Tadesse .2005). This was also lower than report of 11.5% in Delgi (Ayalew*et al*., 2001) and 19% in Zarima(Alemu*et al*.,2011) of Ethiopia. This was higher than report of 1.75% in Nigeria (Inabo and John,2010), 2.65% in Nepal (Shrestha*et al*., 2012), 1.4% in Ecukodor (Andrade *et al*.,2001). It is known that hookworm is transmitted by penetration of the skin by infective larvae from fecal contaminated soil (World Health Organization,2013). This is true in this study areas as those schoolchildren who did not wear shoe were 1.8 times more likely affected by hookworm. Similar association was reported in another study from Zarima (Alemu*et al*.,2011) and Babile (Tadesse .2005) of Ethiopia. Hook worm infection is known as it causes intestinal blood loss leading to iron deficiency and protein malnutrition among school children. During childhood, it is partly responsible for its physical and mental growth retardation effects (Stoltzfus *et al*., 2001; World Health Organization ,1997). This needs an intervention to prevent further transmission and complication in affected study areas.

Ascaris lumbercoides was the second STH in this study which was identified at the rate of 1.1%. This was lower than study carried in Delgi (48%) (Ayalew*et al*.,2011), 22% in Zarima (Alemu*et al*.,2011), and 5.9% in Gondar (Gelaw*et al*.,2013) of Ethiopia. It is also lower than other studies carried abroad which was reported as 28.4% in Kashmir, India (Wani *et al*., 2007) and 63% in Ecuodor (Andrade*et al*., 2001). But it was slightly lower than 2.65% report in Nepal (Shrestha *et al*., 2012).

Trichuris trichiura was the third STH which was identified at the rate of 0.6%. This was lower than 2.5% report from Zarima of Ethiopia (Alemu *et al*.,2011) . It was also lower than other studies conducted abroad which was reported as 22.8% in Nigeria (Inabo and . John ,2010), 4.9% in Kashimir India (Wani *et al*., 2007), 5% in Nepal (Shrestha*et al*., 2012) and 10% in Ecukodor (Andrade *et al*., 2001).

In addition, other intestinal helminths were identified in this study. *Hymenolepis nana* was reported at 10% prevalence rate. This was similar to report of 10.1% in Babile , Ethiopia (Tadesse 2005). But it was slightly lower than 13.8% report from Gonadar, Ethiopia (Ayalew*et al*., 2011).In addition, *Enterobius vermicularis* was identified at 3.5% rate. The above two helminths also need further attention. For example *Enterobius vermicularis* can be transmitted rapidly from one infected school children to other in the school and their family through contact with infected child hands and cloths or other inanimate objects. It causes severe nocturnal perianal itching which can disturb an infected individual sleep during the night. This might have an impact on school attendance of children. The overall prevalence of intestinal heliminths including STH was found 18.5% in this study. This was lower than 47.1% in Jimma (Yami*et al*.,2011), 27.2% in Babile (Tadesse .2005) of Ethiopia and 63.3% in Nigeria (Inabo and John, 2010).

This study also tried to assess risk factors for STH. Those school children who practiced open field defection were 1.8 times more likely affected by STH. This was similar to study conducted in Kashimir , India (Wani *et al*, 2007) and Nepal (Shrestha*et al*., 2012). But it was not similar to study carried in Jimma which showed there was no association between prevalence of intestinal helimnths with availability latrine (Yami*et al*.,2011). Frequency of usage of latrine was not significantly associated with prevalence of STH in this study. This was similar to report from study in Jimma (Yami*et al*.,2011) which regular use of latrine was not associated with the prevalence of intestinal helimnths. Some studies also reported the prevalence of STH was higher in those children drinking from river and well or untreated water (Ahmed*et al*., 2011; Ayalew*et al*., 2011;Wani *et al*., 2007). But, this was not in agreement with this study finding which the prevalence of STH was not related to unsafe water sources. This might be due to hook worm, which is the highly prevalent STH in this study, is mainly transmitted through contact with fecal polluted soil.

Albendazole is widely used anthelminthic drug which is reported more effective for Hookworm infection (Bennett and Guyatt, 2000; andUtzinger, 2008; Steinmann *et al*., 2011). In this study, a cure rate (CR) of 95.7% for hookworm was found after treatment with single dose Albendazole. This was lower than a CR of 98.9% in Ethiopia (Vercruysse*et al*., 2011). But it was higher than report of 92.4% in Kenya (Muchiri *et al*., 2001) and 69% in China (Steinmann *et al*., 2011). While the fecal egg count reduction rate (FECR) of 98.6% was reported in this study. This was slightly lower than a report of 99.7% in Ethiopia (Vercruysse*et al*., 2011). But it was slightly higher than report of 96.7% in Kenya (Muchiri *et al*., 2001) and 97% in China (Steinmann *et al*., 2011). All hookworm infected children in this study have light infection which should be considered at time of interpretation of this efficacy of Albendazole result. However, in this study, the CR and FECR for hook worm was > 90% which is above cut off value recommend for efficacy Albendazole study (Vercruysse*et al*., 2011).

5. Conclusions

The prevalence of STH was low in this study. It was higher in those school children who practiced open field defecation. The highest STH was Hookworm. It was higher in those school children who were bare foot. In addition, other intestinal helimnths like *Hymenolepis nana* and *Enterobius vermicularis* were also identified at slightly higher rate than some STH. Therefore, these studies recommend health information dissemination should be given by teacher and health extension worker to school children in order to avoid open filed defection and to improve their shoe wearing habits for prevention of STH. It also needs further screening and treatment of infected children in schools which was reported the highest prevalence of STH and other intestinal heliminths. Albendazole was found effective for treatment of light infection hookworm in this study. But it cannot be conclusive for moderate and heavy infection of Hookworm. Further study should be done for evaluation of the efficacy of this single brand of Albendazole on areas of with different intensity STH infection.

6. Acknowledgements

We acknowledge Haramaya University Research and Publication Office for budg*et* allocation. Our thanks also extend to Institutional Health Research and Ethics Review Committee of the Haramaya University for facilitating the ethical clearance.

7. References

Ahmed A., Al-Mekhlafi1 HM, Choy SH, Ithoi I, Al-Adhroey AH, Abdulsalam A., Surin MJ. 2011. The burden of moderate-to-heavy soiltransmitted helminth infections among rural malaysian aborigines: an urgent need for an integrated control programme. Parasites & Vectors 2011, 4 : 242

Alemu A.,Atnafu A., Addis Z., Shiferaw Y., Teklu T., Mathewos B., Birhan W., Gebretsadik S. , GelawB. 2011. Soil transmitted helminths and schistosoma mansoni infections among school children in zarima town, northwest Ethiopia. *BMC Infectious Diseases* 2011, 11 : 189

Andrade C., Alava T.., palacio IA De, ,poggio P Del, Jamoletti C, Gulletta M, Montresor A. 2001. Prevalence and intensity of soil transmitted helmintiasis in the city of Portoviejo (Ecuador) Mem, Inst oswaldo cruz, Rio de janerio Nov 2001; 96 (8) :1075 - 1079

Ayalew A., Debebe T. ,Worku A. 2011.Prevalence and risk factors of intestinal parasites among Delgi school children, North Gondar. *Ethiopian Journal of Parasitol. Vector Biol.* 2011; 3 (5): 75 - 81.

Beasley NM., Tomkins AM., Hall A., Lorri W., Kihamia CM., Bundy DA. 2000. The impact of weekly iron supplementation on the iron status and growth of adolescent girls in Tanzania. *Trop Med Int Health* 2000; 5: 794 - 9

Bennett A., Guyatt H. 2000. Reducing intestinal nematode infection: efficacy of albendazole and mebendazole. *Parasitol Today* 2000; 16: 71 - 74

Bethony J., Brooker S., Albonico M. 2006. Soil transmitted helminth infections ascariasis, trichuriasis, and hookworm. Lancet. 2006; 367: 1521 - 1532.

De Silva ,N.R., Brooker, S. , Hottez, P.J., Mentresor, A. 2003. Soil transmitted helminth infections updating the global picture . Trends in parasitology 2003; 19: 547 - 51

Eastern Hararghe Zone Helath Office. 2012. Health Performance and Profile Report.

Erko B., Tedla S. 1993. Intestinal helminthes infections at Zeghie ,Ethiopia ,with emphasis on Schitosomiasis mansoni. Ethiopia. *The Ethiopian Journal of Health Development* 1993; 7 : 21 - 26.

Gelaw A., Anagaw B., Nigussie B., Silesh, B.,Yirga A., Alem M., Endris M., Gelaw B. 2013. Prevalence of intestinal parasitic infections and risk factors among schoolchildren at the University of Gondar Community School, Northwest Ethiopia: a cross-sectional study. *BMC Public Health* 2013, 13 : 304.

Hotez, P.J., de Silva N., Brooker S., Bethony J. 2003. Soil Transmitted Helminth Infections: The Nature, Causes and Burden of the Condition. Disease Control Priorities Project Working Paper No. 3, 2003.

Inabo H.I , H.D. John. 2010. Intestinal helminthes among children in orphanages in some parts of Kaduna state, Nigeria. *Continental J. Microbiology* 2010; 4: 31 - 36.

Jemaneh ,L. 2000. Major intestinal helminthes infection in the Auak population of four villages in south western Ethiopia. *Ethiopian Journal of Health science* 2000; 10 : 1 - 6.

Keiser J., Utzinger J. 2008. Efficacy of current drugs against soil-transmitted helminth infections: systematic review and meta-analysis. JAMA. 2008; 23; 299 (16) : 1937 - 48.

Legesse M., Erko, B. 2004. Prevalence of intestinal parasites among school children in rural areas close to south East of Lake Langano, Ethiopia. *The Ethiopian Journal of Health Development* 2004; 18: 116 - 20.

Legesse M., Erko B., Medhin G. 2004. Comparative efficacy of Albendazole and three brands of Mebendazole in the treatment of Ascariasis and Trichuriasis. *East African Medical Journal* 2004; 81 (3) : 134 - 38.

Levecke B., De Wilde N., Vandenhoute E., Vercruysse J. 2009. Field validity and feasibility of four techniques for the detection of Trichuris in simians: a model for monitoring drug efficacy in public health? *PLoS Negl Trop Dis* 3 (1): e366., 2009.

Montresor A, Crompton DWT, Hall H, Bundy DAP, Savioli L. 1998. Guidelines for the evaluation of soil-transmitted helminthiasis and schistosomiasis at community level. A guide for control programme managers. WHO/CTD/SIP98.1, World Health Organization, Geneva; 1998

Muchiri EM., Thiong'o FW., Magnussen P., Ouma JH. 2001. A comparative study of different albendazole and mebendazole regimens for the treatment of intestinal infections in school children of Usigu Division, western Kenya. *J Parasitol.* 2001 Apr;87 (2) : 413 - 8.

O Andy E., D. palmer A. 2005. Soil transmitted helminthiasis among school age children in Ethipe East local Government area Delta state, Nigeria American journal of Biotechnology Sep 2005; 4 (9) :938 - 941.

Shrestha A., KC. Narayan, 2 Sharma . 2012. 2 Prevalence of Intestinal Parasitosis Among School Children in Baglung District of Western Nepal. *Kathmandu Univ Med J* 2012; 37 (1) : 3 - 6.

Steinmann P., Utzinger J., Du ZW., Jiang JY., Chen JX., Hattendorf J., Zhou H., Zhou XN.2011. Efficacy of single-dose and triple-dose albendazole and mebendazole against soil-transmitted helminths and Taenia spp.: a randomized controlled trial. PLoS One. 2011;6 (9) : e25003.

Stoltzfus RJ., Kvalsvig JD., Chwaya HM., Montresor A., Albonico M., Tielsch JM., Savioli L., Pollitt E. 2001. Effects of iron supplementation and anthlemintic treatment on motor and language development of preschool children in Zanzibar: double blind, placebo controlled study. *Br Med J* 2001; 323 : 1389 - 93.

Tadesse G. 2005. The prevalence of intestinal helminthic infections and associated risk factors among school children in Babile town, Eastern Ethiopia. *The Ethiopian Journal of Health Development* 2005; 19: 140 - 47 .

Vercruysse J., Behnke JM., Albonico M., Ame SM., Angebault C.. 2011.Assessment of the Anthelmintic Efficacy of Albendazole in School Children in Seven Countries Where Soil-Transmitted Helminths Are Endemic. *PLoS Negl Trop Dis* 2011;5 (3): e948.

Vercruysse J.. 2008. Monitoring anthelminthic efficacy for Soil Transmitted Helminths (STH), March 2008

Wani SA., Ahmad F., Zargar SA., Ahmad Z., Ahmad P., Tak H. 2007. Prevalence of intestinal parasites and associated risk factors among schoolchildren in Srinagar City, Kashmir, India. *J Parasitol.* 2007; 93 (6) : 1541 - 3.

World Health Organization.2013. Deworming to combat the health and nutritional impact of soil transmitted helminths .Available at *http://www.who.int/elena/titles/bbc/deworming/en/index.html* (Accessed 13 October, 2013).

World Health Organization. 1997. The Use of Essential Drugs: Model List of Essential Drugs (9th list). Geneva, Switzerland: World Health Organization; 1997.

Yami A., Mamo Y., Kebede S.. Prevalence and predictors of intestinal helminthiasis among school children in Jimma zone; a cross-sectional study. *Ethiop J Health Sci*. 20.

18. Smear-Positive Pulmonary Tuberculosis and Quality of Sputum Smear Microscopy in three Selected Governmental Hospitals, Eastern Ethiopia.

Abiyu Mekonnen*

Haramaya University, College of Health and Medical Sciences, Department of Medical Laboratory Sciences, Harar, Ethiopia

Abstract

The World Health Organization's global target using the Directly Observed Treatment-Short (DOTS) course program was to detect 70% of new sputum-smear positive pulmonary tuberculosis cases. TB case detection rate remains very low in Ethiopia.The increases in smear-negative Pulmonary Tuberculosis diagnosis could be attributed to several factors including poor quality of sputum smear-microscopy. The study aimed to assess the five year prevalence and trend of pulmonary tuberculosis and quality of sputum smear microscopy at Dil Chora, Hiwot Fana and Karamara hospitals.

A five year retrospective record review of data between September 2007 and August 2012 and in-depth assessment of factors affecting the quality of sputum smear microscopy using a standard checklist was made. The proportion of Smear positive cases relative to overall AFB screened was determined in five years period to indicate the overall prevalence and the trend. An appropriate regression model was used to depict the possible association and risk factors that might exist with these variables using SPSS version-16.

A total of 1,266 individuals' data were reviewed.. Majority of the study participants were male, 704 (55.6%), and rural residents, 690 (54.5%). The overall prevalence rate of smear positive pulmonary tuberculosis was 21.6%. Age categories between 15-24 and 25-34 years were independent predictors of smear positive pulmonary tuberculosis with adjusted odds ratio of 2.246 [95% CI (1.098-4.597)] and 2.267 [95% CI (1.107-4.642)], respectively. More males were affected by pulmonary Tuberculosis than females with an adjusted odds ratio of 1.426 [95% CI (1.083-1.879)]. Serial sputum examinations did not show any significant variability between the first spot samples, second morning sputum samples and the third spot samples.

Smear positive pulmonary tuberculosis case detection rate indicated in this study was by far lower than the countries which met the 70% target of the World Health Organization. Lack of feedback mechanisms in the External Quality Assurance schemes of sputum smear microscopy made the opportunity for improvement missing. Serial sputum examination showed a considerable rate of positivity in the second sputum sample than the others. Appropriate examination of two sputa smears is sufficient for the detection of Acid Fast Bacilli. Further studies to re-evaluate these findings are recommended.

Keywords: Smear positive pulmonary tuberculosis; quality of sputum smear microscopy; Eastern Ethiopia

1. Introduction

TB epidemic is steady, albeit modest and slow decline –nonetheless more than nine million people still develop active TB each year and nearly two millions die (WHO 2010). Directly Observed Treatment-Short course (DOTS) strategy of tuberculosis is the World Health Organization's (WHO) recommended approach, by passive detection of pulmonary tuberculosis (PTB) cases, primarily using sputum smear microscopy. The global target using the DOTS program was to detect 70% of new sputum-smear positive PTB cases (WHO 2000). However, only 32% of the estimated new smear positive PTB cases were detected throughout the globe (WHO 2003).

In 2010, DOTS coverage is reportedly reached 100% and TB treatment is integrated into general health services. However, TB case detection rate remains very low in Ethiopia (36%) (Federal Ministry of Health 2010).The increases in smear-negative PTB diagnosis in Ethiopia could be attributed to several factors: poor quality of sputum smear-microscopy, non-adherence to diagnostic algorithm, and HIV-TB co-infection (Hawken 2001;Mengiste M 2005).

Microscopy remains the mainstay of rapid TB case detection, especially for those patients who are most infectious to others, with the bacterial load involved often reflecting the extent of disease requiring immediate treatment. The sensitivity of the direct Ziehl-Neelsen (ZN) smear depends on the diligence of the technician and on the use of appropriate technique (Hawken 2001, NJ Hargreaves 2001).

Also, external quality Assurance (EQA) programs are needed to ensure that smears are performed and interpreted correctly and that all microscopy centres achieve an acceptable level of performance, effective EQA programs are, however, labour-intensive and complex, requiring dedicated staffs for onsite supervisory visit and to recheck results for a relatively large work load of smears (M Aziz 2002, A Van Deun 1998). Direct microscopy of sputum-smear using the Ziehl-Neelsen technique is the only means to diagnose PTB in Ethiopia (Enarson DA 2000). Therefore, this study assessed the prevalence of smear positive pulmonary tuberculosis and factors affecting the quality of sputum smear microscopy in eastern Ethiopia.

2. Methods and Materials

2.1. Study Areas and Period

The study was conducted from September to October 2012 amongst hospitals in Eastern Ethiopia. They included Dire Dawa, Dil Chora hospital; Harar, Hiwot Fana hospital and Jijiga, Karamara hospital. Dire Dawa is located 500km away from the capital Addis Ababa, between 950 to 1250 meters above sea level. Harar is located 510 km away from Addis Ababa, and is the capital of the Harari regional state, with an elevation of 1885 meters. Jijiga is about 615km away from the capital Addis Ababa, which is the capital of the Somali regional state, with an elevation of 1609 meters above sea level.

2.2. Study Design

A retrospective study based on record review, from September 2007 to August 2012 was conducted to determine the trend and prevalence of smear positive pulmonary tuberculosis, and an in depth interview using a standard checklist was carried out with the respective hospital laboratory chiefs to assess the quality of sputum smear microscopy.

2.3. Sample Size

The sample size was determined by using single population proportion formula. Four hundred twenty two individuals were included from each study hospitals, and a total of 1,266 participants were studied. In addition, the chiefs of the respective hospital laboratories were interviewed using a standard checklist to assess the quality of sputum smear microscopic technique.

2.4. Data Collection

Data was collected by three trained laboratory technologists under intensive supervision by the researcher. The data collectors had a two-day training emphasizing on how to collect complete data from AFB record book and how to assess quality of sputum smear microscopy using the standard checklist provided as accurate as possible.

2.5. Data Analysis

The data were entered into SPSS version-16, Chi-square and P value computation was accomplished to depict the possible association that might exist with these variables. Odds ratio with 95 percent confidence interval was calculated for categorical variables using Binary Logistic Regress model to assess the strength of association.

2.6. Ethical Considerations

The study was ethically approved by Haramaya University Institutional Research and Ethical Review Committee, and the data collection was carried after submitting the ethical clearance letter to the respective hospital administrations and chiefs of laboratories.

3. Results

A total of 1,266 individuals, 422 from each hospital (Hiwot Fana, Dil Chora, and Karamara), were studied. Majority of the study participants were male, 704 (55.6%), and rural residents, 690 (54.5%). The median age of the population was 30 years with a standard deviation of 14.9 years. Age categories between 15-24 and 25-34 years were independent predictors of smear positive pulmonary tuberculosis with adjusted odds ratio of 2.246 [95% CI (1.098-4.597)] and 2.267 [95% CI (1.107-4.642)], respectively. More males were affected by pulmonary Tuberculosis than females with an adjusted odds ratio of 1.426 [95% CI (1.083-1.879)] (Table-1).

The overall prevalence rate of smear positive pulmonary tuberculosis was 21.6%. Almost twenty five percent of the males and 19% of the females studied were positive for sputum smear microscopy. Smear positive pulmonary tuberculosis was significantly higher in rural than urban residents [AOR: 1.573, 95% CI (1.193-2.076)] (Table-1).

Smear positive pulmonary TB was highly prevalent at Hiwot Fana followed by Karamara hospitals with prevalence of 27% and 21.1%, respectively. Smear positive pulmonary TB was significantly higher at Hiwot Fana hospital [AOR: 1.449, 95% CI (1.047-2.006)] (Table-1).

Table 1. Socio-demographic characteristic of the study participants and its association with smear positive pulmonary TB in three selected governmental hospitals, eastern Ethiopia, 2012.

Characteristic	Total examined no. (%)	Smear positive no.(%)	COR (95% CI)	AOR (95% CI)
Gender				
Female	562 (44.4)	108 (19.2)	1	1
Male	704 (55.6)	175 (24.9)	1.391 (1.061-1.823)*	1.426 (1.083-1.879)*
Age group (in years)				
<15	75 (5.9)	10 (13.3)	1	1
15-24	364 (28.8)	92 (25.3)	2.199 (1.085-4.456)*	2.246 (1.098-4.597)*
25-34	358 (28.3)	93 (26.0)	2.281 (1.126-4.623)*	2.267 (1.107-4.642)*
35-44	204 (16.1)	46 (22.5)	1.892 (0.901-3.976)	1.858 (0.875-3.943)
45-55	149 (11.8)	24 (16.1)	1.248 (0.563-2.767)	1.280 (0.569-2.878)
>55	116 (9.2)	18 (15.5)	1.194 (0.518-2.749)	1.201 (0.514-2.804)
Residence				
Rural	690 (54.5)	177 (25.7)	1.530 (1.166-2.007)**	1.573 (1.193-2.076)**
Urban	576 (45.5)	106 (18.4)	1	1
Study hospital				
Karamara	422 (33.33)	89 (21.1)	1	1
Dil Chora	422 (33.33)	80 (18.9)	0.875 (0.624-1.227)	0.871 (0.617-1.228)
Hiwot Fana	422 (33.33)	114 (27)	1.385 (1.008-1.903)*	1.449 (1.047-2.006)*

COR: Crude Odds Ratio; AOR: Adjusted Odds Ratio; CI: Confidence Interval;.
**: P<0.05; **: p<0.01.*

Trend of smear positive pulmonary tuberculosis did not show any considerable difference between years of examination. The prevalence of smear positive pulmonary tuberculosis were higher in males than the female counterparts (Fig-1).

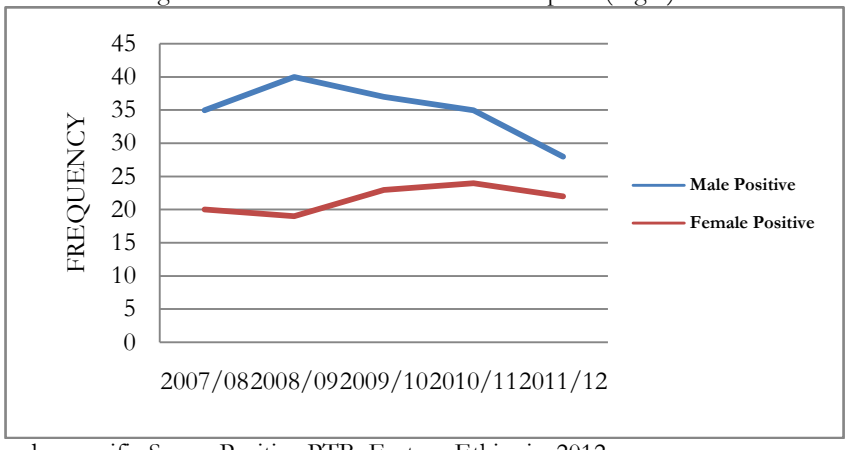


Figure-1. Five years trend of Gender specific Smear Positive PTB, Eastern Ethiopia, 2012

Serial sputum examinations did not show any significant variability between the first spot samples, second morning sputum samples and the third spot samples by year of examinations. On average, 4.5 suspects had to be screened to diagnose one smear positive case. A total of about 283(22.4%) suspects had at least one positive smear. Of these, 273 (21.6%) were positive from the first specimen. A further 10 (0.8%) were positive on the second morning specimen but not the first. However, eight and eighteen specimens were negative from the first spot specimen and the second morning specimen to the third specimen, respectively (table-2).

Table 2. Frequency of smear positive serial sputum samples by year of examination, Eastern Ethiopia, 2012.

Type of sputum sample	Year of examination 2007	2008	2009	2010	2011	Total	P-value
First spot sample							P= 0.98
Positive	56 (22.2)	55 (21.6)	56 (22.2)	55 (21.6)	51 (20.2)	273 (21.6)	
Negative	196 (77.8)	200 (78.4)	196 (77.8)	200 (78.4)	201 (79.8)	993 (78.5)	
Total	252 (19.9)	255 (20.1)	252 (19.9)	255 (20.1)	252 (19.9)	1266 (100)	
Second morning sputum sample							P=0.91
Positive	57 (22.6)	58 (22.7)	60 (23.8)	58 (22.7)	50 (19.8)	283 (22.4)	
Negative	195 (77.4)	197 (77.3)	192 (76.2)	197 (77.3)	202 (80.2)	983 (77.6)	
Total	252 (19.9)	255 (20.1)	252 (19.9)	255 (20.1)	252 (19.9)	1266 (100)	
Third spot sample							P=0.89
Positive	55 (21.8)	53 (20.8)	56 (22.2)	54 (21.2)	47 (18.7)	265 (20.9)	
Negative	197 (78.2)	202 (79.2)	196 (77.8)	201 (78.8)	205 (81.3)	1001 (79.1)	
Total	252 (19.9)	255 (20.1)	252 (19.9)	255 (20.1)	252 (19.9)	1266 (100)	

3.1. Factors Affecting Quality of Sputum Smear Microscopy

An in-depth interview with chiefs of the respective hospital laboratories using a standard checklist of WHO's Tuberculosis Laboratory Assessment tool (3rd draft, 2002) was conducted. The assessment showed greater similarity between the study hospital laboratories except some minor inconsistencies. All the study hospital laboratories have no problems with the number and qualification of lab staffs to perform sputum smear microscopy, but they have indicated that there was no national TB manual and national guideline or protocol of quality assurance of smear microscopy in the country.

Quality control measures for sputum smear microscopy were used at different levels of the testing activities; quality control during specimen reception/handling by using clearly described specimen rejection criteria were used in one of the hospitals studied, whereas, quality control during stain preparation and in the staining procedure and also quality control measures on reading and reporting of results were performed but with some irregularly in the study hospitals. However, equipment function verification as a quality control measure was not accomplished regularly in all of the study hospital labs.

All the study hospital laboratories have an internal quality assurance scheme for sputum smear microscopy regularly and at the beginning of every month. Even though there were no regular feedback mechanism to detect areas that need improvement and no means to ensure the implementation of the corrective actions recommended, all the study hospital labs were involved in an external quality assurance program organized by the respective regional laboratories using slide rechecking methods.

The work load of the lab staffs on sputum smear microscopy was about 7 to 9 smears examined per worker per day. The implementation of safety practice in sputum smear microscopy by the lab staffs appeared good; they were using appropriate disinfectants regularly and dispose wastes based on biosafety requirements. However, availability of trainings on safe lab practices was scarce, and there was no regular health check-up of laboratory workers in any of the study hospitals using chest x-ray, sputum examination or any other mechanisms.

The role of in-service trainings to enhance quality laboratory service is highly significant. Some of the laboratory workers at Karamara hospital did not get in-service training on sputum smear microscopy, whereas those in Dil Chora and Hiwot Fana hospitals got the training organized by Haramaya University in collaboration with Ethiopian Health and Nutrition Research Institute (EHNRI) and Centers for Disease Control and Prevention- Ethiopia (CDC-E) at different training periods.

Table 3. Factors affecting quality of sputum smear microscopy Eastern Ethiopia, 2012.

Criteria	Yes (No. %)	No (%)
Presence of national TB lab manual	0 (0)	3 (100)
Presence of national guideline (or protocol) of Quality Assurance	0 (0)	3 (100)
Quality Control measures during		
Specimen reception/handling	2 (66.7)	1 (33.3)
Stains preparation	3 (100)	0 (0)
Staining	1 (33.3)	2 (66.7)
Equipment function	1 (33.3)	2 (66.7)
Reading and reporting	3 (100)	0 (0)
Presence of Internal quality assessment program(IQA)	3 (100)	0 (0)
Participation in External Quality Assessment program (EQA)	3 (100)	0 (0)
Presence of feedback mechanism on results of EQA	0 (0)	3 (100)
Trainings on safe lab practices (safety)	2 (66.7)	1 (33.3)
Regular health check-up of lab workers	0 (0)	3 (100)
Availability of In-service trainings on sputum smear microscopy	2 (66.7)	0 (33.3)
Frequent interruption of lab work due to shortage of supplies for sputum smear microscopy	1 (33.3)	2 (66.7)
Presence and adequacy of maintenance system for equipments	0 (0)	3 (66.7)

The procurement system for lab supplies including reagents, consumables and equipment looked good in the sputum smear microscopy as compared with other supplies required in the clinical laboratory services. This is indicated by very rare interruption of the test due to shortage of supplies. However, the maintenance system for equipments in all the study hospitals is highly deficient, microscopes and other equipments were deposited in the storage rooms which may only required minor repairs.

4. Discussion

Smear positive pulmonary tuberculosis was highly prevalent within the age categories between 15-34 years, and more males were affected than females. Unlike other studies which showed a higher prevalence in the elderly (>45 years) (Tadesse T 2011), this study revealed a 2.3 times higher prevalence in the age group between 15-34 years, which can be explained by the more interactive nature of the people in this age category than the elderly and children. Also this could be related to the higher association of pulmonary tuberculosis with HIV/AIDS (Paul Jerome 2000). The male dominance for smear-positive sputum sample is consistent with data from Ethiopia (Federal Ministry of Health 2010), and other countries also (K Zaman 2006, Yamasaki-Nakagawa 2001), and could reflect occupational, behavioral or immunological factors contributions to risk.

Smear-positive pulmonary tuberculosis was about two times higher in rural residents than in urban residents. This could be due to lack of awareness and poor housing conditions in the rural inhabitants than in the urban dwellers. A study from Tigray showed that rural residents were less knowledgeable on pulmonary tuberculosis than the urban counterparts (Mengiste M 2005). Furthermore, differences in literacy rate and access to health services could be attributed to the TB-knowledge variation among urban and rural respondents (Hoa NP 2003), and results in variation in the prevalence of PTB.

Smear positive pulmonary tuberculosis was defined as cases with two positive sputum smears for Acid Fast Bacilli (AFB) (Mengiste M 2005). This study revealed that the five years overall prevalence of smear positive pulmonary tuberculosis to be 21.6%, which indicated that the disease was of major clinical significance in the study areas. This finding is higher than studies from south western part of Ethiopia which showed a prevalence of 10.9% from Agaro (Hussen Ali 2012), and 8.5% from Jimma University specialized hospital (Gebreselassie S., 2003), this could be due to variability in the awareness of communities for early diagnosis and treatment; susceptibility to pulmonary TB due to excessive exposure to predisposing factors like smoking and khat chewing habit in the study areas than the south western part of the nation.

The increase in the prevalence of smear positive TB in the study area could also be explained by the effectiveness of active follow up of the Nongovernmental organizations like International Center for AIDS care and treatment Program- Ethiopia (ICAP-E) on the laboratory activities mainly on TB-laboratory in the Eastern part of Ethiopia, that could enhance the quality of AFB testing procedure and hence the rate of positivity. A study from Tigray showed a comparable prevalence of smear-positive pulmonary tuberculosis to be 24.6% (Mengiste M, 2005), and an increased proportion of smear positive cases were also reported from southern region of Ethiopia (Yassin MA, 2003).

The principal WHO measure of case detection is an increment for new smear-positive cases in DOTS program (WHO 2008). However, our finding from eastern part of Ethiopia is very low when compared with the case detection rate achieved in Africa (46%), and the 77 countries which met the 70% target by the end of 2006. According to this WHO report, Ethiopia is accounting for more than one-quarter of "missing" cases (WHO, 2008). This decreased smear positive case detection rate in the study area and in the country may show lack of emphasis on sputum smear microscopy or incomplete geographical coverage of DOTS.

Smear positive pulmonary TB showed a statistically significant variability between the study hospitals. It was highly prevalent at Hiwot Fana followed by Karamara and Dil Chora hospitals, respectively. This difference could be attributed to variations in geographical coverage of DOTS strategy in the communities; differences in the respective hospital administrations; differences in commitment of laboratory staffs and opportunities for trainings that enhance quality services in carrying out all pre analytical, analytical and post analytical procedures for sputum smear microscopy. In addition, differences in frequency of monitoring and support from regional laboratories and nongovernmental organizations like ICAP-E could contribute to this variability.

No statistically significant variability were observed between the first spot samples, second morning samples and the third spot samples by year of examinations. In this study, the rate of positivity was increased from 21.6% in the first spot sample to 22.4% in the second morning sample. However, no increments were observed from the third spot sample, rather reduced the rate of positivity to 20.9%. This finding is in agreement with a study from Rwanda (Claude 2010).

5.Conclusion

The overall prevalence of sputum smear positive cases of 21.6% indicates that the disease is of major clinical significance in the study areas. However, the case detection rate pointed out in our study is by far lower than the target set by WHO; this signifies the need to improve the test sputum smear microscopy. The most vulnerable groups were males and amongst the age range 15-34 years, designing preventive measures targeting this gender and age categories is recommended. Lack of feedback mechanisms in the external quality assurance programs made the opportunity for improvement missing. Serial sputum examination showed a considerable rate of positivity in the second sputum sample than the others. However, the third sample showed no positivity than the first and the second samples. Further studies to re-evaluate these findings are recommended.

6. Acknowledgments

I am grateful to Haramaya University for granting me this research fund. It is my pleasure to acknowledge the cooperation of the research and publication office of Harar campus. I would also like to thank all the study hospital administration and laboratory chiefs involved in the study.

7. References

A Van Deun, F. Portaels. 1998. Limitations and requirements for quality control of sputum smear microscopy for acid fast bacilli, *Int J Tuberc Lung Dis*, 2: 756 - 65.

Claude Mambo Muvunyi, Florence Masaisa, Claude Bayingana, Andre Musemakweri, Leon Mutesa and Teresa Carbonell Hernandez. 2010. Prevalence and diagnostic aspects of sputum smear positive tuberculosis cases at a tertiary care institution in Rwanda, African *Journal of Microbiology Research*, 4 (1): 0.88 - 0.91

Enarson DA., Rieder HL., Arnadottir T., Treucq A. 2000. Management of tuberculosis: a guild for low-income countries, International Union against Tuberculosis and Lung Disease, 5th edn. Paris, 1 - 89.

Federal Ministry of Health. 2010. Annual Health Service report. Addis Ababa, Ethiopia.

Gebreselassie S. 2003. Evaluation of the concentration sputum smear technique for the lab diagnosis of PTB, *Ethiop Med J*, 33 (3) : 160 - 162.

Hawken MP., Muhindi DW., Chakaya JM., Bhatt SM., Ng'ang'a LW., Porter JD. 2001. Under-diagnosis of smear-positive pulmonary tuberculosis in Nairobi, Kenya, *Int J Tuberc Lung Dis*, 5 (4) : 360 - 3.

Hoa NP., Thorson AE., Long NH., Diwan VK.. 2003. Knowledge of tuberculosis and associated health-seeking behaviour among rural Vietnamese adults with a cough for at least three weeks, *Scand J Public Health*, 62 : 59 - 65.

Hussen Ali, Ahmed Zeynudin, Abiyu Mekonnen, Solomon Abera, Solomon Ali. 2012. Smear positive pulmonary tuberculosis (PTB) prevalence amongst patients at Agaro teaching health center, south west Ethiopia, *Ethiop Ournal of Health Sciences* 22 (1).

K. Zaman, M. Yunus, S. E. Arifeen, A. H. Baqui, D. A. Sack, S. Hossain, Z. Rahim, M. Ali, S. Banu, M. A. Islam, N. Begum, V. Begum, R. F. Breiman, and R. E. Black. 2006. Prevalence of sputum smear positive tuberculosis in a rural area in Bangladesh, *Epidemiol Infect*, 134: 1052 - 1059.

Mengiste M Mesfin, Tesfay W Tasew and Madeley J Richard. 2005. The quality of tuberculosis diagnosis in districts of Tigray region of northern Ethiopia, *Ethiopian Journal of Health De*v,19 : 13 - 20.

M Aziz, G Bretzel. 2002. Use of a standardized checklist to assess peripherial sputum smear microscopy laboratories for tuberculosis diagnosis in Uganda, *Int J Tuberc Lung Dis*, 6: 340 - 9.

NJ Hargreaves, O Kadzakumanja, CJ Whitty, FM Salaniponi, AD Harries, SB Squire 2001. Smear negative "pulmonary tuberculosis in a dots program: poor outcomes in an area of high HIV seroprevalence, *Int J Tuberc Lung Dis*, 5 : 847 - 54.

Paul Jerome. 2000. Dual infection, the challenge of HIV/AIDS and TB in Ethiopia, *North East African studies*, 7 (1) : 147 - 165.

Tadesse T, Demissie M, Berhane Y, Kebede Y, Abebe M. 2011. Two-Thirds of Smear-Positive Tuberculosis Cases in the Community Were Undiagnosed in Northwest Ethiopia: Population Based Cross-Sectional Study, *PLoS ONE*, 6 (12).

WHO. 2000. 44th World Health Assembly (WHA/1991/REC/1); supplemented by 53rd World Health Assembly, Report by the Director General, Provisional Agenda Item 12.1, A53/5: World Health Organization.

WHO. 2003. Global tuberculosis control: surveillance, planning, financing, WHO Report 2003 (WHO/CDC/TB/2003.316), Geneva: World Health Organization.

WHO. 2008. Global tuberculosis control : surveillance, planning, financing : WHO report. 200. "WHO/HTM/TB/2008.393".

WHO. 2010. Stop TB Partnership. The Global Plan to stop TB 2011-2015. Transforming the fight towards elimination of tuberculosis. Geneva: World Health Organization.

Yamasaki-Nakagawa, K.Ozasa, N. Yamada, N. Osuga, K. Shimouchi, A. Ishikawa, N. Bam, D.S. Mori, T.2001, Gender difference in delays to diagnosis and health care seeking behaviour in a rural area of Nepal*, International Journal of Tuberculosis and Lung Disease*, 5: 24 - 31.

Yassin MA., Cuevas LE. 2003. How many sputum smears are necessary for case finding in pulmonary tuberculosis, Trop Med Int Health, 8 (10) : 927 - 32.

19. Type-2 Diabetes Mellitus among Government Employees in Harar Town, Eastern Ethiopia: A Cross-Sectional Study

Desalegn Admassu[1]*, Yadeta Dessie[1], Kedir Teji[1], and Dawit Ayele[1]

Haramaya University, College of Health and Medical Sciences, Harar, Etiopia

Abstract

Lifestyle with less physical activity and higher consumption of sugar and fat transformed obesity to an epidemic, which poses a risk for the development of type-2 diabetes. This study aimed to assess type-2 diabetes mellitus and its associated factors among government employees in Harar town, Eastern Ethiopia.

A cross-sectional study was conducted on 714 employees working in ten government offices from May-July 2013. The WHO STEP wise approach to chronic disease risk factor surveillance questionnaire was used. An overnight fasting capillary blood was analyzed for blood glucose concentration using a commercially available electronic glucose monitor (Senso Card Plus). Participants with fasting blood sugar level ≥126mg/dl were checked with a more specific glucose oxidase method(HumaStar 80,compact automated clinical chemistry analyzer, Germany).Logistic regression was used to examine factors associated with type-2 diabetes mellitus, and a p-value <0.05 was used to declare statistical significance.

A total of 50 (7%) participants were found to have a fasting blood sugar level of≥126mg/dl after an overnight fasting, of which, 1.5% were known diabetic cases.There was a statistically significant association between hip circumference (COR (95% CI) =2.32(1.27, 4.22), waist circumference (COR (95% CI) =1.94 (1.05, 3.58) and type- 2 diabetes.Participants who consumed fruit and vegetables for about ≥ 3days/week were less likely to have type-2 diabetes mellitus(AOR 0.49; 95% CI=0.27,0.91).A ten point increase of BP increases the likelihood of developing type 2 diabetes mellitus by 6%, AOR (95% CI) = 1.057 (1.027, 1.087). Behavioral change communication on the need for healthy lifestyle, with a special emphasis on fruit and vegetables consumption and regular checkup for blood sugar level is recommended forprevention and early detectionof type 2 diabetes mellitus.

Keywords: Prevalence; type 2 diabetes; government employees; fruit and vegetables

1. Introduction

Type-2 diabetes mellitus develops due to a complex interaction between genetic predisposition and lifestyle, and it is characterized by insulin resistance and/or decreased insulin secretion.The actual manifestation of the disease is preceded by a phase of impaired glucose regulation, in which the cardiovascular risk is already increased. Significant lifestyle factors that promote or accelerate the manifestation of type 2 diabetes mellitus are bad nutritional habits, lack of physical activity and increased obesity(Schulze MB 2005).

Concomitant with the development of human societies which caused significant reductions in mortality related to infectious diseases, the adoption of an inadequate lifestyle with less physical activity and higher consumption of sugar and fat transformed obesity to an epidemic, which poses a risk for the development of type-2 diabetes(WHO 1999; Yusuf S. *et al* 2001 and Hossain P. *et al* 2007).

Population growth, ageing and urbanization with associated lifestyle change are likely to lead to a 54% increase in worldwide numbers with diabetes by 2030. A worldwide prevalence among adults aged 20-79 years increasing from 285 million in 2010 (6.4%) to 439 million in 2030 (7.7%) has been estimated (Schulze MB *et al* 2005 and Shaw JE *et al* 2010). According to International Diabetes Federation (IDF), the estimated prevalence rate of type 2 diabetes in Africa was about 2.8%. Countries such as Malawi and Ethiopia had rates about 2%, whereas Ghana, Sudan and South Africa have prevalence rates over 3%(Gill G. *et al* 2009). The prevalence of diabetes mellitus is increasing in developing countries due to population growth, aging, unhealthy diets, obesity and sedentary lifestyles(King H *et al* 1998). In sub-Saharan Africa, the estimate of people with diabetes was 10.8 million in 2006 and this would rise to 18.7 million by 2025, an increase of 80%, as such exceeding the predicted worldwide increase of 54% (Gill G *et al* 2009, Jamison DT *et al*., 2006;Levitt NS 2008).

Studies in different cities and one peri-urban area in South Africa indicated various prevalence rates ranging from 4–8% (Jamison DT *et al* 2006).A study conducted in South Africa among individuals in an age range of >30 reported a prevalence of 8.8% (Alberts M *et al* 2005). Another study conducted in Zimbabwe also reported a prevalence of 10% among individuals >25 years of age(WHO STEPS 2005).

WHO estimates the number of cases of diabetics in Ethiopia to be about 800,000 in 2000 and projected that it would increase to about 1.8 million by the year 2030 (WHO 2013).Different studies conducted in Ethiopia reported different prevalence rates. A cross-sectional study conducted in Jimma Town among adults 40 years and above found out a prevalence of 5.3% (Yemane T *et al* 2007). Similarly, a recent study conducted by Megerssa and his colleagues in selected institutions in Bishoftu town reported an overall prevalence of diabetes as 5% (95% CI: 3-7)(Megerssa YC *et al* 2013).

Dietary factors are important and are potentially modifiable risk factors for diabetes. There has been a focus on the role of carbohydrates and fiber, but the role of fruit and vegetable intake and incidence of type-2 diabetes is not fully understood. A meta-analysis concluded that there is an overwhelming support for the benefit of lifestyle interventions to prevent type 2 diabetes. Intervention studies have included the promotion of fruit and vegetables in the diet (Carter P *et al* 2010).Epidemiological studies suggest higher intakes of fruit and vegetables and low-fat dairy may be protective (Nettleton JA *et al* 2008 and Villegas R *et al.,* 2010).

Different studies found that obesity, expressed by Body Mass Index (BMI) or centrally by waist circumference or waist:hip ratio, has been consistently an independent risk factor for diabetes in the African region(Levitt NS 2008 and Aspray TJ 2000). A cross sectional study based on record review of 305 diabetic follow-up patients in Jimma, Ethiopia reported that189 (62.0%) and 76 (96.1%) patients with type-2 diabetes mellitus had hypertension (Dawit WD *et al*., 2010).

Evidence suggests that the increasing burden of chronic diseases has grave consequences because very few people will seek treatment, leading to high morbidity and mortality rates from potentially preventable diseases(Duda R *et al* 2007).Raising awareness of risk factors amongst the population, alongside the development of targeted programs to identify those at high risk of developing type-2 diabetes would go a long way towards reducing the devastating and costly complications of coronary heart disease, renal disease, blindness, and stroke and foot disease (National Service Framework for Diabetes, 2001).

Screening identifies people with impaired fasting glucose (IFG) or impaired glucose tolerance (IGT) and provided with lifestyle advice, support and information about healthy eating. Identifying potential modifiable risk factors in the development of type 2 diabetes is increasingly important; because of the growing global burden of the disease (WHO, 2013).Therefore, this study was aimed to assess type-2 diabetes mellitus and its associatedfactorsamong government employees in Harar town, Eastern Ethiopia.

2. Methods and Materials

2.1. Study Setting and Design

A cross-sectional study was conducted among government employees working in ten different offices in Harar town, Eastern Ethiopia from May-August 2013.Government offices were selected randomly, and 787 employees were recruited and distributed proportionally. Attendance sheet of the employees was used to select study participants using systematic random sampling. Employee on the next consecutive number was included in case the selected employee was not found on the day of interview. A questionnaire was distributed a day before the fasting blood sugar measurement was carried out in order to complete a detailed survey. An in-person interview was also conducted as necessary for assessment of dietary intake, physical activity and measurement of anthropometrics, and other factors.

2.2. Measurements

Data werecollected using The WHO STEPwise approach to chronic disease risk factor surveillance questionnaire, (STEPS). The questionnaire was translated to the local language and then translated back to the original language to avoid inconsistency. The fasting blood sugar level and anthropometric measurements were conducted by trained medical laboratory technologists and nurses, respectively. Data on socio-demographic variables and family history were collected. Systolic blood pressure (sBP) and diastolic blood pressure (dBP) were measured twice and the mean of the two measurements was calculated. Weight, height, and waist and hip circumferences were measured, and the body mass index (BMI) and waist to hip ratio (WHR) were determined. Body weight was measured with an electronic scale while waist circumference was measured at a midway between the costal margin and the iliac crest with a tapeline. Hip circumference was also measured at its widest part (greater trochanter). Family, history of diabetes was considered to be present if any first degree relative (parents, brother, sister, and child) had diabetes. Participants that already had breakfast were informed to come after an overnight fast next day. Blood sample was collected from an index finger after 10–12 hours over night fasting with only drinking water allowed and immediately analyzed for blood glucose concentration using a commercially available portable electronic blood glucose monitor (Senso Card Plus). Participants with fasting blood sugar level ≥126mg/dl were appointed to the specialized university hospital laboratory for a more specific enzymatic test (Glucose oxidase method using HumaStar 80, compact automated clinical chemistry analyzer, Germany).

The quality of the measuring instruments was validated by weighing or measuring a known weight or length of objects. The measurement was taken constantly by a single reader in order to avoid inter reader variability. The quality of the laboratory test results was maintained by running the point of care tests as per the manufacturers' instruction and daily quality controlwas monitored before running each sample for the enzymatic test. The laboratory test measures were accepted or rejected based on the quality control result.

2.3. Statistical Analysis

The collected data were entered and cleaned with Epidata Software version 3.1 and then transferred to SPSS Version 16 for analysis. Logistic regression model was used to study the association of risk factors with diabetes. Variables with p-value<0.1 in bivariate analysis resultusing sex as important variable were taken for the multivariate analysis and finally p-value <0.05 was considered statistically significant.

2.4. Ethical Consideration

The study protocol was approved and ethical clearance was obtained from College of Health and Medical Sciences Institutional Health Research Ethics Review Committee of Haramaya University. Written informed consent was obtained from the study participants.

3. Results

3.1. Characteristics of Study Participants

A total of 787 employees were enrolled, and data were collected from 714 giving a response rate of 91%. From the 714 study participants, 472 (66.1 %) were males and 242 (33.9%) were females giving a sex ratio of 1.9:1. Ethnically, about 255 (35.7%) were Oromo, 248 (34.7%) Amhara, 85 (11.9%) Gurage, 37 (5.2%) Harari, 25 (3.5%) Somali and the rest 9 % were from Tigray, Southern Nations and Nationalities and others. (Table 1).

3.2. Prevalence of Type-2 Diabetes Mellitus

From the total of 714 government employees screened, 57 (8%) had a fasting blood glucose level ≥ 126mg/dl. After further checkup using a more specific plasma glucose measurement (glucose oxidase) method, the overall prevalence of type 2 diabetes mellitus (≥126mg/dl) after an overnight fasting was 50 (7%).From these, 1.5% were known diabetic individuals and 5.5% were undiagnosed diabetes mellitus.

Table 1. Socio-demographic characteristics of government employees of Harar town, 2013

Socio-demographic variables(n=714)	Number	%
Age in years		
<35-Years	371	51.9
>35-Years	343	48.0
Sex of the adolescents		
Male	472	66.1
Female	242	38.9
Ethnicity		
Oromo	255	35.7
Amhara	248	34.7
Other ethnic groups ‡	211	29.5
Educational status		
Primary school (grade 1-8)	183	25.6
Secondary school (9-12)	190	26.6
Post-secondary	341	47.7
Marital status		
Married	305	42.7
Unmarried	409	57.2

3.3.Factors Associated with Diabetes Mellitus

In bivariate analysis, age, hip and waist circumference, frequency of fruit and vegetable consumption and sBP showed statistically significant association with type-2 diabetes mellitus. This study had found a statistically significant association between age ≥ 35 and diabetes mellitus (COR (95% CI) 2.39;95% (1.34, 4.26). The prevalence of diabetes mellitus was less among those who consumed fruit and vegetables three and more days per week (COR (95% CI) =0.51(0.29, 0.91).There was a statistically significant association between hip circumference (COR (95% CI) =2.32(1.27, 4.22), waist circumference (COR (95% CI) =1.94 (1.05, 3.58) and a ten point increase systolic blood pressure (COR (95% CI) =1.07(1.04, 1.09) and type 2 diabetes mellitus.(Table2).

Table 2. Diabetes cases by selected variables among government employees of Harar town, Eastern Ethiopia, 2013.

Socio-demographic variables(n=714)		Fasting blood glucose ≥126 n (%)	Fasting blood glucose <126 n (%)	COR(95% CI)	P-value
Age in years	<35	18 (4.85)	353 (95.15)	1	
	≥35	32 (9.93)	311(90.67)	2.39(1.34, 4.26)	0.003
Sex of the adolescents	Male	37(7.84)	435(92.16)	1	
	Female	13(5.37)	229(94.63)	0.67(0.35, 1.28)	0.224
Ethnicity	Oromo	17(6.67)	238(93.33)	1	
	Amhara	19(7.66)	229(92.34)	1.16(0.58, 2.29)	0.666
	Other ‡	14(6.64)	197(93.36)	0.99(0.48, 2.07)	0.989
Educational status	Primary school (grade 1-8)	9(4.92)	174(95.08)	1	
	Secondary school (9-12)	12(6.32)	178(93.68)	1.30(0.54, 3.17)	0.559
	Above Secondary	29(8.50)	312(91.50)	1.79(0.83,3.88)	0.136
Marital status	Married	15(4.92)	290(95.08)	1	
	Not married	35(8.56)	374(91.44)	1.81(0.97,3.38)	0.063
Alcohol in last 12 month	Yes	11(8.80)	114(91.20)	1	
	No	39(6.62)	550(93.38)	0.73(0.37,1.48)	0.388
BMI (kg/m2)	<25	31(6.50)	446(93.50)	1	
	≥25	19(8.02)	218(91.98)	1.25(0.69, 2.27)	0.455
Vegetable consumption	≤2 days/week	25(10.00)	225(90.00)	1	
	3 and more days / week	25(5.39)	439(94.61)	0.51(0.29, 0.91)	0.023
Vigorous work for 10 minutes	Yes	8(7.85)	94(92.15)	1	
	No	42(6.82)	570(93.28)	0.86(0.39,1.90)	0.72
Walking for at least 10 minutes/day	Yes	25(8.90)	256(91.10)	1	
	No	25(5.77)	408(94.23)	0.62(0.35, 1.11)	0.113
Vigorous activity that causes high breathing rate	Yes	6(7.59)	73(92.41)	1	
	No	44(6.93)	591(93.07)	0.64(0.307,1.31)	0.221
Waist circumference*	Normal	11 (4.2)	253 (95.8)	1	
	Risk group	39 (8.7)	411 (91.3)	1.94 (1.05,3.58)	0.034
Hip circumference (mean)	Low	18(4.57)	376(95.43)	1	
	High	32(10.00)	88(90.00)	2.32(1.27, 4.22)	0.006
Systolic blood pressure SBP(mmHg)	Mean± SD	121.07 (± 12.60)	131.00 (±10.43)	1.07(1.04, 1.09)	0.000

** Waist circumference greater than 102 cm for male and 88 cm for female were used as threshold(Walter RJ et al 2014)*
P-value <0.05 indicates statistically significant .

In the final model built, those participants who consumed fruit and vegetables for about three and above days per week were about 50% less likely to be diabetic than those who consumed less than three days per week, AOR(95% CI)=0.496(0.271,0.910). A ten point increase of sBP increases the likelihood of developing type 2 diabetes mellitus by 6%, AOR (95% CI) = 1.057 (1.027, 1.087). (Table 3).

Table-3 Factors associated with type diabetesamong government employees of Harar town, Eastern Ethiopia, 2013

Variables (n=714)		Fasting blood glucose			
		>126mg/dl	<126mg/dl		
		no	no	AOR 95% CI	P-Value
Age	<35 years	24	457	1	
	>35 years	26	207	1.653(0.89,3.07)	0.113
Sex	Male	37	435	1	
	Female	13	229	0.47(0.22, 1.003)	0.051
Marital status	Married	15	290		
	Notmarried	35	374	1.53(0.79,2.942)	0.205
Vegetable consumption	1-2	25	225	1	
	3 and more	25	439	0.531(0.29,0.98)	0.041
Waist circumference *	Normal	11	253	1	
	Risk group	39	411	1.815(0.85,3.90)	0.127
Hip circumference(mean)	Low	18	376		
	High	32	288	1.17(0.58,2.36)	0.669
SBP(mmHg)	Mean	121.073 (+ 12.60)	131.00 (+10.43)	1.06(1.026,1.084)	0.000

* Waist circumference greater than 102 cm for male and 88 cm for female were used as threshold
Significant at p-value<0.05

4. Discussion

This study identified that age, hip and waist circumference, fruit and vegetables consumption and sBP as significant factors for diabetes mellitus.The prevalence of type-2 diabetes mellitus among the study participants was 7%. Respondents who consumed fruit and vegetables for about ≥ 3 days/ week were less likely to experience diabetes mellitus. A ten point increase in systolic blood pressure (sBP) was associated with increased likelihood of type-2 diabetes mellitus.

WHO estimated the number of diabetic cases in Ethiopia to be 800,000 by the year 2000, and the number is expected to increase to 1.8 million by 2030(WHO 2013).A worldwide prevalence among adults aged 20-79 years also estimated a continuous increase from 6.4% in 2010 to 7.7% in 2030 (Shaw JE *et al* 2010). Though there has not been many population-based estimate of the prevalence of type-2 diabetes in Ethiopia, this study found an overall prevalence of 7%. This result was comparable to the cross-sectional study conducted in Jimma and Bishoftu townsin Ethiopia and to other community-based studies in developing countries that reported a prevalence of >5% undiagnosed diabetes mellitus.Different prevalence rates ranging from 4–8% were also reported from South African studies undertaken in different cities (Jamison DT *et al* 2006; Yemane T *et al* 2007 and Megerssa YC *et al*., 2013). The 7% prevalence reported in this study was likely to be higher if OGTT was used in addition to the fasting glucose test (Bur A *et al* 2003).This result showed a rapid increase in the prevalence of diabetes mellitus in an alarming rate and it may exceed the 2030 estimation soon.

Epidemiologic studies have examined associations between dietary patterns and the risk of type-2 diabetes. It is suggested that higher intakes of fruit and vegetables, whole grains, fish, and low-fat dairy may be protective for diabetes, and higher intakes of processed grains, added sugars, processed and red meat and fried foods may increase diabetes risk(Nettleton JA *et al*., 2008 and Villegas R *et al* 2010). In our study, fruit and vegetables consumptionwas found to be significantly associated with type 2 diabetes. The prevalence of type 2 diabetes mellitus was less among those who consumed fruit and vegetables three and more days per week time(COR (95% CI) =0.51(0.29, 0.91).Researchers also reported that, educational status, family origin and socioeconomic status affect the purchasing power of food, food choice, food preparation and food availability which in turn affects consumption (Wang Y *et al.,* 2002).

Studies found a significant association between increased blood pressure and diabetes (Villegas R *et al* 2010 and National Service Framework for Diabetes 2002). In a similar manner, a ten point increase of sBP increases the likelihood of diabetes mellitus by 6%, AOR (95% CI) = 1.057 (1.027, 1.087). This result was similar with different studies that found obesity as an independent risk factor for diabetes in the African region (Levitt NS, 2008 and Aspray TJ, 2000). A cross-sectional study in Jimma, Ethiopia also reported hypertension in high number of type-2 diabetes mellitus patients (Dawit WD *et al*., 2010). This may indicate the importance of screening among hypertensive individuals in Ethiopia.
This study conducted fasting glucose measurement. No additional tests were conducted to differentiate type-1 and type-2 diabetes. Besides, the prevalence of type-2 diabetes was likely to be higher if OGTT was conducted in addition to the fasting glucose test.

5. Conclusions

In conclusion, there is a rapid increase in the magnitude of type-2 diabetes as compared to other sub -Saharan African countries. This requires the need for getting regularly screened for blood sugar levels and strong behavioral change communication on healthy life styles to prevent the

occurrence of type-2 diabetes. Large-scale community based study involving the rural community is also recommended to determine the burden of type-2 diabetes mellitus.

Competing Interest

There is no any conflict of interest associated with the publication of this manuscript.

Author's contribution

All of the authors participated in proposal writing, data collection, analysis, interpretation and critical review of the manuscript. All authors read and approved the final manuscript.

6. Acknowledgements

We thankfully acknowledge Haramaya University for funding the study. We take this opportunity with great pleasure to thank the study participants working in the government offices in Harar town and the heads of the government institutions in which this study was conducted. . Our gratitude also goes to Hiwot Fana Specialized University Hospital laboratory staff for their heartly cooperation and provision of all the necessary assistance throughout the study.

7. References

Alberts M, Urdal P, Steyn K. 2005. Prevalence of cardiovascular diseases and associated risk factors in a rural black population of South Africa. *Eurpean Journal of Cardiovasc Prev Rehabil* 12:347 - 54.

Aspray TJ, Mugusi F, Rashid S. 2000. Rural and urban differences in diabetes prevalence in Tanzania: the role of obesity, physical inactivity and urban living. *Trans R Soc Trop Med Hyg*;94: 637 - 44).

Bur A, Herkner H, Woisetschläger C,Vlcek M, Derhaschnig U,Hirschl MM. 2003. Is fasting blood glucose a reliable parameter for screening for diabetes in hypertension?*American Journal of Hypertens.* 16 (4):297 - 301.

Carter P, Gray LJ, Troughton J, Khunti K, Davies MJ. 2010. Fruit and vegetable intake and incidence of type-2 diabetes mellitus: systematic review and meta-analysis. *BMJ* 341:c4229.

Dawit WD., Hamza L., Woldemichael K. 2010. Patterns of diabetic complications at Jimma University specialized hospital, southwest Ethiopia. *Ethiopian Journal of Health Sciences* 20.

Duda R, Kim M, Darko R. 2007. Results of the Women's Health Study of Accra: assessment of blood pressure in urba women. *International Journal of Cardiol* 117(1):115-122.].

Department of Health. National Service Framework for Diabetes - England. Standards (2001) and Delivery Strategy (2002).

World Health Organization. Diabetes estimates and Projections.. Available at diabetes@who.int (Accessed on Sep. 2013).

Gill G, Mbanya JC, Ramaiya K, Tesfaye S: 2007. A sub-Saharan African perspective of diabetes. Diabetologia 2009, 52 (1): 8 - 16. Hossain P, Kawar B, Nahas ME: Obesity and diabetes in the developing world - a growing challenge. *N Engl J Med* 356:213 - 215.

Jamison DT, Feachem RG, Makgoba M W.2006. Disease and mortality in sub-Saharan Africa. 2nd ed. Washington: The International Bank for Reconstruction and Development/The World Bank,:43 - 58.

King H, Aubert RE, Herman WH. 1998. Global burden of diabetes, 1995 - 2025: *Prevalence, numerical estimates, and projections. Diabetes Care* 21:1414 - 31.

Levitt NS. 2008. Diabetes in Africa: epidemiology, management and health care challenges. Heart, 94:1376 - 1382.

Megerssa YC, Gebre MW, Birru SK, Goshu AR, Tesfaye DY.2013. Prevalence of Undiagnosed Diabetes Mellitus and its Risk Factors in Selected Institutions at Bishoftu Town, East Shoa*, Ethiopia. Journal of Diabetes Metab* S12: 008. doi:10.4172/2155-6156.S12-008

Nettleton JA, Steffen LM, Ni H, Liu K, Jacobs DR Jr. 2008. Dietary patterns and risk of incident type-2 diabetes in the Multi-Ethnic Study of Atherosclerosis (MESA). *DiabetesCare*31:1777 - 1782

Shaw JE, Sicree RA, Zimmet PZ. Global estimates of the prevalence of diabetes for 2010 and 2030. Diabetes Res Clin Pract 2010, 87: 4 - 14.WHO Steps 2005.Available at (http://www.who.int/chp/steps/STEPS_Zimbabwe_Data.pdf).

Schulze MB, Hu FB 2005. Primary prevention of diabetes: what can be done and how much can be prevented? *Annual Rev iew of Public Health*. 2005, 26:445 - 467.

Villegas R, Yang G, Gao YT,. 2010. Dietary patterns are associated with lower incidence of type-2 diabetes in middle-aged women: the Shanghai Women's Health Study. *International Journal of Epidemiology* 39:889–899

World Health Organization. 1999. Definition, Diagnosis and Classification of Diabetes Mellitus and its Complications. Report of a WHO Consultation. Geneva: World Health Organization.

Walter RJ, Sandra CNG, Elenir RJCP, Celso CS, Lilian PG, Paula FL, Maria LMNC, Lucas MB, Annelise AO, Clarissa RS, José Valério librelotto steFa, Andrezza LDR. 2014. Diabetes mellitus and impaired glucose tolerance in urban adult population. *Rev Assoc Med BRAs*60(2):118-124.

Wang Y, Bentley ME, Zhai F & Popkin BM. 2002. Tracking dietary intake patterns of Chinese from childhood to adolescence over a six-year follow-up period. *Journal of Nutrition 2002*, 132 (93):430-438.

Yemane T, Belachew T., Asaminew B. 2007. Type 2 diabetes mellitus in Jimma town, Southwest Ethiopia. *Ethiopian Journal o Health Sciences* 17, 2,

Yusuf S, Reddy S, Ôunpuu S, Anand S. 2001. Global burden of cardiovascular diseases: Part I: general considerations, the epidemiologic transition, risk factors, and impact of urbanization. Circulation, 104: 2746 - 2753.