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Introduction

This Harar Bulletin of Health Sciences is a special issue. It includes twenty-three extracts written by recent MPH graduates who attended Addis Continental Institute of Public Health (ACIPH), a privately owned education enterprise in Addis Ababa. While registered as Haramaya University students, they received their classroom instruction, conducted their thesis preparation with ACIPH advisement, and defended their theses at ACIPH. After ACIPH approval and signatures, the theses were delivered to Haramaya University. While their work was conducted at ACIPH, the students received their MPH degrees from Haramaya University. This educational activity continues through an arrangement with Haramaya University administration and the ACIPH management.

The bulletin includes topics that are diverse in subject matter. Examples include a descriptive study of menstrual hygiene practices in adolescent schoolgirls, goiter prevalence in a mountainous area of Ethiopia, biomedical waste disposal practices in Addis Ababa, intestinal parasitosis prevalence in pregnant women attending antenatal care in Addis Ababa, substance abuse among Addis Ababa University students, and assessment of private
sector health facilities engaged in TB care in the Amhara region. Other topics include, for example, exclusive breast feeding, HAART survival, institutional delivery, and family planning issues.

The extracts offer variety recommendations that result from the research. Recommendations include health education programming, specific ways to enhance clinical operations, the development of new clinical programs, and improvements in current clinical activities. Recommendations suggest actions in health facilities and in offices and bureaus at the local, regional, and national levels. Health policy refinements and development are also recommended.

Many problems have been identified in these theses and confirmed through many similar MPH theses written throughout Ethiopia. It now becomes the concern for higher level and more sophisticated research that explores ways that recommendations can be put into action. It is not enough to reiterate problems with descriptive and often duplicative research. Research that explores ways to solve problems is needed. More sophisticated research questions need to be asked and answered in master’s level research.
The extracts enclosed are interesting reading. They all represent considerable time, energy, and human and financial resources to complete. They contribute to the ever-growing public health knowledge of the country. If the recommendations brought about by these studies are put into practice, they could vastly improve the lives of people throughout Ethiopia.

Editor
# Acronyms and Abbreviations

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<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
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<tr>
<td>AFP</td>
<td>Acute Flaccid Paralysis</td>
</tr>
<tr>
<td>AIDS</td>
<td>Acquired Immodeficiency Syndrome</td>
</tr>
<tr>
<td>ANC</td>
<td>Antenatal Care</td>
</tr>
<tr>
<td>ART</td>
<td>Anti Retroviral Therapy</td>
</tr>
<tr>
<td>BMI</td>
<td>Body Mass Index</td>
</tr>
<tr>
<td>CD4</td>
<td>Cluster of Differentiation 4</td>
</tr>
<tr>
<td>CPR</td>
<td>Contraceptive Prevalence Rate</td>
</tr>
<tr>
<td>EBF</td>
<td>Exclusive Breast Feeding</td>
</tr>
<tr>
<td>EDHS</td>
<td>Ethiopian Demographic Health Survey</td>
</tr>
<tr>
<td>EPI</td>
<td>Expanded Program on Immunization</td>
</tr>
<tr>
<td>FANC</td>
<td>Focused Antenatal Care</td>
</tr>
<tr>
<td>FGD</td>
<td>Focused Group Discussion</td>
</tr>
<tr>
<td>FP</td>
<td>Family Planning</td>
</tr>
<tr>
<td>GAM</td>
<td>Global Acute Malnutrition</td>
</tr>
<tr>
<td>HCW</td>
<td>Health Care Worker</td>
</tr>
<tr>
<td>HAART</td>
<td>Highly Active Anti Retroviral Therapy</td>
</tr>
<tr>
<td>IEC</td>
<td>Information Education Communication</td>
</tr>
<tr>
<td>Acronym</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td>IMNCI</td>
<td>Integrated Management of Neonatal and Childhood Illnesses</td>
</tr>
<tr>
<td>IPT</td>
<td>Inpatient Treatment</td>
</tr>
<tr>
<td>MAM</td>
<td>Moderate Acute Malnutrition</td>
</tr>
<tr>
<td>MMR</td>
<td>Maternal Mortality Rate</td>
</tr>
<tr>
<td>OI</td>
<td>Opportunistic Infection</td>
</tr>
<tr>
<td>OPT</td>
<td>Outpatient Treatment</td>
</tr>
<tr>
<td>PLWHA</td>
<td>People Living with HIV/AIDS</td>
</tr>
<tr>
<td>PPM-DOTS</td>
<td>Private-Public Mix- Directly Observed Treatment Short-Course</td>
</tr>
<tr>
<td>PYO</td>
<td>Person Years Observed</td>
</tr>
<tr>
<td>RH</td>
<td>Reproductive Health</td>
</tr>
<tr>
<td>SAM</td>
<td>Severe Acute Malnutrition</td>
</tr>
<tr>
<td>SRH</td>
<td>Sexual and Reproductive Health</td>
</tr>
<tr>
<td>TB</td>
<td>Tuberculosis</td>
</tr>
<tr>
<td>UNICEF</td>
<td>United Nations Children’s Emergency Fund</td>
</tr>
<tr>
<td>USAID</td>
<td>United States Aid for International Development</td>
</tr>
<tr>
<td>VCT</td>
<td>Voluntary Counseling and Testing</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
</tr>
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</table>
Magnitude and Factors Affecting Institutional Delivery in Dodota Woreda, Oromia Regional State, Ethiopia

Addisalem Fikre

Abstract

Background: Giving birth in a medical institution under the care and supervision of trained health care providers promotes newborn survival and reduces maternal mortality. However, the use of institutional delivery service is only at 6% and 4.8% of pregnant mothers in Ethiopia and the Oromia region, respectively.

Objective: To assess the magnitude and factors that affect utilization of institutional delivery in Dodota Woreda, Oromia Regional State.

Methods: A community-based, cross-sectional study was conducted that employed quantitative and qualitative methods with 506 subjects. The study was conducted during the month of January, 2011 in the Dodota woreda. The quantitative method involved interviewing a total of 506 women who gave birth within the last two years using a pre-tested structured questionnaire. For
the qualitative portion of the study, the focus group discussion (FGD) procedure was chosen as the tool for data collection.

*Results:* A total of 18.2% of the mothers gave birth to their last baby in a health facility. The place of residence, educational level of mother, history of pregnancy-related health problems, a previous prolonged labor, woman’s attendance at the antenatal clinic (ANC), and decision on birthing location by husband or relative showed significant associations with utilization of institutional delivery services (p<0.05 for each factor).

*Conclusions and Recommendations:* The magnitude of institutional delivery in this area was greater than observed in other studies in Ethiopia. However, at 18.2%, or one of every five newborns, efforts must be intensified. Aside from improved education of women, more emphasis can occur with ANC. Health education of the pregnant woman, her husband, and relatives about the benefits and increased safety of institutional delivery should be conducted. A strengthening of community participation and dialogue on the subject matter, and increased accessibility to health facilities for all expectant women is needed.
Introduction

Early and regular check-ups by health professionals are essential in assessing the physical status of women during pregnancy to ensure appropriate interventions during labor and delivery. In spite of the global and national efforts to reduce maternal morbidity and mortality through the Safe Motherhood Initiative, institutional delivery of babies continues to decrease. (1)

The United Nations International Children’s’ Emergency Fund (UNICEF) estimates that each year 515,000 women die during pregnancy and in childbirth. It is estimated that 1,600 women across the world die each day from pregnancy and childbirth-related problems and the greatest proportion of these deaths occurs in the least developed countries like Ethiopia. (2, 3)

In Ethiopia, maternal mortality and morbidity levels are some of the highest in the world. The maternal mortality ratio is currently 673 per 100,000 live births. (4) One explanation for the poor health outcomes among these women is non-availability and the underuse of more modern health services and facilities by the majority of women in Ethiopia.
According to EDHS-2005, the proportion of women utilizing safe delivery services in the country, in general, and in Oromia region, in particular, is very low. Also, related to safe delivery services, only one fourth of the eligible mothers received ANC service and only five percent of the mothers sought care for institutional delivery in the region. (4) Therefore, the purpose of this study was to better understand the determinants of institutional delivery in a specific woreda and perhaps serve as a tool for possible research-based interventions aimed to improve the low utilization rate of institutional delivery in the area.

**Methods**

*Study Area and Period:* Dodota woreda is one of sixteen woredas in the Arsi zone of the Oromia Regional State and is located 125 kms southeast of Addis Ababa. The woreda is structured into twelve rural and three urban kebeles. According to a 2005 census, the total population of the woreda was 72,000.

*Study Design:* A community-based, cross-sectional study that employed both quantitative and qualitative data collection methods was deployed.
Study Population and Sample Size: Women who gave birth in the last two years in Dodota woreda were the study population. A total sample size of 506 was calculated using a formula for a single population proportion, assuming a design effect of two and a non-response rate of 10%.

Sampling Procedures: There are twelve rural and three urban kebeles in the woreda and five kebeles from the rural area and one kebele from the urban area were selected by simple random sampling method. The sample size was distributed to the six kebeles proportionate to the size of the population. A systematic sampling method was then used for each kebele to select the households to be studied. The sampling interval of the households in each kebele was determined by dividing the total number of households into the allocated sample size. The initial interviewed household was randomly selected by a lottery method from the sampling frame using a number 1 and the sampling interval. By adding the sampling interval to the previous number, the data were collected. If more than one eligible woman was identified in the household, a lottery method was used to select the woman for interview. In the case where no eligible woman was identified in
the selected household, the next household located to the right was visited and that next woman was interviewed if she was eligible.

**Study Variables**

*Data Collection:* A pre-tested structured questionnaire was used for data collection. It was originally prepared in English and then translated into Amharic. Data collection was conducted by health extension workers (HEWs) who were trained for three consecutive days. These were HEWs who worked outside of the study area.

*Qualitative Design:* Three FGDs with 10 participants in each were conducted. Recruitment of participants was assisted by the HEWs in the kebeles. The participants were between 15 and 72 years of age. Each of the three FGDs took between 45 and 60 minutes to conduct.

*Data Analysis:* The data were first entered in Epi-Info Version 3.5 and then transported to SPSS Version 16 for cleaning and analysis. Univariate analysis using the frequency technique was used to describe the data according to selected characteristics of study subjects. Tables and frequencies were used to present the data. In addition, the association between dependant and independent variables was determined using odds ration with a 95% confidence
interval. Logistic regression analysis was used to control for potential confounders.

Ethical Considerations: Ethical clearance was obtained from the Haramaya University Institutional Research Ethics Review Committee and Addis Continental. Also, permission was obtained from the Dodota Woreda Health Office. Informed verbal consent was obtained from each of the participants in the study.

Results

Socio-demographic Characteristics: With a response rate of 100%, a total of 506 completed the interview. Of the total respondents, 275 (54.5%) were illiterate, 436 (86.2%) were Oromo, 395 (78.1%) were housewives, 263 (52%) were Orthodox Christian, 467 (92.3%) were married; 329 (65%) had an income ranging from ETB100-499, and 182 (36%) were in the age group of 25–29 years with a mean age of 28 years. Also, 429 (84.8%) were in the age range of 15-19 during their first pregnancy and 292 (57.7%) had a history of two to five pregnancies. Among the respondents, 90 (17.8%) had a history of infant death. 34 (6.7%) had a history of abortion, 25 (5%) of stillbirth.
Medical Characteristics of Respondents: Out of the 506 respondents, 414 (81.8%) gave birth to their last child in their home. A total of 466 (92.1%) respondents did not face problems before or during the time of labor and delivery. A total of 371 (73.3%) of the study subjects responded that their labor took less than half a day, 100 (19.8%) one day or one night, and 30 (5.9%) more than one and one half day.

The vast majority of the mothers 493 (97.4%) had a live birth and among these newborns, 492 (97.2) did not face any medical problems. The majority of the respondents 402 (79.4%) made the final decision as to the place of delivery by themselves.

Table1. Medical Characteristics of Respondent Mothers of Dodota Woreda, 2010

<table>
<thead>
<tr>
<th>Medical Characteristics of Respondents</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Place of Delivery of Last Child</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home</td>
<td>414</td>
<td>81.8</td>
</tr>
<tr>
<td>Health Facility</td>
<td>92</td>
<td>18.2</td>
</tr>
<tr>
<td>Problems Faced During/Before Labor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>40</td>
<td>7.9</td>
</tr>
<tr>
<td>No</td>
<td>466</td>
<td>92.1</td>
</tr>
</tbody>
</table>
**Duration of Last Labor**

<table>
<thead>
<tr>
<th>Duration</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than half a day</td>
<td>371</td>
<td>73.3</td>
</tr>
<tr>
<td>One day or one night</td>
<td>100</td>
<td>19.8</td>
</tr>
<tr>
<td>More than one and one half day</td>
<td>30</td>
<td>5.9</td>
</tr>
<tr>
<td>Do not remember</td>
<td>5</td>
<td>1</td>
</tr>
</tbody>
</table>

**Decision-maker for Location of Delivery**

<table>
<thead>
<tr>
<th>Decision-maker</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mother</td>
<td>402</td>
<td>79.4</td>
</tr>
<tr>
<td>Husband</td>
<td>67</td>
<td>13.2</td>
</tr>
<tr>
<td>Relatives/Neighbors</td>
<td>37</td>
<td>7.3</td>
</tr>
</tbody>
</table>

**Factors Related to Institutional Delivery:** Bivariate analysis showed that place of residence, age, education level of mother, occupation, income, parity, prolonged labor, a previous history of pregnancy-related problems and the final decision made by the husband or relative showed statistically significant associations with place of delivery.

By adjusting for the confounding factors, place of residence, educational level of mothers, history of pregnancy-related health problems, previous prolonged labor, ANC attendance and the final decision made by husbands or relatives remained significant.
Table 2. Factors Influencing Place of Delivery in Dodota Woreda, 2011

<table>
<thead>
<tr>
<th>Socio-demographics</th>
<th>Place of Delivery</th>
<th>Crude OR (95% CI)</th>
<th>Adjusted OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>370 19</td>
<td>0.03(0.02,0.06)</td>
<td>0.04(0.02,0.11)</td>
</tr>
<tr>
<td>Urban</td>
<td>44 73</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Level of Schooling</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illiterate</td>
<td>253 22</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Read and Write only</td>
<td>50 4</td>
<td>0.92(0.30,2.79)</td>
<td>0.97(0.21,4.35)</td>
</tr>
<tr>
<td>Primary</td>
<td>86 47</td>
<td>6.29(3.58,11.03)</td>
<td>3.46(1.45,8.24)*</td>
</tr>
<tr>
<td>Secondary and Higher</td>
<td>25 19</td>
<td>8.74(4.18,18.29)</td>
<td>4.06(1.09,15.15)*</td>
</tr>
<tr>
<td>Antenatal Care</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>340 75</td>
<td>3.70(2.70,10.11)</td>
<td>3.21(1.97,9.21)*</td>
</tr>
<tr>
<td>No</td>
<td>74 17</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Faced Pregnancy-related Problems</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>386 80</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Yes</td>
<td>28 12</td>
<td>2.07(1.01,4.24)</td>
<td>10.58(3.26,34.34)</td>
</tr>
<tr>
<td>Length of Labor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than Half a Day</td>
<td>319 52</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>One Day or One Night</td>
<td>72 28</td>
<td>2.39(1.41,4.04)</td>
<td>2.26(0.91,5.60)</td>
</tr>
<tr>
<td>More than One and one Half Day</td>
<td>23 12</td>
<td>3.20(1.50,6.82)</td>
<td>5.70(1.86,17.52)</td>
</tr>
<tr>
<td>Final Decision on Location</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother</td>
<td>364 38</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Husband</td>
<td>44 23</td>
<td>5.01(2.73,9.17)</td>
<td>7.48(2.88,19.47)</td>
</tr>
<tr>
<td>Relatives/Neighbors</td>
<td>6 31</td>
<td>49.5(19.4,126.2)</td>
<td>7.81(2.47,24.67)</td>
</tr>
</tbody>
</table>

*p value < 0.01
Discussion

The prevalence of institutional delivery in this study was 18.2%. The education level of mothers, residential place, a history of pregnancy-related health problems, previous prolonged labor, attendance at ANC, and the final decision made by husband or relative were the determinant factors of institutional delivery.

This finding of 18.2% is higher than the study results in the north Gondar zone. (5) In that study, only 13.5% of all the mothers gave birth in health facilities. The delivery service was influenced by place of residence. Women who lived in rural areas were less likely to deliver in a health facility (OR: 0.04, 95% CI=0.02, 0.11). This finding is in line with other studies conducted in Ethiopia. (4-6) For instance, women residing in Addis Ababa are forty times more likely to deliver in a health facility than rural women living in the more rural areas around the city. Nationally, women from other urban areas are five times more likely to deliver in a health facility than rural women (OR=4.8, 95% CI=3.2-7). This is because women who live in urban areas have better access to health facilities and the cost of transportation to the facility is minimal.
The women’s education level was a strong predictor of the place of delivery. Those women with secondary and a higher level of education were four times more likely to deliver in health institutions than illiterates (OR: 4.06, 95% CI=1.09, 15.15). Also, women with a primary education were three times more likely to deliver in health institutions than those with no formal education. (OR: 3.46, 95% CI=1.45, 8.24). These findings are consistent with other studies done in Ethiopia, Tanzania, Burkina Faso and India. (4-9) This may be because educated women have knowledge and awareness about the advantages of the interventions and pregnancy-related complications. This is just one example of how education of women makes a profound difference in health matters. These women are more likely to seek modern health care than those who are not educated. This finding is also supported by the results of discussion in the FGDs.

Another factor for utilization of institutional delivery was the length of previous labor. As the length of labor was prolonged, the women preferred to deliver in a health institution. If the length of labor was prolonged more than one and one half day, the women were much more likely to deliver in health institution (OR: 5.70, 95% CI= 1.86, 17.52). Also, women with previous difficulty with
labor were eleven times more likely to deliver in a health institution than those who did not have any problems (OR: 10.58, 95% CI=3.26, 36.34). This finding is consistent with other studies conducted in India and northern Gonder. (5,10) This may be because as the length of labor was prolonged, and if the women had any past histories of complications during labor, they or their families feared a threat to life. The past incident was a precaution for the current pregnancy.

Another result of the current study was that attending ANC appeared to be a significant predictor of institutional delivery. Mothers who attended ANC follow-up for the current pregnancy had a three times higher chance of delivering in a health facility (OR:3.21 95% CI=1.97,9.21). This finding was consistent with a study conducted by a student of Addis Ababa University in northern Gondar. The possible explanation is that women who had antenatal care follow-up received health education about pregnancy and learned the advantages and benefits of giving birth in a health facility.

The other finding of this study was that if the final decision as to the place of delivery was made by the husband or relative, the chances were seven times greater for delivering in a health
institution than the decision made by the delivering mother herself (OR: 7.48, 95% CI=2.88, 19.47 and OR:7.81, 95% CI=2.47, 24.67). This finding is consistent with the research done in Jimma and northern Gondar. (5,11)

The quantitative portion of the study revealed that the majority of the decisions regarding the place of delivery was made by husbands or relatives. Therefore, if women are encouraged by their husbands or relatives, they are much more likely to deliver their babies in health institutions.

Acknowledgements

I would like to pass my heartfelt gratitude and appreciation to my advisor, Dr. Meaza Demisse, for her unreserved assistance in all matters. My appreciation also goes to all staff members of ACIPH, Haramaya University and Dodota Woreda Health Office. Finally, I am heartily thankful to Firehiwot Getachew and my family and friends for their encouragement.
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Magnitude and Factors Affecting Institutional Delivery in Primary Health Care Units, Arsi Zone, Oromia Regional State, Ethiopia

Dedefo Teno

Abstract

Introduction: Intra-partum care is most accurately defined as the medical management and delivery of care to women in labor. Although intra-partum care is essential for improvement of maternal and newborn health, little is known about the level of use and factors affecting the use of the care in primary health care units.

Objectives: To assess the magnitude and factors affecting intrapartum care in a primary health care unit among women who gave birth in the last 12 months prior to the survey in Digalu Tijo woreda located in the Arsi zone of the Oromia Regional State in Ethiopia.

Methods: A community-based, cross-sectional survey was conducted in February, 2011. A structured questionnaire was used to collect data from women who had given birth in the last 12 months in primary health care units. Data collection was
conducted in selected kebeles of the Digalu Tijo woreda in the Oromia Regional State of Ethiopia.

Results: The proportion of women who received intra-partum services for their recent birth was 18.3%. A total of 13.4% of the mothers received post-natal service within 48 hours if living in an urban residence; used ANC follow-up, and had previous obstetric problems. These mothers also had access to information about the benefits of health facility intra-partum services and some knowledge on benefits of health facility intra-partum services. The positive perception of the mothers towards the care service providers and the involvement of partners in deciding where to deliver were identified as predictors for use of facility intra-partum services.

Conclusions and Recommendations: This study highlighted the significant factors that prompted mothers to use facility intra-partum services in a primary health care unit in a woreda located in the Oromia Regional State. Understanding these factors can perhaps assist in the improved planning and provision of better facility intra-partum services in the primary health care units in Ethiopia. Four recommendations are offered from this study. They include community-based awareness creation activities on use of maternal health services, capacity building of service providers on
maternal health service, use of ANC service as one of the contact points to counsel mothers on the use of maternal health services in the health facility, and encouraging male involvement in the decision-making about the use of maternal health services and labor and delivery in a health facility by trained health personnel.

**Introduction**

Globally, over 585,000 women die annually because of complications of pregnancy and childbirth. More than 70% of all maternal deaths are due to five major complications which include hemorrhage, infection, unsafe abortion, hypertensive disorders of pregnancy, and obstructed labor. An estimated 42% of these maternal deaths are intra-partum related as defined as during the birthing process and first day after birth.

A report of the World Health Organization (WHO) indicated that the maternal mortality ratio was 470 per 100,000 live births in Ethiopia because of complications of pregnancy and childbirth in 2008. The Ethiopia Demographic Survey of 2005 also revealed that less than 6% of births took place in health facilities and only 5 percent received postnatal care within the critical two days following the delivery.
Different studies conducted in Ethiopia and in other third world developing countries identify determinants that limit the use of maternity health services. Not unexpectedly, the woman’s low educational level, the lack of empowerment among women, poor access to maternal health care services in the area, and a lack of knowledge about maternal health care services were identified.

This study was conducted to determine the level of use and factors influencing use of facility intra-partum services in a primary health care unit with women who gave birth within the last 12 month in the Digalu-Tijo woreda of Arsi zone.

**Methods**

A community-based, cross sectional study was conducted in Digalu Tijo woreda in February, 2011 among women who gave birth within the last 12 month. Digalu Tijo woreda is located in the southeast of Arsi zone and twenty kilometers from the capital city of Asela. The woreda includes twenty-three rural kebeles and four small urban towns. The total population of the woreda as projected from 1997 census report was 157,739 with 5,520 estimated pregnancies with a 3.8% conversion factor for 2009. Eight hundred forty-four (844) mothers who gave birth within the last 12 month
were included in the study from six selected rural kebeles and two urban kebeles. The multistage sampling technique was used. The probability proportion to size (PPS) sampling technique was also used to determine the sample size of each kebeles.

A structured and pretested questionnaire was used to collect information from mothers. Ethical clearance was obtained from the relevant committees; verbal consent was taken from study participants. During data collection, supervision was conducted by the observation of questionnaire administration and their completeness before the end of each visit to a study participant. Data were entered in to EPI-Info Version 3.5.1 and transported to SPSS Version 15 for further processing and computation. Frequencies, percentages and summary statistics were computed to describe the study population in relation to relevant variables. Multivariate logistic regression analysis was employed to control for possible confounding effects and to assess the separate effects of each variable.

**Results**

*Socio-demographic Characteristics:* A total of 844 mothers who had delivered within the last one year prior to data collection were recruited. All persons participated for a response rate of 10%. The
mean age of mothers was 28.9 (± 6) years. Seven hundred thirty-four (87%) of the respondents resided in a rural kebeles. Two hundred ninety seven (35.5%) of respondents had no formal education. A total of 40.4%, 14.3%, and 10.1% had elementary, secondary, and tertiary level educations. Only 3.3% were engaged in paying jobs while 88% of them were housewives.

Table 1. Socio-demographic Characteristics of the Respondents, Digalu Tijo Woreda, Arsi Zone, Oromia Regional State, 2011

<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequencies (n=844)</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age in Years</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15-24</td>
<td>225</td>
<td>26.7</td>
</tr>
<tr>
<td>25-34</td>
<td>440</td>
<td>52.1</td>
</tr>
<tr>
<td>35-44</td>
<td>179</td>
<td>21.2</td>
</tr>
<tr>
<td><strong>Educational Status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No formal education</td>
<td>297</td>
<td>35.2</td>
</tr>
<tr>
<td>Grades 1-6</td>
<td>341</td>
<td>40.4</td>
</tr>
<tr>
<td>Grades 7-10</td>
<td>121</td>
<td>14.3</td>
</tr>
<tr>
<td>Grades 10 plus</td>
<td>85</td>
<td>10.1</td>
</tr>
<tr>
<td><strong>Religion</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Muslim</td>
<td>425</td>
<td>50.4</td>
</tr>
<tr>
<td>Orthodox Christian</td>
<td>368</td>
<td>43.6</td>
</tr>
<tr>
<td>Catholic / Protestant</td>
<td>51</td>
<td>6.0</td>
</tr>
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</table>
**Ethnicity**

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oromo</td>
<td>802</td>
<td>95.0</td>
</tr>
<tr>
<td>Amharic</td>
<td>41</td>
<td>4.9</td>
</tr>
<tr>
<td>Tigrian/Gurage</td>
<td>1</td>
<td>0.1</td>
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**Marital Status**

<table>
<thead>
<tr>
<th>Marital Status</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single</td>
<td>12</td>
<td>1.4</td>
</tr>
<tr>
<td>Married</td>
<td>816</td>
<td>96.7</td>
</tr>
<tr>
<td>Divorced/widowed</td>
<td>16</td>
<td>1.9</td>
</tr>
</tbody>
</table>

**Occupation of Respondent**

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housewife</td>
<td>743</td>
<td>88.0</td>
</tr>
<tr>
<td>Government or Private Employee</td>
<td>28</td>
<td>3.3</td>
</tr>
<tr>
<td>Farmer or Daily Laborer</td>
<td>73</td>
<td>8.6</td>
</tr>
</tbody>
</table>

**Place of Residence**

<table>
<thead>
<tr>
<th>Residence</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>734</td>
<td>87.0</td>
</tr>
<tr>
<td>Rural</td>
<td>110</td>
<td>13.0</td>
</tr>
</tbody>
</table>

**Total Family Size**

<table>
<thead>
<tr>
<th>Total Family Size</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 3</td>
<td>365</td>
<td>43.2</td>
</tr>
<tr>
<td>4-6</td>
<td>347</td>
<td>41.1</td>
</tr>
<tr>
<td>7 or more</td>
<td>132</td>
<td>15.6</td>
</tr>
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</table>

**Household Income/ Monthly ETB (n=348)**

<table>
<thead>
<tr>
<th>Income Level</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 300</td>
<td>226</td>
<td>64.9</td>
</tr>
<tr>
<td>300-510</td>
<td>81</td>
<td>23.3</td>
</tr>
<tr>
<td>&gt; 510</td>
<td>41</td>
<td>11.8</td>
</tr>
</tbody>
</table>

**Obstetric History and Characteristics:** The mean age of mothers during their last pregnancy was 28 (+6) years with a range of 16 to 41 years. Regarding their pregnancy profile, 112 (13.3%) of the
respondents had been pregnant once and 312 (38.0%) had been pregnant equal to or greater than five times in their lives. 608 (80.6%) of the respondents received ANC on one or more occasions.

Table 2. Obstetric Characteristics of Respondents in Digalu Tijo Woreda, Arsi Zone, Oromia Regional State, March, 2011

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mother’s Age at Last Delivery</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(n=844)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15-24</td>
<td>256</td>
<td>30.3</td>
</tr>
<tr>
<td>25-34</td>
<td>430</td>
<td>50.9</td>
</tr>
<tr>
<td>35-44</td>
<td>158</td>
<td>18.7</td>
</tr>
<tr>
<td><strong>Total Number of Pregnancies</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(n=844)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One</td>
<td>112</td>
<td>13.3</td>
</tr>
<tr>
<td>2-4</td>
<td>411</td>
<td>48.7</td>
</tr>
<tr>
<td>&gt;=5</td>
<td>321</td>
<td>38.0</td>
</tr>
<tr>
<td><strong>Last Pregnancy Was Planned</strong></td>
<td></td>
<td></td>
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<tr>
<td>(n=844)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>549</td>
<td>65.0</td>
</tr>
<tr>
<td>No</td>
<td>295</td>
<td>35.0</td>
</tr>
<tr>
<td><strong>Primary Caregiver for All Children</strong> (n=844)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>815</td>
<td>96.6</td>
</tr>
<tr>
<td>No</td>
<td>29</td>
<td>3.4</td>
</tr>
<tr>
<td>ANC Follow-up (n=844)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td>Yes</td>
<td>680</td>
<td>80.6</td>
</tr>
<tr>
<td>No</td>
<td>164</td>
<td>19.4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Number of ANC Visits (N=691)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1-4</td>
<td>649</td>
<td>93.9</td>
</tr>
<tr>
<td>&gt; 4</td>
<td>42</td>
<td>6.1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Place of Delivery (N=782)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Home</td>
<td>639</td>
<td>81.7</td>
</tr>
<tr>
<td>Health Post</td>
<td>11</td>
<td>1.4</td>
</tr>
<tr>
<td>Health Center</td>
<td>132</td>
<td>16.9</td>
</tr>
</tbody>
</table>

Mothers’ Obstetric Knowledge: A total of 588 (69.7%) mothers knew at least one pregnancy-related health risk. A total of 560 (66.4%) of the respondents knew one or more benefits of health facility intra-partum services use. Six hundred eighty-eight (81.5%) of the respondents had heard about the importance of health facility intra-partum services from various sources.

A total of 88.7% of the respondents agreed with the benefits of skilled birth attendant support during intra-partum period to herself and newborn and 311 (36.8%) respondents also agreed that the nearby health facility was staffed with adequate service providers.

Health Service Use: The study revealed that 31.7% of the expectant mothers had some type of intra-partum service. Of these, health personnel assisted delivery was at 18.3% and postnatal care
delivery within 48 hours was at 13.4%. Of these, 1.3% and 3% of the health personnel-assisted deliveries and postnatal care service delivery within 48 hours was conducted by HEWs in the health posts. The study also showed a variation of service use between women in the urban areas and rural areas with 74.2% for urban and 33.4% for rural residents.

Determinants for Intra-partum Service Use at Primary Health Care Units: Mothers who lived in the rural area were 11.4% less likely to utilize intra-partum services in the PHCU facility than those mothers who lived in the urban area AOR=0.114 (0.046-0.287). This study finding is similar to another study done in the Arsi zone which revealed that 4.3% of rural and 40.4% of urban women had health professional assistance during delivery in the health facility. A study done elsewhere in Ethiopia found that 31% and 10% of the women received provider assistance during delivery and postnatal care in urban areas and rural areas, respectively. These findings indicate that rural women are at a distinct disadvantage in the use of facility intra-partum services. The explanation for this might be that rural women have multiple responsibilities and are more likely to be married, live in extended family households, and have at least one child at a younger age. Moreover, the very limited opportunity for education and employment in rural areas cause women to have
a low income, which in turn, affects the decision role of women who may seek better medical services at a cost.

Another significant result of the current study was use of ANC appeared as a significant predictor for facility intra-partum service use AOR=1.958, 95% CI (1.119, 3.426). Mothers who attended antenatal follow-up for their recent pregnancies had a two times greater chance of using intra-partum services in a primary health care unit in the study area. This finding is consistent with earlier studies done elsewhere which showed women who had ANC follow-up were nearly five times more likely to receive provider assisted maternal health services than women who did not attend ANC follow-up. The explanation might be that women who had antenatal care follow-up were counseled on the possible pregnancy-related complications and advantages of using facility intra-partum services.

The other factor found to be significant was the past experience of intra-partum problems. Mothers who had encountered any intra-partum period complications were found to be five times more likely to use facility intra-partum service when compared with mother who did not report such complications, AOR= 5.650, 95% CI=(3.734-8.551) This finding is consistent with other studies conducted on maternal health services use which showed that
mothers who had developed life threatening obstetric complications were five times more likely to use facility delivery services than mothers who did not. The possible explanation could be that mothers who actually had a history of complications during the intra-partum period had a practical experience about the life threatening conditions than those who did not. This experience could have motivated them to utilize intra-partum services at a health facility.

The present study found that mothers who had knowledge about benefits of health facility intra-partum services were found to utilize the services 1.7 times more often when compared with those who could not mention any benefit of the services, AOR=1.699, 95% CI=(1.039, 2.779). This finding consistent with other findings which stated that mothers who knew danger signs in pregnancy were more likely to deliver in a health facility when compared to those without such knowledge (p<0.05). This could be to knowledge about risks of childbirth and the benefit of health personnel care.

Women who were equal decision makers with their partners were more likely to use facility intra-partum services when compared with women who decided alone (AOR=1.845, 95% CI (1.054-3.229). A study conducted in Yirgalem and Jimma showed
that the husband’s approval on the use of maternal health services had a great effect on prenatal services use.

**Conclusions**

Women who received some facility intra-partum services for their recent birth in the primary health care unit of Digalu Tijo woreda was 31.7%. Of these women, 18.3% received health personnel assisted delivery for their recent childbirth and 13.4% of the mothers received postnatal services within 48 hours both in the health centers and the health posts. About 1.3% and 3% of the health personnel assisted delivery and postnatal care services within 48 hours, respectively were provided by HEWs in the health posts. The study identified the significant factors, which prompted mothers to use facility intra-partum services in a primary health care unit in the study area. The understanding of these factors is important to improved planning and the better provision of facility intra-partum services in the primary health care units.
Recommendations

Based on the findings, the following points are recommended:

1. Community mobilization and awareness creation activities on the use of facility intra-partum service in the rural area.
2. Use of ANC as a point of contact to counsel mothers on the use of subsequent intra-partum services in the primary health care unit facilities.
3. Maternal health services provision of primary health care units should be well equipped and staffed with skilled service providers.
4. Promotion of joint partner involvement in decision making regarding the use of intra-partum services in the primary health care unit.
References

Exclusive Breast Feeding in Arbaminch, SNNPR, Ethiopia

Mathewos Echamo

Abstract

Background: Exclusive breast feeding (EBF) is critical for infants between the ages of birth and twelve months. This is a period where physical and mental development is paramount. Despite the practical benefits and ease of EBF, the majority of women do not practice EBF; the prevalence is low in the United Nations designated least developed countries of the world including Ethiopia. Multiple problems arise from the absence of EBF in such countries.

Objective: To assess the prevalence of exclusive breast feeding practices during the first six months of life of babies and to describe factors associated with exclusive breast feeding.

Methods: A facility-based, cross-sectional study design using a quantitative method was used. The study was conducted in the town of Arbaminch from September, 2010 to May, 2011 using a standardized questionnaire among mothers whose children were
aged were six to twelve months and came for health services during the study period in three health institutions located in the town. A systematic sampling method was performed and a total of 768 mothers of infants were included in the study to collect information about the prevalence and some important factors associated with EBF concerning both mothers and children.

Results: The rates of EBF and non-EBF were 46.5% and 53.5%, respectively. Those who had no formal education and low grade completion were more likely to practice EBF (AOR= .431 (.230, .807)) and (AOR= 309(.165, .580)) p<0.001 than mothers who attended formal education. Respondents who did not have information about EBF were 0.6 times more likely not to exclusively breast feed than those who had information (A=0.66(0.44, 0.91)) PV<0.01. Mothers who delivered at home were 0.6 times less likely to exclusively breast feed their children than those who delivered at a health facility (A=0.64(0.45, 0.92) PV<0.01. Mothers who started breastfeeding their children after six hours were two times more likely not to exclusively breast feed than those who began breast feeding within one hour of birth. (AOR=2.4(1.71, 3.41) PV<0.001.

Conclusions: Health personnel were the major source of information about EBF. The EBF rate in the study area was low
despite a high level of information among mothers. Working mothers were found to practice EBF less when compared to those who stayed at home.

**Introduction**

World Health Organization (WHO) and United Nations Children’s Fund (UNICEF) recommend that all mothers breastfeed their children exclusively for the first six months and thereafter, they should continue to breastfeed for as long as the mother and child wish. Appropriate and sufficient weaning foods should be added to the infant’s diet after six months of life. (1) Globally, only 38% of all infants are exclusively breastfed during the first four months of life and complimentary feeding practices are often ill timed, inappropriate, and unsafe. (2)

Each year, under nutrition is implicated in 40% of the eleven million deaths of children under five in developing countries. The lack of both immediate and exclusive breastfeeding in infancy causes an additional 1.5 million of these deaths. (3) Deaths in the neonatal period, which is the first 28 days of life, account for 41% of all deaths in children younger than 5 years. (4) Infants who have been optimally breastfed have reduced risks for common childhood
illnesses such as gastrointestinal and respiratory infections, otitis media, atopic eczema, and allergies during childhood. (5) In Ethiopia, 69% of the mothers with children under five reported breastfeeding within one hour. (6, 9) According to the International Baby Food Action Network (IBFAN) Africa Regional Report, EBF at three to four months in the region was conducted in Botswana 29.7%, Eritrea 64%, Ghana 36%, Lesotho 54%, Kenya 17% and Malawi 11%. (6) In Ethiopia, diarrhea is a major contributor to morbidity and mortality in young infants and children, especially in urban areas due to inappropriate breastfeeding patterns. (7) The early introduction of liquids and semi-solid foods is of concern because of the potential for these foods to displace breast milk and lower the overall quality of the infant’s diet. (8) The prevalence of practicing exclusive breast feeding in the 2005 EDHS in Ethiopia was 49%. (9) In Jimma, the prevalence of exclusive breast feeding was 25% and in Sidamo, very few children were exclusively breast fed. (9) Nationally, the feeding of colostrum was reported at 45% of the mothers in SNNPR at 39%, Tigray at 56%, and 50% in the Amhara region. (10)

Women who experienced increased exposure to health care providers, preventive health measures, and health education during the antenatal period are more likely to make positive health-related
decisions or modify adverse health behaviors during this time. (11) The present study sought to show the prevalence of the EBF practice and measure the association of demographic and service-related factors. The information obtained from this study can be considered by health care programmers, policy makers, and MCH NGOs with information for future planning and interventions to improve EBF throughout Ethiopia.

Methods

Study Design and Study Area: The study design was a facility-based, cross-sectional quantitative approach conducted with mothers whose children were aged six to twelve months and visited the health facility at the time of data collection. The study was conducted at Arbaminch town public health centers and hospital from September 2010 to June 2011. There are 27 public and private health institutions in the town and 19 are private clinics and eight are government health institutions. However, for the data collection Arbaminch Hospital, Secha and Sikela health centers were used based on the services they gave for the people.

Source and Study Population: The study was conducted at the pediatric clinics of the Arbaminch Hospital, Sikela Health Center,
and Secha Health Center. The population included mothers of infants within the age of six to twelve months at the time of the study in Arbaminch. These mothers included both nursing and non-nursing mothers who visited the selected institutions.

Sample Size and Sampling Procedures:
The sample size for Objective 1. The sample size was determined using the formula for single population proportion with the following assumption \( p = \) the proportion of mothers practicing EBF and 6-12 months continuing until two years which is 50%. \( D \) was the margin of error 5%, \( za/2 \) was the critical value at 95% confidence level of certainty 1.96, \( n = (z, a/2)2x (p/1-p)/d2 \). To increase sample size, \( i \) was multiplied by two. \( N = (Za/2)2 x P (1-P) \). The total calculated sample size was 384 but was multiplied by two for 768.

Cross-Sectional Study for Internal Comparison of Sample Size for Objective 2.
Exposed: Mothers who did not or were not able to exclusively breast feed their children for six months.
Unexposed: Mothers who were able to EBF their children for at least six months. Two population proportion formulas were used to determine the sample of exposed and unexposed. Ratio of
unexposed to exposed was 2:1. In this study, the prevalence of EBF according to DHS-2005 was 49% and was used to calculate the sample size with an estimated exposure among cases with 95% confidence interval. Epi-Info was used for the calculation of the second specific objective. Controls=220. Cases=110. The final sample size for internal comparison was computed at 330 mothers.

*Instrument Used:* All mothers who came for health services and fulfilled the inclusion criteria were interviewed with a structured questionnaire consecutively until the required sample size was obtained. The sampling frame was taken from health institutions.

*Data Collection:* The questionnaire was developed through previous research identified in literature review. The questionnaire was prepared in English then translated into Amharic and back to English to check for language consistency. Data collectors were diploma-level nurses employed as health extension workers in Arbaminch. All data collectors had previous experience in data collection. One supervisor was selected from the B.Sc. nurses of three health facilities based on her experience with research. Data collectors and supervisors received two days of training. Five percent of the total sample size was used for pre-testing. Clarity, completeness, and consistency were considered. Those questions that were difficult to answer were rephrased and corrected. Quality
was assured by double-data entry and training of the data collectors and the supervisor.

Measurements: The dependent variable was EBF while the independent variables included:

1. Socio-demographic characteristics of age, gender, education level, religion, marital status, occupation, and monthly income.
2. Maternal and child health related variables of ANC visits, breast feeding initiation, infant receiving vaccination, the birth interval, parity, previous experience with exclusive breast feeding, place of infant’s birth, time at breast feeding initiation, information heard about exclusive breast feeding, and the reasons for terminating breast feeding of infant.

Data Analysis and Ethical Considerations: A template was prepared by using the Epi-Info. Data were coded, data entered, cleaned and transferred to SPSS Version 16 for more detailed analysis. Cross tabulations were conducted to calculate percentages and frequency distributions using tables and figures to show the prevalence of EBF practices. Logistic regression of bivariate analysis was calculated to identify the association of dependent and
different independent variables. Multivariate analysis was carried out to control cofounders of the variables.

**Ethical Considerations:** the Institutional Research Ethics Review Committee of the Haramaya University granted ethical approval. A formal supporting letter was submitted to the Gamo Goffa Zone Department of Health. Respondents were given information providing a clear explanation of the purpose of the study prior to recording their informed consent. The study subjects were made aware of their right to withdraw from the study at any stage without giving a reason. Their participation was voluntary and confidential. All private information would be protected. Written signed informed consent was obtained from each participant. The information collected remained confidential.

**Results**

**EBF and Multivariate Analysis:** Respondents who delivered at home were 0.6 times less likely to exclusively breastfeed their children than those who delivered at a health facility with the assistance of health personnel (A=0.64(0.45, 0.92)) PV<0.01. Mothers who did not attend ANC were 0.5 times less likely to exclusively breastfeed than those who attended ANC.
Respondents who did not have information about exclusive breast feeding were 0.6 times more likely not to exclusively breastfeed than those who had information. These were significantly associated (AOR=0.66(0.44, 0.91)) PV<0.01.

Mothers who started breastfeeding their infants later and up to six hours after delivery were two times more likely not to exclusively breast feed than who began breast feeding within one hour (AOR=2.4(1.71, 3.41) PV<0.001. Mothers who did not give colostrum to their infants were 0.3 times less likely to exclusive breast feed than those who gave it. These were significantly associated (AOR=0.37(0.23, 0.60) PV<0.001).
Table 4. Multivariate Analysis to Control Confounders and to Show Factors Associated with Exclusive Breast Feeding, Arbaminch, 2011

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>EBF</th>
<th>Non-EBF</th>
<th>COR 95% CI</th>
<th>Adjust OR 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Place of Birth</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>At home</td>
<td>130(16.9%)</td>
<td>230(29.9%)</td>
<td>**0.45(0.33,0.60)</td>
<td>**0.64(0.45,0.92)</td>
</tr>
<tr>
<td>At health institution</td>
<td>227(29.6%)</td>
<td>181(23.6%)</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>ANC</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>332(43.2%)</td>
<td>360(46.9%)</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>No</td>
<td>25(3.3%)</td>
<td>51(6.6%)</td>
<td>**0.53(0.32,0.87)</td>
<td>**0.50(0.26,0.98)</td>
</tr>
<tr>
<td>Information on EBF</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>300(40.8%)</td>
<td>309(40.2%)</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>No</td>
<td>57(7.4%)</td>
<td>102(13.3%)</td>
<td>***0.57(0.40,0.82)</td>
<td>**0.66(0.44,0.91)</td>
</tr>
<tr>
<td>Initiation of Breast Feeding</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Immediately/with in hour</td>
<td>162(21.1%)</td>
<td>253(32.9%)</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Before six hours</td>
<td>171(22.3%)</td>
<td>116(15.1%)</td>
<td>***2.30(1.69,3.13)</td>
<td>***2.42(1.71,3.41)</td>
</tr>
<tr>
<td>After 24 hours</td>
<td>24(3.1%)</td>
<td>421(5.5%)</td>
<td>0.89(0.52,1.53)</td>
<td>1.51(0.82,2.77)</td>
</tr>
<tr>
<td>Infant got colostrum</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>325(42%)</td>
<td>310(40%)</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>No</td>
<td>32(4.2%)</td>
<td>1015(13.2%)</td>
<td>***0.30(0.19,0.46)</td>
<td>***0.37(0.23,0.60)</td>
</tr>
</tbody>
</table>

*p <0.05            **P <0.01              ***P<0.001

Discussion

Globally, only 38% of all infants are exclusively breast fed. This is lower than the current study results in Arbaminch. (2) This study revealed that the prevalence rate was 46.5%. This is higher...
compared to the study conducted in Botswana, Ghana, Kenya, and Malawi where about 29.7%, 36%, 17%, and 11%, respectively was identified. (6) Mothers who did not attend formal schooling and elementary school (grades 1-4) practiced exclusive breast feeding 0.7 times more than those who attended school (AOR=0.43(0.23, 0.80)) and (AOR=0.30(0.16, 0.58)), respectively, and PV<0.001. (11)

The current study in Arbaminch showed that respondents who attended ANC were 0.5 times more likely to practice EBF than those not attending ANC. This was a positive association AOR=0.50(0.26, 0.98). (12) The initiation of breast feeding within an hour in the study area was 54%. This is lower than a study conducted at the national level of Ethiopia with 69%. (9)

In this study, the provision of colostrum by the mothers was 82%. This finding is higher than found in the studies of Tigray and Amhara at 56% and 50%, respectively. (10) Those mothers who gave birth at home were less likely to exclusively breast feed (AOR=0.45(0.33, 0.60)) than those respondents who delivered in a health institution. The recent prevalence rate was lower than the previously observed figure of EDHS-2005 with 49 %. (9) In Jimma, the prevalence of EBF was 25% and in Sidamo, it was found that very few children were exclusively breast fed. (9)
Conclusions

The response rate in this study was 100%. The intended rate to exclusive breast feed in this study area was 46.5%. The EBF rate in the study area was low despite a high level of information distributed among mothers. Working mothers were found to practice exclusive breastfeeding less when compared to those who stayed at home. The prevalence of exclusive breastfeeding was much lower when compared to the EDHS-2005 study results.

Recommendations

1. It is recommended that the Ethiopian Federal Government provide all employed mothers with maternity leave for up to four months. This maternity leave will allow working mothers to be with their babies and exclusively breast feed them for at least four months.

2. It is recommended that all health personnel take on more responsibility in promoting exclusive breast feeding in their service area along with their focus on curative practices.
3. Use modern communication technology including social networks, forums, and mass media to health educate expectant mother on the topic of EBF in towns, regions, and the nation.

4. Develop leaflets and pamphlets in the appropriate local languages on EBF to be shared with mothers in the ANC and with EPI services.

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Visible Goiter in Six to Twelve Year Old School Children in the Mountainous Area of Wolayta Zone, SNNPR, Ethiopia

Mengistu Dubale

Abstract

Background: Goiter is a worldwide problem. It is an iodine deficiency disorder and is a severe health problem in some of the lesser developed countries in the world including Ethiopia. In these developing countries, many school age children are at risk of goiter because of their vulnerability to disease.

Objective: This study sought to investigate the prevalence of goiter and any associated factors in school age children in the mountainous areas of the Wolayta zone in February, 2011.

Methods: A cross-sectional survey was used to conduct this study in four primary schools in the Wolayta zone. After obtaining written consent from the school directors, the children were interviewed and physically examined by trained health workers. Data analysis was conducted with SPSS Version 19. Data were
checked for normality and descriptive statistics were generated. Binary logistic regression tests were performed to analyze the degree of association between the dependent and the independent variables.

**Results:** A total of 720 children were interviewed and examined. Of these 720 children, 337 (46.8%) of the students had goiter. Of these 337 (46.8%), 35.4% presented with palpable, and 11.4% had visible goiters. Gender, age, education, residence, nutrition, and knowledge levels of the school children were used to measure their degrees of contribution to the prevalence of visible goiter. Age, knowledge, and education were found to have significant associations with the prevalence of visible goiter (p<0.05) while the rest had insignificant associations. The study revealed that the goiter rate was serious in the area.

**Conclusions and Recommendations:** This study suggested that age, knowledge, and dietary status may be the more responsible factors for visible goiter in the study area. The role of other factors should also be considered. Salt iodization programs and health education of the community to increase awareness about iodized salt are recommended. Further clinical and community-based studies to
assess the reasons for the high prevalence of visible goiter in different geographical areas are recommended.

**Introduction**

Goiter is a condition in which iodine is insufficient or is not utilized properly. A simple goiter (enlargement of the thyroid gland) is the most common form of iodine deficiency illness and is found especially in mountainous regions and areas that are far from bodies of salt water. Globally, the total goiter rate (TGR) in the general population is estimated to be 15.8% and varies between 4.7% in the Americas to 28.3% in Africa. Iodine deficiency is a severe public health problem in Ethiopia. In high goiter endemic regions, the prevalence of goiter in children has been found greater than 30%. Communities living in iodine-deficient environments face major barriers to their human and social development. The elimination of iodine deficiency can play a role in the development of a country and to improved public health.

Goiter is known to be associated with iodine deficiency and goiterogenic agents. In addition to this, living in mountainous areas is another contributing factor because of the shortage of iodine in these areas. Goiter is associated with impaired cognitive
development, poor school performance, stunting, and low productivity. School age children are vulnerable to a lack of thyroid hormones, which is often the result of insufficient iodine intake. This is debilitating for children, as this is a period of rapid growth and development of the body and mind. (8) Thus, revealing visible goiter early among school aged children can help to correct thyroid gland dysfunctions in a timely manner and prevent future health complications.

Many health institutions attempt to treat the situation through Lugol’s solution. These institutions sometimes teach about the illness to those who attend health facilities after developing the problem. However, these efforts are not based on community mobilization into possible determinants of the preventing practice. Therefore, this study attempted to provide information on the magnitude of goiter, the factors contributing to iodine deficiency disease, and its effects on school performance.

**Methods**

*Study Design: A school-based, cross-sectional study was conducted with randomly selected primary schools from the mountainous*
woredas in the Wolyata zone in January, 2011.

Study Area: This study was conducted in the Wolyata zone, which is the centre of SNNPR. The zone has twelve woredas and three administrative towns. The livelihood of the people is based on agriculture and livestock. The health service coverage of the zone is 80%. There are four major mountainous woredas in the zone including Sodo Zuria, Boloso Bombe, Bitana, and Kindo Didaye. The total number of students enrolled in grades one through six in the zone was 342,795 at the time of the study.

Study Population: In this cross-sectional study, a sample of 748 primary school children aged 6-12 years was computed. Schools were selected from the four woredas.

Sampling Procedures: The woredas of Sodo Zuria, Boloso Bombe, Bitana, and Kindo Didaye are in mountainous areas of the zone. These woredas were selected because these areas were well known to be more prone to iodine depletion. In each of the selected mountainous woredas, all of the primary schools were selected and framed for sampling. One school was taken randomly from the sampling frames. In the selected school, all the classes were stratified by grades one through six and clustered by sections. One cluster was selected from each grade with a total of six clusters
from one school so that twenty-four clusters were randomly selected from the four schools.

**Data Quality Control:** One day of training for two supervising health officers and eight data collecting nurses and health officers was provided. A questionnaire was developed and used for data collection. The questionnaire was pretested. Eight trained data collectors were involved in the data collection process and conducted interviews and physical examinations under close supervision of supervisors. The data were collected and the questionnaires were completed by trained health workers in January, 2011. To control for any systematic error, the data collectors were selected from outpatient department workers who had experience with health screening of children. The principal investigator supervised data collection. Data cleaning was conducted manually. The principal investigator monitored the overall data collection process.

Before any assessment of the school children, a copy of the consent letter which included detailed information on the procedures and benefits of the study, was read to the guardians, school directors, teachers, community leaders, and the school children. Questionnaire questions included information regarding
demographic details such as gender, age, nutritional status, residence, knowledge, attitudes and practices of iodine importance and effects resulting from its deficiency.

The sample of children in each school was examined and 96% of the required data was collected through observation of grade II goiter and palpation of grade I goiter according to criteria certified by the World Health Organization and the International Council for the Control of Iodine Deficiency Disorders by the World Health Organization published in 1994 and El-Mougi published in 2004.

Data Analysis: After data collection was completed, data entry and cleaning were conducted using Epi-Info Version 3.5.3. Data were analyzed using SPSS Version 19. Appropriate descriptive analysis was calculated for quantitative variables. Binary logistic regression was computed to identify the factors associated with prevalence at \( p < 0.05 \). To provide odds ratio (OR) and a 95% confidence interval (CI), bivariate associations were calculated between the dependent and independent variables, and two factors such as age, and nutritional habit were adjusted for other variables and significantly associated (\( p < 0.05 \)) with visible goiter.

Ethical Considerations: An ethics committee at Addis Continental Institute granted ethical approval. An informed consent was
prepared. All of the study participants were informed of the study purposes and the informed consent obtained. All of the children’s information was kept confidential by using a coding system. No risks were anticipated or occurred with the study subjects during the study. The children actually benefited from education about iodine deficiency prevention.

**Results**

Of 720 children interviewed and examined, 336 (46.7%) were males. The mean age of the study group was 8.5 years. A total of 75% of the children under study lived in the mountainous areas. From the total of 720 students, 41.1% consumed casaba at least once each week and 58.9% never or rarely consumed casaba.

Some goiteriogenic foods like casaba, sweat potatoes, and maize were the common foods especially in Kindo Didaye. Casaba was not commonly consumed in the rest of the areas studied. Participants from Kindo Didaye indicated that they consumed casaba during the drought and when other food was not available. Sweet potatoes and maize were common in all study areas. Forty-one percent of total study participants consumed casaba at least
once per week. They were aware that there was fish in the Omo River around Kindo Didaye, but very few consumed the fish because of a lack of knowledge about iodine deficiency disease. Only 20% of these participants used iodated salt. The children mentioned that they gained knowledge about goiter from their parents. If the children were suspected of having goiter, their parents took them to a medical facility.

Overall, the prevalence of palpable and visible goiter was 337 (46.8%) of the 720 children studied. Of the 337 (46.8%) cases, 255 (35.4%) had a G1 goiter and 82 (11.4%) had a G2 goiter. The prevalence of visible (grade 2) goiter among female and male students was 6.52 and 4.86, respectively (p>0.05).

Discussion

Overall, goiter prevalence as confirmed by palpation and observation was identified in 46.8% of the children in the mountainous area of the zone. This indicates that the mountainous areas of the Wolayta zone are severely affected by iodine deficiency. This prevalence level is alarming. Grade II (11.4%) was found to be almost twice the amount as reported in a previous
report from Sekota (5.8%) published in 1996. Grade I and Grade II (46.8%) was about eight times greater than the previous older report. This could be due to the variations in the populations studied and the geography.

The goiter rate in the current study is higher than that of previously reported surveys by WHO, UNICEF, and ICCIDD in 2001. This is a serious concern as dietary-associated severe iodine deficiency limits a person’s intellectual capacity, occupational choices, personal economic development, future earnings, and contributions to the development of Ethiopia.

**Conclusions**

While similar studies have been published on this public health concern in Ethiopia, this study confirms the problem of goiter prevalence among school children in mountainous areas of Ethiopia. A high prevalence of goiter was identified in the Wolayta Zone in Ethiopia.
Recommendations

Several recommendations are offered. The most prominent of the recommendation is school and community health education. Health education of the school children in the classrooms by teachers and education of the parents in the surrounding communities by health workers about the importance of iodized salt use in the diet is required. Suggesting the alteration of family dietary habits to include fish is also recommended. Avoidance of harmful traditional practices regarding goiter is needed. Finally, all health care workers can suggest iodized salt use and dietary change when they meet with their patients regardless of the reason for patient visit.

Acknowledgements

I express my heartfelt gratitude to my thesis advisor, Professor Yemane Berhane, for his help in reviewing this document and providing important comments and constructive suggestions. My gratitude goes to my Addis Continental Institute instructors for their sincere interest in teaching. I am also thankful to the Wolayta Zone Health Department, the education department staff members,
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References


Intestinal Parasitic Infection in Pregnant Women Attending Antenatal Care at Gandhi Memorial Hospital, Addis Ababa, Ethiopia

Woldeselassie Gebre

Abstract

Background: Intestinal parasitic infections are endemic worldwide and have been described as constituting one of the greatest single worldwide causes of illness and disease. Tropical diseases such as malaria, schistosomiasis, intestinal helminthes, and filariasis have serious impacts on reproductive health. Many cases of unexplained pregnancy loss are due to undiagnosed tropical diseases such as these. Malnutrition or anemia caused by intestinal parasites makes pregnancy more difficult.

Objectives: The purpose of this study was to determine the prevalence of intestinal parasitosis among pregnant women attending ANC at Gandhi Memorial Hospital (GMH) in Addis Ababa, Ethiopia.

Methods: A cross-sectional descriptive parasitological study was conducted in GMH. Stool samples were taken from 314 pregnant women who consecutively came to GMH for regular ANC follow-
up between February, 2011 and March, 2011. Stool samples were examined for intestinal parasites using both direct wet mount and formal-ether concentration techniques. The socio-demographic and determinant factors were collected by using a structured questionnaire and the data were entered into EPI-Info Version 3.5.1. Data were analyzed using SPSS Version 15.

Results: Among the 314 subjects who provided a stool sample, 79 (25.2%) were infected with at least one kind of intestinal parasite. *Entamoeba histolytica*, *Taenia* species, and *Ascaris lumbricoides* had the higher prevalences with 39 (12.4%), 11 (3.5%), and 10 (3.2%) respectively. *Giardia lamblia* contributed seven (2.2%), *Trichuris trichuria* 5 (1.6%), *Hookworm* 4 (1.3%), *Hymenolopus species* and *Larva of strongyloid* had equal magnitude of three (1.0%). *Enterobius vermicularis* was the least prevalent with one (0.3%). Out of the total positives, 4 (5%) of them had a double parasitic infection. The bivariate regression analysis showed that there was a statistically significant difference between residence and intestinal parasitosis. Those who resided in urban-outside-of-Addis Ababa and rural residencies were 6.21 (95% CI 1.76, 21.87) and 7.09 (95% CI 2.07, 24.32), respectively. These subjects had greater infection than urban residents in the city of Addis Ababa.
Conclusions: With parasitic infection identified at over 25%, this is a cause for concern. Pregnant women who came from urban-outside-of-Addis Ababa and the rural parts of the country were more vulnerable to intestinal parasitosis. Approaches to the diagnosis and treatment of common parasitic diseases presenting as acute infection during pregnancy are likely to be addressed case-by-case. Unless the parasitic infection threatens the pregnancy of the woman, many of the treatments are best postponed to the postpartum period. However, treatment is required for all.

Public health education measures to improve home and community sanitation, personal hygiene, and food preparation practices are needed. These measures can reduce the prevalence and transmission of intestinal parasites among the pregnant women in parasitized communities.

Introduction

Intestinal parasites are among the most common human infections distributed throughout the world. There are high prevalence rates in developing countries, which are mainly due to deficiencies in sanitary facilities, unsafe human waste disposal systems, inadequacy or a lack of a safe water supply, and low socio-economic status. (1)
Infectious diseases, some of which are caused by helminthes and protozoan parasites, have always challenged human societies. In fact, the helminthes/protozoan group causes one fourth of the known human infectious diseases. Intestinal parasites have been known to infect humans since prehistoric times and they have evolved with humans throughout history. This association is still strong. In recent history, this human-parasite relationship has been influenced by global changes in the human socio-cultural spectrum. In the modern world, parasitic diseases are associated with underdeveloped countries, and the developed world has conventionally viewed itself as “an island free of parasites/worms.” However, even today, intestinal parasites are among the major contributors to the global disease load even in the developed world. A wide variety of intestinal parasites is prevalent in different parts of the world. *Ascaris, Entamoeba, Toxoplasma, Cyclospora, Giardia,* and *Cryptosporidium* are among the major contributors to the global intestinal parasitic disease burden. (2)

Over the years, several estimates of the global and regional prevalence and of number of infections by intestinal parasites have been made. These estimates project similar pictures. *Ascariasis* still remains the most common intestinal parasite with 807–1221 million infections globally. It is most prevalent in East Asia, sub-
Saharan Africa, and India. *Whipworm (Trichuris)* and *hookworm* account for 604 to 795 and 576 to 740 million infections, respectively. Sub-Saharan Africa and East Asia have the highest incidence of these intestinal worms. Globally, an estimated 4% to 28% of children have pinworm infections. In a recent study, DALYs lost due to *Ascaris, whipworm, and hookworm* infections were estimated to be 1.2, 1.6, and 1.8 million, respectively. (2)

In sub-Saharan Africa, it is estimated that twenty-four million women become pregnant each year. This high rate may be related to an increase in the susceptibility of pregnant women to infections because pregnancy is a time of high hormonal activity which may exert immune-suppressive effects on the childbearing woman. In pregnancy, there is a transient depression of cell-mediated immunity that allows fetal allograft retention but also interferes with resistance to various infectious diseases like intestinal parasites. (3, 4)

In the developing third world countries, young women, pregnant women, and their infants and children frequently experience a cycle where under-nutrition (both macronutrient and micronutrient) and repeated infections including parasitic infections, lead to adverse consequences that can continue from one generation to the next. (5)
Intestinal parasitic infections, especially those due to the helminthes, increase anemia in pregnant women. Additionally, *hookworm* infections induce deficiencies of iron, total energy, protein, and possible folate and zinc deficiencies. The results of this are low pregnancy weight gain and intrauterine growth retardation (IUGR), followed by low birth weight (LBW) babies with its associated greater risks of infection and higher prenatal mortality rates. These assertions have been reported in multiple studies, although a causal link remains to be completely proven. (5)

In Ethiopia, the prevalence of *hookworm* is estimated at 16% and the prevalence’s of *A.lumbricoide* and *T.trichiura* are 37% and 30%, respectively. Soil-transmitted helminthe (STH) infections have not been targeted for control in Ethiopia. However, mass de-worming efforts started in 2004 as a component of the Enhanced Outreach Strategy (EOS) targeting under-five children. (6)

Although parasitic infestation is a common cause of morbidity in tropical countries, many studies have focused only on assessing the burden of the disease among under-five year old children and studies on other vulnerable groups like pregnant women have not been conducted. This study attempted to fill this gap by assessing the prevalence of intestinal infestation and contributing factors.
among pregnant women attending ANC at Gandhi Memorial Hospital in Addis Ababa.

**Objectives**

*General Objective:* To assess the magnitude of intestinal parasitosis and factors associated with intestinal parasitosis among pregnant women who attended ANC for maternity follow-up at Gandhi Memorial Hospital.

*Specific Objectives:*
1. To determine the prevalence of intestinal parasitosis among pregnant women.
2. To determine the contributing factors for intestinal parasitosis among pregnant women.

**Methods**

*Study Setting:* The study was carried out in Addis Ababa at the Gandhi Memorial Hospital located near the National Stadium. This hospital is the only maternal public hospital which provides obstetrical and gynecological services to pregnant women who come from different parts of the country.
Study Design: A descriptive cross-sectional study was conducted at Gandhi Memorial Hospital with pregnant women who came for regular ANC follow-up. Internal comparison was done to see factors contributing to parasitosis.

Source Population: All pregnant women who came to Gandhi Memorial Hospital to receive services that the hospital offers.

Study Population: All pregnant women who came for ANC follow-up service at Gandhi Memorial Hospital within a specified study period.

Sample Size Determination: The sample size was determined by using EPI-Info sample size and power for a cross-sectional study. Assumptions included a confidence interval (confidence level or 1-α) = 95%, Power (1-β) = 80%, ratio (exposed to non-exposed) = 1:1, expected frequency of disease in unexposed group (those with anti-helminthic drug) = 46% (2), and OR closest to 1=1.8. The sample size was computed to be 402.

Sampling Procedures: The study participants were selected using a non-probabilistic convenience sampling technique with eligible ANC attendees who consecutively presented for regular follow-up within the study period.
Study Variables

*Dependent Variable:* The dependent variable was the presence or absence of intestinal parasite(s) in the stool sample.

*Independent Variables:* The independent variables included age, residence, occupation, educational status, family size, average income, home ownership, number of rooms in home, availability of a separate kitchen, availability of a personal latrine, a water source, hand washing habits, waste disposal practices, previous history of taking an anti-parasitic treatment, and presence of domestic animals.

*Data Collection Methods and Instruments Used:* Data collection was conducted using a structured interview questionnaire after getting informed verbal consent from the participants. The interview included information regarding age, occupation, education, income, prior history of treatment for parasitic infection, hygiene behavior, and household parameters to assess the overall risk factors. Three trained graduate laboratory technicians were selected with the help of the hospital laboratory department head to conduct the interviews and collect the stool samples. These three laboratory technicians were trained by the principal investigator.
two days on how to conduct the interviews, collecting stool, and the proper specimen handling techniques.

Stool Sample Collection and Laboratory Investigation: Stool samples were collected from 314 pregnant women with dry, clean and labeled stool cups and the direct wet mount microscopic examination was conducted immediately. For any further examination by the formal-ether concentration technique—especially for the identification of intestinal helminthes and cysts of protozoal parasites—all of the stool samples were preserved with 10% formalin.

Results

A total of 402 pregnant women participated in the study and 314 (78.1%) brought a stool sample after completion of the structured questionnaire. The rest 88 (21.9%) were excluded from the study because of their inability to provide stool specimen at that time. The mean age of the study participant was 27.6 (+4.3) years with a minimum of fourteen and a maximum of thirty-nine years. Two hundred ninety-one (92.7%) of the study participants lived in Addis Ababa, 11 (3.5%) of them lived in urban outside-of-Addis Ababa and 12 (3.8%) came from rural parts of the country. The majority of the pregnant mothers 149 (47.5%) were homemakers and 145
(46.2%) had an average monthly income of less than ETB 500. Except for 24 (7.6%), all of the women could both read and write. A total of 247 (78.6%) had completed grade 7 and above and of these, 126 (40.1%) of them completed grade 12 and above.

Environmental factors were examined. Most of the pregnant women live in a rented house 228 (72.6%) and of these renters, 205 (65.3%) lived in a house which had one or two rooms. A total of 311 (99.0%) had a separate latrine for the family. One hundred seventy-two (54.8%) used the communal pipe as their water source and 139 (44.3%) had their own private water pipe. However, 227 (72.3%) did not use any water purification methods for drinking. Hand washing habits of the study participants differed based on the activity. A total of 293 (93.3%) of them washed their hands before meals, 141 (44.9%) washed after meals, 285 (90.8%) after visiting the latrine, and 260 (82.8%) washed their hands before and after food preparation. The majority of the participants 229 (72.9%) disposed of their refuse/garbage with the help of a cleaner and 230 (74.2%) disposed of their liquid waste either in a seepage pit or in a communal sewerage system. The remaining women 71 (22.6%) disposed of their waste in open fields.

Of the 314 study subjects providing a stool specimen, 79 (25.2%) of them were identified as positive for at least one kind of intestinal
parasite. *Entamoeba histolytica*, *Taenia Species*, and *Ascaris lumbricoid* had the greatest prevalence with 39 (12.4%), 11 (3.5%) and 10 (3.2%), respectively. *Giardia lamblia* contributed 7 (2.2%), *Trichuris trichuria* 5 (1.6%), *Hookworm* 4 (1.3%), *Hymenolopus species* and *Larva of strongloyd* with equal magnitude of 3 (1.0%) and *Enterobius vermicularis* with 1 (0.3%) were found.

When examining socio-demographic, environmental and behavioral factors of these pregnant women, the prevalence of intestinal parasites was higher among pregnant women who came from the more rural areas of Addis Ababa and the countryside. The bivariate regression analysis calculated a statistically significant difference between residence and intestinal parasitosis. Urban out-of-Addis Ababa and rural residency had an AOR of 5.95 (95% CI 1.68, 21.14) and 6.61 (95% CI 1.91, 22.87), respectively. Even though statistical significance was not achieved, AOR 1.68 (95% CI 0.87, 3.25), the non-availability of a separate kitchen created a greater risk for parasitic infection.
Discussion

Intestinal parasitosis is one of the most prevalent infectious diseases in the tropics and subtropics. It is a medical and public health problem in sub-Saharan countries including Ethiopia. Pregnant women are some of the most vulnerable for parasitic infection due to their immune suppression during the gestational period. In the present study, the overall prevalence of intestinal parasitosis among pregnant women who came to the Gandhi Memorial Hospital for ANC follow-up was 25.2% (n=314). This prevalence is lower when compared to world records. For example, in Venezuela, the prevalence of intestinal parasitosis among pregnant women is 73.9% (5) and in rural west Kenya, the prevalence is 76.2%. (14) It is 66% among pregnant women in Gabon. (15) These variations could be attributable to the differences in geographic area and cultural practices.

Research has been conducted in Ethiopia regarding the prevalence of intestinal parasitosis. However, most of these studies targeted school age children. A study conducted in Babile in eastern Ethiopia showed that 27.2% of these children were infected with one or more intestinal helminth. (12) Likewise, a study conducted in Jimma in southwestern Ethiopia among a young adult
population with a mean age of 23 (±16) showed overall intestinal parasitosis of 83%. (9) In another similar study conducted in Butajira, Ethiopia, that included mothers (mean age 26.8 (±6.3) showed an overall prevalence of any such infection being 43.5% (95% CI 40.2-46.8%). (6) When the present study results are examined, the prevalence of intestinal parasitosis among pregnant women was 25.2%, which is lower. However, this may be due to the high number of urban dwellers who participated in the present study. It may also be attributed to the smaller sample size.

The present study agrees with a recent study conducted in Angolela, Ethiopia that focused on the personal hygiene of schoolchildren. That study used intestinal parasitic infection as one of the indicators for an analysis of knowledge, attitudes, and practices of hygiene. The study identified a prevalence rate of intestinal parasitic infection at 36.5% (n=669). In addition, agreement was found with hand washing habits before and after meals of pregnant women in the present study which was 93.3% (n=314) and 44.9 (n=314), respectively. With the Angolelas study, 99% (n=655) of the students washed their hands before meals and 46% (n=304) after meals. (19)

The present study was in agreement with the Butajira study that showed that urban place of residence (OR 0.45, 95% CI 0.28-0.73,
was associated with the reduced risk of maternal intestinal parasitic infection. (6) This is likely to be related to a lower prevalence of sanitary measures in the rural areas of Ethiopia. For instance, the proportion of the population with access to an improved water source was nearly twice as great in the urban areas than in the rural areas. (18) In addition, access to improved sanitation was four times greater in urban areas than in rural areas. (18) It is clear and evidence-based that interventions to reduce parasitic infection must first focus on the residents in rural areas.

The prevalence of the different species of parasitic infection identified in this study was in agreement with a study conducted in Nigeria although Nigeria had a higher prevalence of *E.histolytica* followed by other helminthic infections as *Entamoeba histolytica* (18.90%), *Hookworm* (4.8%), *Ascaris lumbricoides* (9.3%), *Taenia species* (2.1%), and *Entamoeba coli* (21.60%). (13) The high prevalence of protozoal infection like *E.histolytica* was most likely related to a poor potable water source, as these parasites are often associated with waterborne transmission. Even though there was no clear association between the water source and parasitosis in the present study, further investigation to reveal any links would be beneficial.
Except for residence, all of the factors expected to be contributing factors for intestinal parasitosis did not have statistical significance in the present study. This may be due to the smaller sample size and large urban dweller participation. In the present study, out of the 314 participants, 291 (93%) of them were urban dwellers and almost all 311 (99%) had a self-owned or communal latrine. When other environmental factors were examined like water source and garbage disposal, 139 (44.3%) of them use their own private water pipe and 172 (55%) used a communal pipe for water source. Only three (0.01%) used another water source. The majority 229 (73%) disposed of their garbage by the help of a house cleaner. To better identify contributing factors of intestinal parasitosis, conducting studies in high prevalence areas or in rural parts of the country is suggested.

**Conclusions**

The present study showed that the overall intestinal parasitic infection was moderate in prevalence among pregnant women attending a hospital ANC clinic in Addis Ababa. However, when residence was examined, pregnant women from the urban-outside-
Addis Ababa and the rural parts of the country were more vulnerable for intestinal parasitosis.

**Recommendations**

1. Public health measures to improve home and community sanitation, personal hygiene, and food preparation practices are needed to reduce the prevalence and transmission of intestinal parasites among pregnant women in parasitized communities. These measured can include community and family health education. This health education can be conducted, in part, by the workers in health extension programs.

2. Women can be encouraged to improve both their home and personal hygiene practices when they attend health facilities like the Gandhi Memorial Hospital. This encouragement can be provided with both formal and informal patient education activities by health care workers caring for them.

3. Approaches to the diagnosis and treatment of common parasitic diseases presenting as acute infection during pregnancy should be addressed case-by-case. Unless the infection threatens the pregnancy, many of the treatments
are best postponed to the postpartum period. These infections, while perhaps delayed, must be treated.

**Acknowledgments**

I would like to express my heartfelt gratitude to Addis Continental Institute of Public Health and Haramaya University for giving the chance to accomplish my MPH studies. I would like to extend my earnest gratitude to my advisor, Dr. Meaza Demisse, for her unreserved support and encouragement which began from topic selection, throughout the development of the thesis proposal, to data collection and analysis, and to finalizing the thesis. I am also grateful to the Addis Ababa Health Bureau and the Gandhi Memorial Hospital for their enthusiastic cooperation. Special thanks go to the laboratory department of Gandhi Memorial Hospital and to the ANC clinic for a place to work and for material support. I especially thank all of the pregnant women who willingly participated in this study. Finally, I extend my appreciation to all of my friends and family members for their support during my academic studies, because without them, nothing would be possible.
References


Comparative Study of Dental Caries and Oral Hygiene Status among Private and Government High School Students in Nifas Silk Lafto Sub-city, Addis Ababa, Ethiopia

Dereje Tolessa

Abstract

Background: It is known throughout Ethiopia that modern services for dental problems are limited. Often some available dental services can be described as primitive, painful, and even dangerous. Education and practice are the keys to the prevention of dental problems. In order to plan and implement effective oral-health promotion programming and health education, and to minimize dental problems in school youth, an evidence-based understanding of the social and behavioural factors related to dental caries and oral health is important.

Objectives: The purpose of this study was to determine the status of oral hygiene, its determinants and the prevalence of dental caries among both private and government high school students in a sub-city of Addis Ababa.
Methods: A comparative, cross-sectional study was conducted in Nifas-Silk Lafto sub-city in Addis Ababa. A total of 953 subjects were interviewed from both school groups.

Results: The prevalence of dental caries among the government school subjects and the private school subjects was similar at 41.8% and 39.2%, respectively. The status of oral hygiene was determined at 169 (51.4%) deemed “poor” and 160 (48.6%) deemed “good” in private school subjects and 465 (74.4%) deemed “poor” and 160 (25.6%) deemed “good” in government school subjects. Among those who had poor oral hygiene, 327 (52.3%) had dental caries and 298 (47.7%) had no caries while 63 (19.1%) of those who had good oral hygiene were caries positive and 266 (80.9%) of the subjects who had good oral hygiene were caries negative.

Conclusions and Recommendations: Good oral hygiene practice is a preventive measure for dental caries. The prevalence of dental caries among the government school subjects was 41.8% and 39.2% in private school subjects. Tooth cleaning practices appeared to play a significant role in preventing dental caries. In a country where HIV/AIDS, tuberculosis, and malaria easily trump other public health problems, oral hygiene must still be considered. Oral
hygiene education in schools and discussions in the community can play a role in reducing dental problems.

**Introduction**

Oral hygiene is the practice of keeping the oral cavity clean and healthy by brushing and flossing to prevent tooth decay and gum disease. Dental caries tend to be more prevalent in plaque-infested mouths than in cleaner ones. When more plaque is allowed to accumulate on the tooth surfaces, more acids are produced and these acids attack the tooth surfaces. (1)

Oral health is related to diet in many ways. For example, nutrition influences craniofacial development and oral mucosal and dental diseases include dental caries, enamel defects, and periodontal disease. (2)

According to recent published reports by the United Nations, Ethiopia continues to be one of the least developed countries of the world. This development status is reflected in part in meagre investments in oral health care and those resources are primarily allocated to emergency oral care and to pain relief. Most oral diseases have common risk factors such as unhealthy behaviors,
particularly the widespread use of tobacco products and the excessive consumption of alcohol and sugar. (3, 4)

**Objectives**

*General Objective:*
To determine the status of oral hygiene, its determinants, and the prevalence of dental caries among private and government high school students in Nifas Silk Lafto sub-city located in Addis Ababa.

*Specific Objectives:*

1. To determine the prevalence of dental caries among private and government high school students.
2. To determine the status of oral hygiene among private and government school students.
3. To assess the socio-economic and demographic determinants of oral hygiene and dental caries among private and government school students.

*Study Area:* The study was conducted in four high schools in Nifas Silk Lafto sub-city in Addis Ababa. Nifas Silk Lafto sub-city is one of the ten sub-cities in Addis Ababa with an estimated population of 336,444. The sub-city includes a total of twelve government
schools, fourteen private schools, two mission schools, four public high schools, and six government high schools.

*Study Design:* A comparative cross-sectional study design was conducted.

*Source Population:* The source population was high school youths in Addis Ababa who were 14 years of age and above.

*Study Population:* The study population consisted of randomly selected samples of students from four high schools in the sub-city.

*Sample Size Determination:* The prevalence of dental caries among the government school students was determined to be 49% = p1. (5) The prevalence of dental caries among the private school students was 59% with an increment of 10% on the stated national prevalence = p2.

The power (1-β) = 80%

The level of confidence (1-α) = 95%

Population allocation ratio=2:1 with 2 for government and 1 for private schools

\[
\text{P} = \frac{(p1n1 + p2n2)}{n+1n2}
\]

\[
\frac{\left(\frac{2 \sqrt{1 + \frac{1}{z^2}} p (1-p) + z \beta \sqrt{p1(1-p1) + p2(1-p2)}}{(1-p1)^2}ight)^2}{n}
\]
The calculation of the sample size was carried out using Epi-Info.

The sample size for n1 (government schools) = 614

The sample size for n2 (private schools = 307

The total sample size for the two groups = 921

Non-response rate (10%) = 92 + 921 = 1013

It was assumed that the population was homogeneous. With the consideration of the time and resource constraints, a design effect of one was assumed in this study.

**Sampling Technique:** A multistage sampling method was used. The ten sub-cities in Addis Ababa were listed with the number of high schools found in each. In the first stage, Nifas Silk Lafto sub-city was randomly selected from the list of ten sub-cities in Addis Ababa. The stage two of the sampling process was the random selection of the four high schools by stratifying by government school and and private school using a lottery method.

**Variables**

*Dependent Variables:* The dependent variables were dental caries and oral hygiene.

*Independent Variables:* The demographic variables were age,
gender, grade in school, and the socio-economic factors were parent’s income and parent’s occupation.

Data Collection Procedures: Data were obtained from the high school youths using an interview method of data collection. Trained data collectors using a structured format conducted interviews of the high school students. Dental science professionals using a standard oral cavity hygiene examination procedure conducted physical examination of the students’ oral cavity.

Data Quality Control: Pre-testing of the questionnaire and supervision of the data collectors were conducted.

Data Analysis Procedure: After collecting the data, each answer was coded for data entry into Epi Info Version 3.5.1. The data were transferred to SPSS and analysis was carried out using odds ratio, x2, p-value and confidence intervals while comparing the two groups of study.

Ethical Considerations: Ethical clearance was obtained from an ethics committee in the Addis Continental Institute of Public Health. Clearance was also given to the concerned educational institutions. The students were informed about the data collection reasons and methods and their full cooperation was gained by verbal statement.
Results

*Dental Caries and Dietary Habits:* The prevalence of caries among those who drank sugared tea 4x/day was 13% in the government school respondents and 30.2% in the private school respondents with x2 value of 18.92 and a p-value=0.001. The daily intake of cakes among the private school respondents indicated a 23.3% prevalence for caries.

Table 1. Comparison of Dental Caries and Dietary Habits among Government and Private Schools, Addis Ababa, 2011

<table>
<thead>
<tr>
<th>Dietary Habits</th>
<th>Government Schools n (%) (n=260)</th>
<th>Private Schools n (%) (n=129)</th>
<th>X2</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Breakfast Meals</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bread and tea</td>
<td>146 (56.2%)</td>
<td>50 (38.8%)</td>
<td>20.26</td>
<td>0.0001</td>
</tr>
<tr>
<td>Bread with spread and tea</td>
<td>22 (8.5%)</td>
<td>30 (23.3%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home baked bread</td>
<td>67 (25.8%)</td>
<td>39 (30.2%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>25 (9.6%)</td>
<td>10 (7.8%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Tea and Coffee Breaks</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tea and cakes</td>
<td>61 (23.4%)</td>
<td>30 (23.3%)</td>
<td>4.59</td>
<td>0.33</td>
</tr>
<tr>
<td>Ice cream, tea and coffee</td>
<td>8 (3.1%)</td>
<td>8 (6.2%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tea, soft drinks and bread</td>
<td>89 (34.1%)</td>
<td>43 (33.3%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bread and milk</td>
<td>57 (21.8%)</td>
<td>33 (25.6%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>46 (17.6%)</td>
<td>15 (11.6%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Frequency of Tea intake**

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Count</th>
<th>Percentage</th>
<th>Count</th>
<th>Percentage</th>
<th>Chi-sq</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>4x/day</td>
<td>34</td>
<td>13.0%</td>
<td>39</td>
<td>30.2%</td>
<td>18.92</td>
<td>0.001</td>
</tr>
<tr>
<td>Once in the morning</td>
<td>149</td>
<td>57.1%</td>
<td>59</td>
<td>45.7%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>After every meal</td>
<td>43</td>
<td>16.5%</td>
<td>22</td>
<td>17.1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not at all</td>
<td>35</td>
<td>13.4%</td>
<td>9</td>
<td>7.0%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Frequency of Sweet Foods (cakes) Intake**

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Count</th>
<th>Percentage</th>
<th>Count</th>
<th>Percentage</th>
<th>Chi-sq</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Once or twice a day</td>
<td>20</td>
<td>7.7%</td>
<td>30</td>
<td>23.3%</td>
<td>33.7</td>
<td>0.001</td>
</tr>
<tr>
<td>2x/week</td>
<td>30</td>
<td>11.5%</td>
<td>23</td>
<td>17.8%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1x/week</td>
<td>32</td>
<td>12.3%</td>
<td>24</td>
<td>18.6%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very Rarely</td>
<td>171</td>
<td>65.8%</td>
<td>51</td>
<td>39.5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>7</td>
<td>2.7%</td>
<td>1</td>
<td>0.8%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Dental Caries and Socio-demographic Factors:** The prevalence of dental caries showed an association with the marital status of the parents and the educational level of the father. Dental caries prevalence in those subjects whose parents were living together was 39.9% and 44.9% in those whose parents were divorced, respectively.

The students’ reported tooth cleaning experience was preventive for dental caries. Poor oral hygiene status was associated with dental caries with crude OR (CI)=4.63(3.38, 6.36). Poor oral hygiene was associated with dental caries with an adjusted OR (CI) = 4.34(1.45, 12.95). Tooth cleaning experiences of the
subjects was associated with dental caries with an adjusted OR (CI) = 0.467(0.226, 0.963). Toothaches were associated with dental caries with an adjusted OR (CI) = 9.4(6.09, 14.5).

Bivariate analysis indicated that being a female was preventive for poor oral hygiene with crude OR (CI) = 0.58(0.44, 0.76). The tooth cleaning experience of the subjects was associated with the oral hygiene status of the respondents with crude OR (CI) = 2.45(1.78, 3.38). Being a female and having a toothache experience were independently associated with oral hygiene status with an adjusted OR (CI) = 0.61(0.39, 0.96) and 1.85(1.11, 3.11), respectively.

Discussion

This study identified a prevalence rate of dental caries at 39.2% in private high schools and and 41.8% in government schools. The oral hygiene status of the study subjects showed that oral hygiene status of private schools study subjects was 51.4% “poor” and 48.6% “good” while from government study subjects it was 74.4% “poor” bad and 25.6 % as “good.” As identified in a study conducted in Shashmane in 1995, the prevalence of dental caries was said to be increasing along with increasing age of the subjects.
A study conducted in India by Mohamed 2009 on high school students revealed that the prevalence of dental caries was associated with oral hygiene status. Another study conducted in Kenya in 2003 in a rural community revealed the association of dental caries to oral hygiene. This particular study also showed that dental caries prevalence was observed to be associated with oral hygiene status. Those subjects who had poor oral hygiene (19.1%) had dental caries (80.9%). Statistically, it was seen that crude odds ratio and confidence interval shows that poor oral hygiene status was the cause of dental caries.

The marital status of the parents had an association with the oral hygiene status of the respondents. A total of 63.6% of the study subjects whose parents lived together had good oral hygiene and only 30.8% of the study subjects whose parents were separated or divorced had good oral hygiene.

A lower educational level of parents was a contributing factor to poor oral hygiene in this study. A total of 73.4% of those whose maternal education level was below high school and 71.0% of those whose father’s educational level was high school and below had poor oral hygiene. Perhaps the reason for poor oral hygiene of the subjects in this case was due to a lack of awareness of the parents to guide their children to keep good oral hygiene.
Conclusions

Based on the findings, this study concluded that:

1. Poor oral hygiene practices and status are contributing factors to dental caries incidence.
2. The prevalence of dental caries in private school study subjects was 39.2% and 41.8% in government school subjects.
3. Reported tooth cleaning practice played a significant role in preventing dental caries.
4. Maternal education contributed to the level of oral hygiene of the subjects.

Recommendations

Good oral hygiene practices are a key factor in preventing dental caries. The status of oral hygiene, especially in the government school subjects was poor and this needs attention. Hence, to improve student oral hygiene status and to reduce the prevalence of dental caries, oral health education at schools should be conducted. Additionally, it is important to offer oral health education for the parents as well as the children. This oral health education can be
conducted formally and informally in coffee ceremonies, community conversations, and when health care providers see their patients on a variety of matters.

Acknowledgements

I acknowledge my advisors, Dr. Alemayehu Worku and Ato Temesgen Workayehu, for their advice and professional expertise. My sincere appreciation also goes to Dr. Abera Kumie and Dr. Ababi Zergaw for their advice in this research effort. My special thanks go to the staff members at Addis Continental, Haramaya University, and the schools and students involved in this study. Finally, I extend special appreciation to my family.

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Programme, Department for Chronic Disease and Health Promotion, Geneva, Switzerland. 2007.


Contraceptive Use and its Associated Factors in Madawalabu University Female Students in Robe, Oromia Regional State, Ethiopia

Kemal Ahmed Kuti

Abstract

Background: Contraceptive use by sexually active female students in a university setting is both practical and intelligent. Reliable, consistent, and therapeutically correct contraceptive use prevents unintended pregnancies and assures a greater likelihood of uninterrupted or impeded higher education for the young woman.

Objectives: The objective of this study was to assess contraceptive use and identify the factors associated with contraceptive use.

Methods: A quantitative, cross-sectional study design was used to determine contraceptive use and to identify factors associated with its use among Madawalabu University female students from September 2010 to August 2011. The sample size was 371.

Results: Knowledge of contraceptive methods was high. The majority of the respondents knew about most contraceptive
methods. The contraceptive prevalence rate (CPR) among the sexually active respondents was 48.65%; approximately half of the sexually active students were using contraceptives. The major contraceptive methods used were pills and injectable contraceptives. Knowledge and use of emergency contraceptive (EC) was low when compared to knowledge of other methods. Age, time of service delivery, partner opposition, and privacy and confidentiality of contraceptive service delivery were the factors associated with contraceptive use.

Conclusions and Recommendations: Inconvenient service delivery times, the sexual partner’s poor attitude towards contraceptive use, and concerns about privacy and confidentiality were important factors to female students. These resulted in lower contraceptive use. Service delivery should be provided at times convenient to the students and not the health providers. Patient privacy must be assured in service delivery. Breaches in confidentiality by health workers must be stopped based on ethical principles of health care delivery. Partner opposition can be discussed in sexual and reproductive health groups wherein young men are encouraged to support the reproductive rights of their partners. Finally, it is recommended that Madawalabu University and Robe Zone Town
Health Office establish a service delivery system which is more suitable for female students.

**Introduction**

Fertility is high in Ethiopia. Women have an average of 5.4 children during their lifetimes and these larger families burden parents or caregivers in providing all that is needed for their proper care. Using contraceptives is an important step towards limiting family size. (2)

Contraceptive use in Ethiopia is not without socio-demographic predictors and cultural complexities. A variety of factors are associated with contraceptive use in the country. Major factors include marital status, educational level of wife, occupational status, family monthly income, number of pregnancies, number of live births, number of living children, spousal educational level, and spousal occupational status. (6)

The main purpose of this study was to determine contraceptive use and to identify the major factors that influence contraceptive use by female students in a university environment. The site for this research was Madawalabu University in southeast Ethiopia.
Objectives

General Objective:
To assess contraceptive use and identify the factors associated with contraceptive use among female students in Madawalabu University, Robe, Oromia National Regional State, Ethiopia.

Specific Objectives:
1. To determine contraceptive use among Madawalabu University female students.
2. To identify factors associated with contraceptive use among Madawalabu University female students.

Methods

Study Area and Period: This study was conducted with female students in Madawalabu University located in Robe, southeast Ethiopia from September, 2010 to August, 2011.

Study Design: An institutionally-based, quantitative cross-sectional study design was used to determine contraceptive use and to identify factors associated with contraceptive use among Madawalabu University female students.
**Source Population:** The source population was all female students in Madawalabu University. The study population was female students residing on the Goba and Robe campuses.

**Sample Size Determination:** The sample size was determined by using the following assumptions: a single population proportion for unmet need for contraceptive use at national level at 36%, a 5% margin of error with 95% CI ($\alpha = 0.05$), and a non-response rate of 5%. The final sample size was 371 female university students.

**Sampling Technique:** Madawalabu University’s schools, colleges, and departments were all taken into consideration for a proper sampling method. Students were finally randomly selected from departments across the campuses and instructional units.

**Study Variables**

**Dependent Variable:** Contraceptive use by the female students was the dependent variable.

**Independent Variables:**

1. Socio-economic educational characteristics.
2. Knowledge of contraceptive methods.
3. Distance from health service site.
4. Family support.
5. Partner or husband opposition.
6. Time convenience for service utilization.
7. Privacy in the delivery of contraceptive services.
8. Confidentiality of client’s information regarding contraceptive services.
9. The service provider’s approach to delivery.

Data Collection Procedures: The data were collected during March, 2011. Five lecturers from Goba Health Science College took one day of training and were recruited to facilitate data collection. The questionnaire used was adapted from the Demographic Health Survey and was administered to study participants. The subjects completed the questionnaires in privacy.

Quality Control: To ensure data quality, activities included the use of a standardized questionnaire; the adherence to language consistency; a provision of training for data collection facilitators; conducting pre-testing with the questionnaire; and checking for data completeness of each of the questionnaires.

Data Processing and Analysis: Data entry and cleaning were carried out using Epi-Info Version 3.3.2. The data were then
exported to SPSS Version 16 for analysis. Univariate, bivariate, and multivariate analysis was conducted.

*Ethical Considerations*: The Institutional Research Ethics Review Committee of Haramaya University’s College of Health Sciences on the Harar campus approved the study. The purpose of the study was clearly explained to all study participants. A consent form was attached as cover page on the questionnaire and was signed by all participating in the study.

**Results**

*Socio-demographic Characteristics*: Of a total of 371 study participants included in the study, 345 (93%) responded. A total of 189 (54.8%) were from urban areas while 156 (45.2%) were from rural areas prior to university attendance. A total of 234 (67.8%) were Oromo, 63 (18.3%) were Amhara, 18 (5.2%) were Tigre, 17 (4.9%) were Gurage and 13 (3.3%) were from other ethnic groups. Three hundred (87%) of the subjects were single and 33 (9.6%) and 12 (3.5%) were married or in another category (ex. separated, divorced, or widowed), respectively. The mean age was 20.9 and the median age was 20.0. The ages range was from seventeen to
thirty-two years. A total of 177 (51.3%), 71 (20.6%), 68 (19.7%), 21 (7%) and 5 (1.4%) were Orthodox Christian, Protestant, Muslim, Catholic, or another religion, respectively. A total of 290 (84.1%) were regular students and 55 (15.9%) were extension students. One hundred nine (31.6%) were first year students, 122 (35.4%) were second year students, and 114 (33%) were third year students. A total of 312 (90.4%) students did not have children and 33 (9.6%) had one or more children.

Source of Information: The major source of information about contraceptives was the radio and TV at 50.7%. Other information sources included health professionals (18.3%), the classroom (11.1%), neighbors (8.4%), newspapers (7.8%), husband or partner (2.9%), and other sources (0.6%).

Contraceptive Knowledge: The study subjects were informed about oral contraceptive pills (87.2%), the injectable contraceptive (75.9%), IUDs (71.3%), and implants (58.8%). Knowledge of other methods such as the male condom, EC, diaphragms, LAM, calendar method/rhythm, and withdrawal was 76.8%, 55.4%, 42.9%, 54.5%, 50.7% 52.1%, respectively.

Contraceptive Use: A total of 82 (55.4) had ever used contraceptives. The contraceptive prevalence rate (CPR) among
sexually active respondents was 48.65%. Twenty-nine (40.28%), 31 (43.06%), 5 (6.94%), 3 (4.17%) were pill, injectable contraceptives, intrauterine device, and implants users, respectively. Four (5.55%) of the respondents used condoms or the rhythm method. Of the sexually active female students, 25 (16.9%) had ever used emergency contraceptives (EC). After analysis, age, privacy, confidentiality, partner opposition, time convenience remained associated with contraceptive use.

Table 1. Factors Associated with Contraceptive Use among Female Students at Madawalabu University, 2011

<table>
<thead>
<tr>
<th>Variables (n=148)</th>
<th>Contraceptive Use</th>
<th>COR 95% CI</th>
<th>AOR 95% CI</th>
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<tr>
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<td>No</td>
<td></td>
</tr>
<tr>
<td>Age 15-19</td>
<td>20</td>
<td>13</td>
<td>0.853 (0.329, 2.215)</td>
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<tr>
<td>20-24</td>
<td>17</td>
<td>27</td>
<td>2.085 (0.856, 5.074)</td>
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<td>25-29</td>
<td>14</td>
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<td>30-34</td>
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<td>38</td>
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<tr>
<td>Muslim</td>
<td>16</td>
<td>13</td>
<td>0.834 (0.354, 1.966)</td>
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<td>Protestant</td>
<td>10</td>
<td>22</td>
<td>2.258 (0.945, 5.394)</td>
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<tr>
<td>Others</td>
<td>7</td>
<td>3</td>
<td>0.440 (0.106, 1.828)</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td>Odds Ratio (95% CI)</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-------</td>
<td>------</td>
<td>--------------------</td>
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<td><strong>Family Support</strong></td>
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<tr>
<td>Yes</td>
<td>38</td>
<td>31</td>
<td>1.622 (0.846, 3.110)</td>
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<tr>
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<td>No</td>
<td>58</td>
<td>31</td>
<td>6.014 (2.865,12.624)</td>
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<tr>
<td>Yes</td>
<td>14</td>
<td>45</td>
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<td><strong>Privacy</strong></td>
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<tr>
<td>Yes</td>
<td>42</td>
<td>28</td>
<td>2.400 (1.239, 4.648)</td>
</tr>
<tr>
<td>No</td>
<td>30</td>
<td>48</td>
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<td><strong>Confidentiality</strong></td>
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<tr>
<td>Yes</td>
<td>40</td>
<td>19</td>
<td>3.750 (1.868, 7.528)</td>
</tr>
<tr>
<td>No</td>
<td>32</td>
<td>57</td>
<td>1</td>
</tr>
<tr>
<td><strong>Time Convenience</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>43</td>
<td>26</td>
<td>2.851 (1.462, 5.562)</td>
</tr>
<tr>
<td>No</td>
<td>29</td>
<td>50</td>
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</tr>
</tbody>
</table>

*Significant at 95% confidence interval

**Discussion**

The contraceptive prevalence rate (CPR) computed in this study was 48.6%. This CPR was greater than in a study done in northwest Ethiopia in the Dambia district (17) which was 22.5%. This significant difference may be due to the study populations in two different geographical areas. Access to knowledge about contraceptive methods may have differed. However, this study showed close agreement to the contraceptive prevalence rate from a
study conducted in Addis Ababa. Family Planning Survey among Ethiopian Domestic Distribution the Addis Ababa-based study showed a contraceptive prevalence rate of 39%.

Emergency contraceptives were studied in this group. Regarding the utilization of the emergency contraceptive (EC) method, this study revealed differences with the Addis Ababa University female students on knowledge, attitudes, and practices regarding emergency contraceptives. The women under studied had a greater use of emergency contraceptives than the Addis Ababa University students with 16.6% and 4.9%, respectively. The difference may have come from recent improvements in the availability of emergency contraceptives in university clinics and other health institutions. The establishment of reproductive health clubs for information dissemination may have influenced a greater use of the method.

Younger age, opposition by sexual partner or husband, confidentiality worries, a lack of privacy and time inconvenience were associated with contraceptive use. This agreed with a study done in northwest Ethiopia on the quality of family planning service (22) regarding privacy as a factor for contraceptive use. No association, however, was found in this study between
contraceptive use, marital status, need for more children, previous residence, or religious prohibition. In this regard, this study differs from other studies done in Ethiopia (6, 17, 18, 23). The difference revealed may be the result of differences level of awareness about contraceptive methods and their benefits due to current service improvements.

The contraceptive prevalence rate was judged to be low at 48.65% among sexually active female students in Madawalabu University. Time inconvenience, a perceived lack of privacy, concerns about breeches in confidentiality, and partner opposition to contraceptive use were the main factors for not using contraceptives. It is recommended that Madawalabu University and Robe Zone Town Health offices establish a service delivery system which is more suitable for young female university students.

Acknowledgements

I would like to thank Addis Continental Institute of Public Health and Haramaya University which operate this joint MPH program. I thank Dr. Meaza Demissie, my advisor, for her constructive comments and continuous follow-up support throughout the thesis work. I thank Madawalabu University staff members for their
cooperation and support. I would also like to extend my thanks to Ato Geroma Morka, Ato Adam Ismail, Ato Haji Kedir, and all those who directly or indirectly contributed to the success of this thesis work.

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22. Melkamu Y, Misganaw A. Linkage between VCT and Reproductive Health Services in Two Public Facilities in

Menstrual Hygiene Practices in Adolescent Students in Akaki Kality Sub-city, Addis Ababa, Ethiopia

Mulugeta Abebe

Abstract

Background: Knowledge and practices regarding menstrual hygiene are clouded by cultural taboos, socio-cultural restrictions for discussion, and ignorance in Ethiopia. Parents, teachers, schools, and communities provide little education about scientific facts and proper hygiene practices. As a result, adolescent girls remain ignorant about this personal hygiene issue.

Objectives: To assess the knowledge and practices of menstrual hygiene and to assess the factors affecting knowledge and menstrual hygiene practices in adolescent school girls.

Materials and Methods: A descriptive, school-based, cross-sectional study was conducted among 1,065 adolescent girls in a junior and secondary school located in the Akaki Kality sub-city of Addis Ababa, Ethiopia. A structured and self-administered questionnaire was used for data collection. Data were entered using
Epi-Info 3.5.1 and transferred to SPSS Version 15 for cleaning and analysis with univariate, bivariate, and multivariate analyses.

Results: Out of 1,065 respondents, 839 (78.8%) girls had knowledge about menstrual hygiene prior to menarche. Their mothers were the first informants regarding menstrual hygiene with 474 (44.5%) of the girls. As far as practices, 902 (84.7%) girls washed their genitals during every visit to the toilet during menstruation, 1,050 (98.6%) girls used sanitary pads during menstruation and only 130 (12.2%) reused sanitary pads. It was determined from this study that 60% of the girls from the rural areas and 40% of the girls from the urban areas practiced good menstrual hygiene.

Conclusions and Recommendations: Menstrual hygiene knowledge and practices were determined to be good in this study. Because menstrual hygiene may prevent reproductive tract infections, it is a vital aspect of early aged health. Health education on the topic of menstrual hygiene for adolescent girls in schools is recommended. Education can be provided through different channels and school teachers and parents can play an important role in transmitting the correct knowledge and practices of menstrual hygiene to the adolescent girls in Ethiopia today.
Introduction

The onset of menarche is one of the most important experiences occurring in girls during adolescence. Menstruation is part of the female reproductive cycle that starts when girls become sexually mature at the time of puberty. (1) Women who have knowledge about menstrual hygiene and safe practices are less vulnerable to urinary tract infections and their consequences. Therefore, increased knowledge about menstruation can improve hygiene practices and can help reduce any discomfort by women. (2)

Good knowledge of and practices regarding menstrual hygiene are important for the health, education, and dignity of girls as they grow to womanhood. Most girls will have their menarche between the age of twelve and fourteen in Ethiopia, and this will be during a time when they are living through a rapid phase of physical development. Unfortunately, the taboos surrounding menstruation in Ethiopian society prevents girls and women from articulating their needs. Problems of poor menstrual hygiene are either ignored or misunderstood. There is lack of information on the process of menstrual hygiene in society. (3)
Objectives

*General Objective:*
To assess the knowledge and practices of menstrual hygiene among adolescent school girls.

*Specific Objective:*
1. To identify the factors affecting knowledge about menstrual hygiene in adolescent school girls in Akaki Kality sub-city in Addis Ababa, Ethiopia.
2. To identify the factors affecting the practices regarding menstrual hygiene in adolescent school girls in Akaki Kality sub-city in Addis Ababa, Ethiopia.

Methods

*Study Area:* This study was conducted in the adolescent school girls in rural and urban Akaki Kality sub-city of Addis Ababa, Ethiopia.

*Study Period:* The study period was from November, 2010 to January, 2011.

*Study Design:* A descriptive school-based, cross-sectional study design was used in this research.
**Study Population:** All adolescent girls going to one of the junior high schools or high schools located in Akaki Kality sub-city in Addis Ababa, Ethiopia.

**Study Subjects:** Schools girls between the ages of fourteen and nineteen years were included in the study.

**Sample Size Calculation:** A single proportion formula was used to calculate the sample size considering the proportion of good practices at 52% derived from a previous study. However, a proportion of 50% was calculated for knowledge about menstrual hygiene, as there were no local studies and to maximize the sample size. A 95% confidence level and a degree of precision at 3% and a 10% for non-response rate were tallied for a sample size of 1,172 adolescent girls.

$$n = \frac{Z^2 \alpha}{2} p (1-p)/d^2$$

The calculated sample size was 1,065 plus a 10% of non-response rate of 107. Hence, the total sample size was 1172.

The total response rate was 100% as all of the 1,172 girls completed the self-administered questionnaires.

**Sampling Techniques:** There was a portion of adolescent girls who came from rural families and the other group from urban families. Hence, they were a heterogeneous group. To make them homogenous, a stratified sampling technique was used in the
schools with urban school and rural school categories. After calculations, 274 students were from rural schools and 791 students were from urban schools.

Variables

Dependent Variables: The dependent variables were knowledge of and practices regarding menstrual hygiene.

Independent Variable: Independent variables included age at menarche, the education level of the parents, the grade of girl, marital status, availability of a TV, pocket money, economic status of parents, and the role of families.

Study Tools: A structured, pretested, self-administered questionnaire was used to collect the data. The questionnaire was developed based on literature relevant to this study topic. It asked about the socio-demographic characteristics of the girl and her family, knowledge and practices regarding menstrual hygiene, sources of information about menstrual hygiene, and associated factors affecting the utilization of hygienic practices. The questionnaire was pre-tested in a similar setting in Addis Ababa.

Ethical Considerations: Ethical clearance was obtained from an ethics committee in the Addis Continental Institute of Public
Health. Written consent was obtained from the Addis Ababa Health Bureau, the Akaki-Kality sub-city education and health offices, and from the school directors. Verbal informed consent was obtained from the adolescent girls in the study. Confidentiality was maintained.

**Operational Definitions**

*Menstrual Sanitary Hygiene Materials*: These are materials used for absorbing or catching menstrual flow during menses.

*Good Hygiene Practices*: These practices include using sanitary pads, changing the pads three times a day, changing the pads during the night, not reusing pads, taking special baths during menses, washing the genital area during every visit to the toilet, and not wearing bloodstained dresses.

*Poor Hygiene Practices*: These practices include not using pads, not changing pads three times a day, not changing pads during the night, reusing pads, not taking special baths during menses, not washing the genital area during every visit to the toilet, and wearing bloodstained dresses.
**Knowledge about Menstruation:** This is (1) the awareness of girls both before and after menarche that menstruation is a natural and normal physiological process and, (2) knowledge of menstrual hygiene practices.

**Results and Discussion**

From the 1,065 who participated in the study, the majority 791 (74.3%) were from urban schools and 274 (25.7%) were from rural schools. A total of 368 (34.6%) were in grades seven and eight, 385 (36.2%) were in grades nine and ten, and 143 (13.4%) were in grades eleven and twelve. The mean age of the girls was 16.49 (± 1.23) years and ranged from fourteen to nineteen years. The vast majority of the girls (93.8%) were single. A total of 453 (42.5%) were Oromo and 821 (77.1%) were Orthodox. Three hundred twenty (30%) of them received pocket money from their parents and 257 (24.1%) had fathers with a college education and above. One hundred fifty-eight (14.8%) mothers of had a college education and above. Half of the respondents reported to have a shower facility in the home and 809 (76%) reported having a television at home.
Nearly all of the girls 1,038 (97.5%) believed that menstruation was a normal physiological process and 463 (43.5%) answered that menses flows from the uterus. A total of 839 (78.8%) reported having information about menstruation before menarche and 880 (82.6%) of the girls got this information from their families.

Table 1. Knowledge Regarding Menstrual Hygiene in School Girls
Akaki Kality Sub-city, Addis Ababa, 2011

<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Menstruation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physiology</td>
<td>1038</td>
<td>97.5</td>
</tr>
<tr>
<td>Pathology</td>
<td>27</td>
<td>2.5</td>
</tr>
<tr>
<td><strong>Menstrual Flow Origin</strong></td>
<td></td>
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</tr>
<tr>
<td>Bladder</td>
<td>123</td>
<td>11.5</td>
</tr>
<tr>
<td>Uterus</td>
<td>463</td>
<td>43.5</td>
</tr>
<tr>
<td>Fallopian Tube</td>
<td>149</td>
<td>14</td>
</tr>
<tr>
<td>Vagina</td>
<td>330</td>
<td>31</td>
</tr>
<tr>
<td><strong>Knowledge Before Menarche</strong></td>
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<td></td>
</tr>
<tr>
<td>Yes</td>
<td>839</td>
<td>78.8</td>
</tr>
<tr>
<td>No</td>
<td>226</td>
<td>21.2</td>
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<tr>
<td><strong>Age for Menarche</strong></td>
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</tr>
<tr>
<td>13</td>
<td>464</td>
<td>43.6</td>
</tr>
<tr>
<td>14</td>
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</tr>
<tr>
<td>17</td>
<td>8</td>
<td>0.8</td>
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<td><strong>Normal Menstrual Flow</strong></td>
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<td></td>
</tr>
<tr>
<td>1-3 days</td>
<td>449</td>
<td>42.2</td>
</tr>
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</table>
Almost all 1,050 (98.6%) of respondents used pads during menstruation and 933 (87.6%) used commercially produced pads. A total of 674 (63.3%) respondents used two to three pads per day and 651 (61.1%) said that it was difficult to change the pad in the school areas. Seven hundred and seventeen girls 67.3% changed their pads in the toilet room during school time, 558 (52.4%) disposed the used pads in the toilet, and 492 (46.2%) disposed them in the garbage. Most of the respondents said that they did not reuse...
pads. A total of 709 (66.6%) girls took baths during menses and the rest did not practice bathing during their menses. On the other hand, 902 (84.7%) stated that they washed their genital area during every visit to the toilet. Most of the respondents 844 (79.2%) desired additional information about menstruation and menstrual hygiene.

Menstruation-related absenteeism of girls was identified among 204 (19.2%) of the girls. This absenteeism ranged from one day to three and more. Also, 651 (61.1%) of the respondents reported that they were uncomfortable or had difficulty changing their sanitary pads in school during menstruation and 717 (67.3%) changed their pads in the toilet room. Two hundred eighty-four (26.7%) of the respondents did not change the pads in school due to inconvenience of the latrines. If there was lack of a toilet in the school, there was a problem for girls during menstrual periods. Often, they preferred to be absent from school. In general, the school environment was identified as not conducive to menstruating girls.

A lack of supplies for menstruation was observed in the schools. This was another challenge for the girls as they sought supplies for menstrual emergencies and for first menstruation that could occur while in school.
Mothers 474 (44.5%) and teachers (22.3%) were the main sources of menstruation information in this study. In similar studies in India, these same results were found. The mother was the first informant regarding menstruation in 37.5% of the girls. Also, 1,038 (97.5%) of the girls believed that menstruation was a physiological process. Nearly all 1,050 (98.6%) of the girls used sanitary pads during menstruation. Conversely, in India, 138 (86.3%) girls believed menstruation was a physiological process and only 18 (11.3%) of the girls used sanitary pads during menstruation. (4)

In this study, the reuse of pads during menses was very low 130 (12.2%) in the girls in Addis Ababa. When compared with a study conducted in Nepal, 133 (88.7%) reused their pads. In addition, this study identified that 1,050 (98.6%) respondents used disposable pads. A study done in India showed that 347 (99%) used pads and 267 (76.3%) used disposable pads.

The proportion of participants having a storage place for pads was 246 (23.1%) while another study in India indicated a similar result (21.1%). According to the healthy practice of changing pads during the night and at school, less than half of respondents 452 (42.4%) practiced changing pads at night while most of the respondents 651 (61.1%) changed pads at school. This finding is contrary to a study in India where a higher percentage of girls
(80%) practiced changing pads at night, while a small portion changed pads at school.

**Conclusions**

This study revealed that menstrual hygiene knowledge and practices could be improved. Open and honest reproductive health education in the home and in the school is the answer. Ideally, all girls learn about menstruation prior to their menarche. Ideally, these girls learn about good menstrual hygiene practices in the home and in the schools. Cultural taboos and reluctance to discuss such issues must be eliminated in Ethiopia for this education to occur. Finally, schools need to take a more sensitive role with regard to their students who are menstruating in terms of availability of pads.

**References**


Substance Abuse and the Risk of HIV/AIDS in Students Attending Addis Ababa University, Ethiopia

Tigist Addis

Abstract

Introduction: Behavioral research often focuses on the identification of modifiable variables that contribute to risk-taking behaviors. Behavioral researchers encourage the study of substance abuse and its relationship to risky sexual behaviors as these behaviors could lead to HIV infection and, ultimately, death from AIDS. This study explores substance abuse and its relationship to risky sexual behaviors, which could lead to HV infection among university students in Addis Ababa, Ethiopia.

Objective: The objective of this study was to assess the level of substance abuse and its contribution to risky sexual behaviors that can lead to HIV infection among undergraduate students attending Addis Ababa University (AAU).

Methods: The study design was a cross-sectional study employing quantitative and qualitative methods. A survey and focus group
discussions (FGDs) were the means for collecting data. The study was conducted with a sample of Addis Ababa University undergraduate students on the sixteen campuses of the university.  

**Results:** Current alcohol use, current cigarette smoking, and khat chewing were found to be 33.3%, 14.7%, and 16.0%, respectively. The logistic regression model that considered alcohol, cigarettes, and khat use among sexually active students indicated that those who consumed alcohol were more likely to participate in risky sexual behaviors.  

**Conclusions and Recommendations:** Alcohol was found to be a significant risk factor for risky sexual behaviors and, as a result, a risk for HIV infection. Campus health education of the student population about alcohol and risky sexual behaviors is recommended. University policy creation that controls substance abuse among students is also recommended.

**Introduction**

The national HIV prevalence rate in Ethiopia was estimated in 2007 at 2.3% of the adult population, of which 7.7% was found in urban areas and 0.9% in rural areas. In the same year, in the age group of fifteen to twenty-nine year olds, there were more women
living with HIV/AIDS than men. In the age group of those thirty years and older, there were more men living with HIV/AIDS than women. It was estimated that 131,145 new HIV infections would occur in 2007 and almost 90% of these infections would occur among the most potentially productive segment of the population with persons between the ages of fifteen and forty-nine years. (1)

The abuse of substances like alcohol, tobacco, and khat is becoming increasingly common in Ethiopia. This is particularly the case in urban areas. While khat chewing was once traditionally confined to certain Islamic population regions, it is now consumed in locales throughout Ethiopia and by people of all religions, regions, and ages. (2) The prevalence of khat consumption has increased rapidly over the last few decades and it has become commonplace nation-wide.

It has been reported in multiple studies for decades globally that substance abuse can lead to risky sexual behaviors. Risky sexual behaviors are defined as not using a condom in premarital sexual intercourse, having multiple partners, engaging in casual sexual relations, and having sexual intercourse with commercial sex workers. These risky sexual behaviors can lead to HIV infection and, ultimately, to AIDS and early death. Therefore, studying the level of substance abuse and its relationship to risky sexual
behaviors and HIV/AIDS may lead to preventive and educational efforts for university students.

**Objectives**

*General Objective:*
To assess the level of substance abuse and its contribution to risky sexual behaviors in AAU students.

*Specific Objectives*
1. To determine the prevalence of substance abuse among AAU students.
2. To determine the prevalence of high-risk sexual behaviors among AAU students.
3. To assess the association between substance abuse and high risk sexual behaviors.

**Methods**

*Study Area:*
The study was conducted with Addis Ababa University on its 16 campuses.

*Study Design:*
The study design was cross-sectional using a survey and focus group discussions (FGDs).
Study Population: The target population was undergraduate male and female AAU students between the ages of eighteen and thirty years in their sophomore year or above.

Sample Size: The minimum sample size required was calculated using the EPI-Info population survey formula. The calculations involved a single proportion for cross-sectional surveys based on the prevalence of high risk sexual intercourse in the past twelve months in Addis Ababa at 44%. (3) The estimations of the proportion were based on the following assumptions:

- Prevalence of higher risk sexual intercourse = 44%
- Confidence interval of 95% ($\alpha$)
- Margin of error (d) = 0.05
- Non-response rate = 10%

Accordingly, the sample size calculated was:

$$n = \frac{Z_{(\alpha/2)}^2 \cdot p \cdot (1-p)}{d^2}$$

$$n = 416$$

Sampling Procedures: A simple random sampling technique was used to select the sample of students on each of the AAU campuses. The primary sampling units of the study were the sixteen AAU faculties. From these faculties, seven were selected using a simple random sampling technique. The second sampling units were the departments in each of the selected faculties. From
the seven selected faculties, one department was chosen using simple random sampling. Then, from each of the selected departments, a sampling frame of students in their second, third, and fourth years of education and above was prepared. Students were selected from lists using a systematic random sampling method.

Data Analysis Procedures: The relationship between substance abuse and high risk sexual behavior measured the overall substance abuse (ex. type of substance, quantity, frequency of use) and measures risky sexual behaviors (ex. correct and consistent condom use, early sexual activity, multiple sex partners) and the risks for HIV infection ultimately leading to AIDS.

The survey data were analyzed by a bivariate linear regression method. Logistic regression was applied to examine the bivariate analysis and whether it was spurious or not. The qualitative data derived from the FGDs were analyzed in themes and triangulated with the findings from the quantitative portion of the study.

Results

A total of 416 students between the ages of seventeen and thirty-two participated in the study for a response rate of 100%. A total of
93.5% of the respondents were between the ages of seventeen and twenty-four. Nearly 44% of the respondents were females. The majority of the respondents 76.9% were Orthodox Christians and 11.4% and 9.5% were Protestants and Muslims, respectively. Almost all of the students who participated in the study were single (96.1%) and 2.4% and 1% were married or divorced/ separated, respectively.

The practice of alcohol use, cigarettes smoking, and khat chewing was asked. The use of substances was found to be widespread. Of all of the respondents, 83.3% knew students who abused alcohol, cigarettes and/or khat. Students who knew students who used these substances were asked about the occurrence of the practice and 39.9% reported that it was something seen “always” followed by 36% percent seen “frequently.” The most common practice of substance abuse was smoking cigarettes at 55% followed by chewing khat at 37.1%.

Among the students, 33.3% reported alcohol use, 14.7% reported cigarettes smoking, and 16% reported khat chewing in the past month. The aggregated prevalence of substance abuse was computed to be 21.9%.

Information about sexual activity was of value in defining the onset of potential exposure to risks including HIV/AIDS and
unwanted pregnancies among the students. A number of questions were asked of the students about their sexual behaviors.

Table 3. Sexual Behavior Reported by the Addis Ababa University Students, Ethiopia, 2011

<table>
<thead>
<tr>
<th>Sexual Behavior</th>
<th>Yes Number (%)</th>
<th>No Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ever had sexual intercourse</td>
<td>126 (30.7)</td>
<td>276 (67.3)</td>
</tr>
<tr>
<td>First intercourse before the age of 18</td>
<td>55 (49.1)</td>
<td>57 (50.9)</td>
</tr>
<tr>
<td>More than one sexual partner in life</td>
<td>55 (43.7)</td>
<td>52 (41.3)</td>
</tr>
<tr>
<td>Condom use during the first sexual intercourse</td>
<td>51 (40.8)</td>
<td>72 (57.6)</td>
</tr>
<tr>
<td>Sex with non-regular sexual partner</td>
<td>39 (32.0)</td>
<td>81 (66.4)</td>
</tr>
<tr>
<td>Condom use always with non-regular sexual partner</td>
<td>19 (45.2)</td>
<td>20 (47.6)</td>
</tr>
<tr>
<td>Sex with commercial sex workers</td>
<td>21 (17.2)</td>
<td>96 (78.7)</td>
</tr>
<tr>
<td>Condom use always with commercial sex workers</td>
<td>18 (90.0)</td>
<td>2 (5.0)</td>
</tr>
<tr>
<td>Sex in exchange for money, gifts, or favors</td>
<td>18 (14.5)</td>
<td>98 (79.0)</td>
</tr>
<tr>
<td>Condom use always during sex in exchange of money, gifts, or favors</td>
<td>3 (15.0)</td>
<td>11 (55.0)</td>
</tr>
<tr>
<td>Sex after use of alcohol/chewing khat</td>
<td>39 (33.3)</td>
<td>74 (63.2)</td>
</tr>
<tr>
<td>Condom use always after the use of alcohol/ chewing khat</td>
<td>20 (31.3)</td>
<td>36 (56.3)</td>
</tr>
</tbody>
</table>
There were associations between demographic variables, prevalence of substance abuse, and high-risk sexual behaviors. In order to know the independent effect of specific variables on the dependent variable, logistic regression was computed using SPSS. The logistic regression model that considered the demographic characteristics including, for example, age, gender, and academic year, indicated that there was no statistical difference between age and gender (p=0.338 and 0.508). Students in their fourth year and above were found to significantly engage in risky sexual behaviors (p=0.004).

The logistic regression model that considered alcohol, cigarettes, and khat use indicated that current alcohol users were 4.18 times more likely to engage in risky sexual behaviors than those who did not consume alcohol. Alcohol use was predictive of risky sexual behaviors in these students.
Table 4. Logistic Regression Analysis for Risky Sexual Behaviors in Relation to Demographic Characteristics, Prevalence of Alcohol Use, Cigarettes Smoking, and Khat Chewing in AAU Students, Ethiopia

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Risky Sexual Behaviors</th>
<th>Crude OR (95% CI)</th>
<th>Adjusted OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No Risk</td>
<td>High Risk</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No. (%)</td>
<td>No. (%)</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>141 (77.5)</td>
<td>41 (22.5)</td>
<td>1.00</td>
</tr>
<tr>
<td>Male</td>
<td>174 (74.4)</td>
<td>60 (25.6)</td>
<td>1.19 (0.75, 1.87)</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17-19</td>
<td>55 (17.8)</td>
<td>6 (6.1)</td>
<td>1.00</td>
</tr>
<tr>
<td>20-24</td>
<td>239 (77.3)</td>
<td>84 (84.8)</td>
<td>3.22 (1.34, 7.76)</td>
</tr>
<tr>
<td>≥25</td>
<td>15 (4.9)</td>
<td>9 (9.1)</td>
<td>5.50 (1.69, 17.90)</td>
</tr>
<tr>
<td>Academic Year</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Second</td>
<td>83 (87.4)</td>
<td>12 (12.6)</td>
<td>1.00</td>
</tr>
<tr>
<td>Third</td>
<td>108 (76.6)</td>
<td>33 (23.4)</td>
<td>2.113 (1.029, 4.342)</td>
</tr>
<tr>
<td>Fourth/plus</td>
<td>124 (68.9)</td>
<td>56 (31.1)</td>
<td>3.12 (1.59, 6.18)</td>
</tr>
<tr>
<td>Alcohol</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never Used</td>
<td>232 (85.6)</td>
<td>39 (14.4)</td>
<td>1.00</td>
</tr>
<tr>
<td>Currently Used</td>
<td>78 (56.5)</td>
<td>60 (43.5)</td>
<td>4.58 (2.84, 7.38)</td>
</tr>
<tr>
<td>Cigarettes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never Used</td>
<td>279 (80.2)</td>
<td>69 (19.8)</td>
<td>1.00</td>
</tr>
<tr>
<td>Currently Used</td>
<td>31 (50.8)</td>
<td>30 (49.2)</td>
<td>3.913 (2.22, 6.90)</td>
</tr>
<tr>
<td>Khat</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never Used</td>
<td>274 (79.9)</td>
<td>69 (20.1)</td>
<td>1.00</td>
</tr>
<tr>
<td>Currently Used</td>
<td>34 (51.5)</td>
<td>32 (48.5)</td>
<td>3.74 (2.16, 6.48)</td>
</tr>
</tbody>
</table>
Discussion

The Registrar’s Office of Addis Ababa University reported 24,123 students in the undergraduate classes for the 2010-2011 academic year. Using a probabilistic sampling method, 416 students were selected from the sixteen campuses of AAU. The target population for the study was Addis Ababa University undergraduate students between the ages of seventeen and thirty-two. Ninety-four percent of the total respondents were between the ages of seventeen and twenty-four years.

Questions were asked of the students about HIV/AIDS transmission and its prevention. The majority of students were aware that the risk of HIV/AIDS was reduced by having sex with only one uninfected person and through consistent condom use in every sexual encounter. Most were aware that healthy looking persons could be HIV-positive.

Alcohol and khat are the most frequently abused substances in Ethiopia. Students and staff members at colleges and universities are also considered to be at high risk of substance abuse. In the study conducted with urban university students, 31% reported current alcohol use and 22.3% current khat chewing. (4) In this study by Fekadu, the prevalence of students with current alcohol
use, cigarette smoking, and khat chewing was 33.3%, 14.7%, and 16%, respectively.

According to the EDHS-2005 report, 6% of young women between the ages of fifteen and twenty-four engaged in high risk sexual activities among those who had sexual intercourse in the past 12 months. Out of the total respondents, 30.7% had ever had sexual intercourse of which 49% had their first sexual intercourse before the age of 18 years. In this current study, the findings were different. The percentage of AAU students who had risky sexual behaviors in the last twelve months was 24.1%, which is much greater than reported in the EDHS-2005 report.

In the qualitative portion of the study and in FGDs, female students reported that most female students had sexual intercourse when they were under the influence of alcohol. This was especially the case in their sexual debut.

In this study, current alcohol users were 4.18 times more likely to engage in risky sexual behaviors than those who never used alcohol. The frequency and consistency of condom use was asked of respondents who ever had sexual intercourse. Out of the total respondents who ever had sexual intercourse, 43.7% had more than one sexual partner in their lives. Condom use during the first sexual intercourse was reported by 40.8%. Condom use all of the time
with a non-regular sexual partner was at 45.2%. When students had sexual intercourse with commercial sex workers, 90% reported using condoms all of the time. In this study, the frequency and consistency of condom use was very high with commercial sex workers. Condom use all the time after the consumption of alcohol was at 31.3%.

A transactional sexual relationship is defined as the exchange of goods, money, or favors for sexual services. Specifically, younger adolescent girls become involved in a sexual relationship with older men in exchange for basic needs. It is a means of survival but can also be for school and university expenses, gifts, luxury items, or payments for their accounts and living expenses. (6) Of the total respondents who had ever had sex, there were eighteen respondents who reported that they had sexual intercourse in exchange for money, gifts, or favors. Transactional sexual relationships occur between teenaged girls and men who might be twenty or more years older. These girls are much less likely to negotiate the use of condom. (7) In this study, of the eighteen respondents who had transactional sex, only three of them used condoms all the time when having sexual relations.
Conclusions

Most of the students who participated in this study knew students who abused substances either always or frequently. Smoking cigarettes and chewing khat were the most abused substances. From this study, one could conclude that the frequency and consistency of condom use was less than 50%. The exception was with commercial sex workers. In the qualitative study, alcohol use influenced condom use. The prevalence of alcohol use was high followed by khat and cigarettes. In the logistic model, the association between alcohol use was found statistically significant when adjusted for cigarettes and khat. The association between khat chewing and cigarette smoking and high-risk sexual behaviors was also significant in their crude odds ratio. This study identified that a substantial proportion of students engaged in risky sexual behaviors and that the use of alcohol, cigarettes and khat was significantly associated with risky sexual behaviors among the students.
Recommendations

The HIV/AIDS policy at Addis Ababa University calls for an active role by the university in fighting HIV/AIDS. The university must recognize there is a problem with substance abuse, which leads to risky sexual behaviors and possibly HIV/AIDS. It is recommended that university administration design strategies that control substance abuse in its student body. Abstinence from sexual intercourse is the only completely effective means to prevent HIV infection, other STIs, and pregnancy. However, the correct and consistent use of condoms can reduce the risk of STI infection including HIV. Condoms can also prevent unwanted pregnancies. The university is called upon to advocate correct and consistent condom use among sexually active students.

HIV prevention education should be developed and implemented with the active involvement of all AAU students. This health education should address the knowledge needs of both students who are not engaging in sexual intercourse as well as those who are currently sexually active. HIV prevention education could be strengthened by integrating it with the sexual and reproductive health services provided by the university in university-based health services delivery.
Finally, activities that promote gender equity should be implemented by the university in all activities related to HIV/AIDS.

References


Knowledge, Attitudes, and Practices Regarding Pulmonary Tuberculosis among Adults in Dubti Woreda, Afar Region, Ethiopia

Abdella Mohammed Ibrahim

Abstract

*Background:* Ethiopia is ranked seventh among the high burden countries in the world for eighty percent of the tuberculosis (TB) cases in the world. At the same time, TB is the sixth most dangerous infectious disease according to the World Health Organization (WHO). Clearly, TB poses a severe threat to human life. In Africa, TB is the third leading cause of outpatient morbidity and inpatient hospital death. Raising knowledge, improving attitudes towards the disease, and increasing preventive practices (KAP) about TB can be an important factor in reducing patient delay in seeking care, improving adherence to TB treatment, and enhancing its prevention. Little is currently known about the level of KAP about TB in Ethiopia in general, and more specifically, in the Afar region of Ethiopia.
Objectives: To assess the KAP regarding TB among adults in Dubti woreda located in the Afar region.

Methods: A community-based, cross-sectional study was conducted from December, 2010 to April, 2011 using a pre-tested interviewer-administered questionnaire in the Dubti woreda. A total of 846 adults were selected by a multi-stage sampling technique.

Results: A total of 818 heads of households participated in the survey for a response rate of 97%. Nearly all 786 (96%) of participants had heard of TB and “the wind” was most frequently cited as the cause of the disease. Negative attitudes towards people with the disease and the disease itself were at 57.5% of the respondents. Better than half (66.1%) of the respondents indicated inadequate practices for its prevention. The independent variables that were significantly associated with the dependent variable were gender OR=1.40 with 95% CI (1.00, 1.95), residence OR=0.42 with 95% CI (0.28, 0.62), education OR=0.68(0.46, 0.96), family income OR=0.68 with 95% CI (0.46, 0.96) and attitudes towards TB.

Conclusions and Recommendations: The respondents were familiar with the disease although more respondents thought that TB was caused by “wind” rather than by a bacterium. There were negative and even discriminatory attitudes towards disease victims and the
disease itself. Preventive practices regarding TB like covering coughs, medical examination of close contacts of TB victims, and ventilation of rooms were found to be low. The regional health bureau should design culturally sensitive intervention strategies that enable TB programs to be successful with a focus on knowledge increases, improved attitudes towards the disease with recognition of its effective treatment, and prevention practices.

**Introduction**

It is estimated by WHO that one third of the world population is infected by the bacteria that causes TB and that one in ten of those infected will develop active symptoms at some point in their lives. (1) The morbidity and mortality rates for TB continue to increase rapidly. Annually, nine million people contract active TB and approximately three million people die of the disease. Of note, a higher proportion of deaths occur among children than adults. Also, the fatal synergy of the HIV infection and TB, and the emergence of multidrug resistant Mycobacterium TB have further contributed to a re-emergence of TB in many part of the world including Africa. (2,7)
A report of the Federal Ministry of Health- Ethiopia (2005) states that TB was the third leading cause of outpatient morbidity and inpatient hospital death. Although the disease is serious, current studies conducted in Ethiopia concerning community-based knowledge, attitudes, and practices about pulmonary TB are few. Evidence of such studies has not been found in Dubti woreda. Therefore, the findings of the study may provide insight into designing problem-oriented and culturally sensitive intervention strategies that will enable the Directly Observed Treatment-Short Course (DOTS) program to be more successful.

**Objectives**

*General Objective:*

The general objective of this study was to assess the knowledge, attitudes, and practices of adults towards TB in Dubti woreda located in the Afar region of Ethiopia.

*Specific Objectives:*

1. To describe adult knowledge on signs and symptoms, the cause, the transmissibility, and curability of pulmonary TB.
2. To describe adult attitudes towards both TB victims/patients and the disease.
3. To describe adult practices on the prevention and control of pulmonary TB.
4. To identify factors associated with the practice on prevention and control of TB among adults.

Methods

Study Design: A community-based quantitative cross-sectional study design was used to assess knowledge, attitudes, and practices of the study participants about TB from December 1, 2010 to April 30, 2011.

Study Area and Period: This study was conducted at Dubti woreda in the Afar regional capital city of Sumara. The study was conducted from December 1, 2010 to April 30, 2011.

Study Subjects: The study subjects were heads of households who were eighteen years old and above. Only those who had a permanent residence in the woreda were included in the study population.

Sample Size Determination: The prevalence of KAP regarding TB could not be reliably assessed. Therefore, a 50% estimated prevalence was selected for KAP on TB in the community to get the maximum sample size for this study. Considerations included a
95% CI, a 5% error, and a design effect of 2 to adjust for a multi-stage sampling technique. A ten percent contingency was added to compensate for non-response. The actual sample size required was calculated by using the standard formula for single proportion. Finally, the sample size was calculated at 846.

**Sampling Techniques:** A multi-stage sampling technique and a simple random sampling lottery method were used to select study units. Out of as possible sixteen kebeles, five kebeles were randomly selected with two from the rural area and three from the urban area. Houses were visited by spinning a pen starting from the center of each kebele and heads of the households were interviewed. Every other household was visited.

**Study Variables**

*Dependent Variables:* The dependent variables were knowledge, attitudes, and practices.

*Independent Variables:* The independent variables included socio-demographic and socio-economic variables including age of the respondent, gender, place of residence, occupational status, educational status, marital status, family size, average income, and religion.
Data Collection Methods and Instruments Used: A structured, pre-tested, interviewed-administered questionnaire was developed in Amharic and translated into English. The questionnaire was prepared as simply and as user-friendly as possible for the benefit of the data collectors and respondents. Pre-testing was conducted on twenty-five households in a nearby woreda and a structured questionnaire with closed-ended questions was employed to collect the data from the study participants. The data collection was completed by five health extension workers (HEWs) and five data collectors who had completed grade twelve schooling. Supervision was conducted by the principal investigator during data collection for timely editing of the data and to provide feedback to the data collectors.

Data Analysis: Data from all the questionnaires were coded, entered, and cleaned to check for completeness, outliers and missed values and variables. Epi-Info was used for this activity. Finally, data were exported to SPSS Version 15 for analysis. Frequencies and cross tabulations were computed for a descriptive analysis of the data. Associations between determinant factors and practices of participants regarding TB were analyzed using bivariate and multivariate logistic regression. Odds ratio and a 95% confidence interval were calculated to measure the associations.
Ethical Considerations: Ethical clearance for the study was provided by the Haramaya University Institutional Research Ethics Review Committee in consultation with Addis Continental Institute of Public Health (ACIPH). Data were collected after getting ethical clearance from the Afar Regional Health Bureau. Informed verbal consent was obtained from all study participants. Each respondent was informed of the purpose of the study and privacy during data collection was insured. In collecting the data, there was no risk or discomfort to the participants. The study participants were assured that their participation was voluntary and they were free to terminate their study involvement at any time.

Operational Definitions

Pulmonary TB: Active TB affects the lungs and causes a persistent cough sometimes with blood sputum, chest pain, exhaustion, night sweats, fever, and shortness of breath.

Knowledge: In this study, knowledge was measured based on respondent’s ability to answer questions about signs, symptoms, causes, transmission, the mode of transmission, severity, curability, preventability, and methods of prevention of TB. Respondents with a total score equal or above the median were classified as having
good knowledge while those below the median were considered to have poor knowledge.

**Attitudes:** A tendency of mind or a relatively constant feeling towards a person and/or situation. An attitude can be either be generally positive or negative. In this study, attitudes were assessed in terms of what persons felt or preferred to do regarding a TB patient and the disease. Respondents with a total score equal to or above the median were classified as having good attitudes while those below the median were considered to have poor attitudes.

**Practices:** Practices deals with health behaviors that either promote health or prevent disease or do not. Asking what the individual did regarding TB was assessed. The practices of prevention and/or control by a person that aimed to cure or prevent the disease was investigated. Examples of practices included covering their coughs and sneezes, open ventilation of rooms, and having people in close contact with a TB patient checked. Respondents with a total score equal to or above the median were classified as having good practices while those below the median were considered to have poor practices.
Results

A total of 846 heads of households participated in the survey. Of this total, 28 (3.30%) persons filled in the questionnaire with gross errors and these were excluded from the analysis. Hence, the final analysis was made based on 818 completed questionnaires and the response rate was 96.70%.

Of the total 818 respondents who responded to the questionnaire properly, 346 (42.4 %) were males. The mean age was 32 years with a range between 18 and 67 years. With regard to educational status, the majority 681 (88.8%) of the respondents were not literate and 85 (11.1%) had completed high school or university.
<table>
<thead>
<tr>
<th></th>
<th>Frequency (Total=818)</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>471</td>
<td>57.6</td>
</tr>
<tr>
<td>Male</td>
<td>346</td>
<td>42.4</td>
</tr>
<tr>
<td>Total</td>
<td>817</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Can't write and read</td>
<td>400</td>
<td>49.2</td>
</tr>
<tr>
<td>Can write and read</td>
<td>147</td>
<td>18.1</td>
</tr>
<tr>
<td>Primary</td>
<td>130</td>
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<td>Secondary</td>
<td>94</td>
<td>11.6</td>
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<td>University</td>
<td>42</td>
<td>5.2</td>
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<tr>
<td>Total</td>
<td>813</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Residence</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Town</td>
<td>535</td>
<td>66.1</td>
</tr>
<tr>
<td>Rural</td>
<td>274</td>
<td>33.9</td>
</tr>
<tr>
<td>Total</td>
<td>809</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Marital Status</strong></td>
<td></td>
<td></td>
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<tr>
<td>Married</td>
<td>625</td>
<td>77.4</td>
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<tr>
<td>Single</td>
<td>173</td>
<td>21.4</td>
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<tr>
<td>Other</td>
<td>10</td>
<td>1.2</td>
</tr>
<tr>
<td>Total</td>
<td>808</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Occupation</strong></td>
<td></td>
<td></td>
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<tr>
<td>Farmer</td>
<td>148</td>
<td>18.2</td>
</tr>
<tr>
<td>Housewife</td>
<td>296</td>
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<td>Merchant</td>
<td>124</td>
<td>15.3</td>
</tr>
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<td>Government</td>
<td>162</td>
<td>20.0</td>
</tr>
<tr>
<td>Student</td>
<td>70</td>
<td>8.6</td>
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<tr>
<td>Other</td>
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<td>1.4</td>
</tr>
<tr>
<td>Total</td>
<td>811</td>
<td>100.0</td>
</tr>
</tbody>
</table>
A total of 786 (96.8%) of respondents had heard about a disease called TB. From those who had ever heard of TB, 38% (n=300) had experienced a persistent fever, 18.6% (n=147) indicated chest pain; 70.2% (n=574) indicated a prolonged cough for two or more weeks, and 24.8% (n=196) indicated weight loss. In addition, 21.1% (n=173) indicated a loss of appetite; 15.3% (n=121) indicated significant night sweats. When the respondents were asked about how contagious TB was, 92.4% (n=756) replied that TB was a contagious disease while the remaining 3.8% (n=30) replied that TB was not. More than half of the responded stated that the wind was the source and cause of TB. In summary, of all of the respondents, 41.2% were determined to have sufficient knowledge about the disease.
Figure 1. The Views of Respondents about the Perceived Cause of TB.

When the heads of households were asked “Can TB be cured?” more than 90% replied that TB was a curable disease while 2.9% and 2.0% responded that TB was not a curable disease or they did know, respectively.

*Attitudes of Adults towards TB:* In this study, attitudes were assessed and out of the total 818 respondents with certain questions related to attitudes, 651 (82%) responded that all pulmonary TB patient did not have AIDS and 44 (5.6) responded that they did, and 283 (36%) of the respondents felt normal after having an exposure to the disease while 286 (35.3%) did not and a large number of
respondents 418 (53%) were not afraid patients of TB. The majority of the respondents 714 (89.7%) continued their friendships with patients diagnosed and treated for TB and 755 (95.3%) reported that they provided support and care to relatives with TB. About half 382 (49.6%) of respondents hid their disease status keeping it a secret. A total of 542 (69%) reported no shame in having TB while the remaining one-third reported shame.

Practice of Adults towards TB: Of all the respondents, 273 (34.5%) reported that they ever had a relative with a cough for two or more weeks. The respondents were then asked where they had taken treatment. Out of those who had a relative with a cough of two or more weeks, the majority (83.3%) said they visited a government health institution for treatment.

Table 2. Bi-Variate and Multivariate Logistic Regression Analysis of Factors Associated With Practice of TB Among Adults in Dubti Woreda Afar Region Ethiopia, 2011

<table>
<thead>
<tr>
<th>Predictor Variables</th>
<th>Practice Adequate (%)</th>
<th>Practice Inadequate (%)</th>
<th>COR (95% CI)</th>
<th>AOR(95%CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>126(15.4)</td>
<td>210(25.7)</td>
<td>1.34(0.99, 1.81)</td>
<td>1.40(1.00, 1.95)</td>
</tr>
<tr>
<td>Female</td>
<td>150(18.3)</td>
<td>332(40.6)</td>
<td>1.00</td>
<td>1.00</td>
</tr>
</tbody>
</table>
Discussion

It is widely known that TB is one of the top serious diseases in Ethiopia and leads to significant morbidity and mortality in youth to the elderly. The TB rates continue to increase and these rising...
rates are a concern to public health and medical professionals in Ethiopia.

At the same time, this research demonstrated a knowledge level of the participants having ever heard about TB at 786 (96.8%). These statistics are generally congruent with studies conducted in Awash Valley, Tigray, and Arbaminch, (13,14,22)

In analyzing factors associated with the outcome variable using bi-variate and multivariate logistic regression analysis, males were 1.45 times more likely to practice prevention than women with (OR = 1.45; 95% CI,1.0,1.92) This indicates an association between sex and practice of TB on the prevention and control aspect of disease transmission. With regard to residence, participants who lived in urban kebeles were 58% times more likely to practice prevention and control measures than rural residents with (OR=0.42; 95% CI, 0.28, 0.62). This demonstrates an association between residence and practice in terms of prevention and control of TB where those from urban areas more liked to practice than those from rural areas.

The educational status of participants was assessed. The more literate respondents were more likely to practice prevention and control methods than the low literate persons (OR= 1.5, 95% CI, 1.02, 2.32). Those participants with a family income that was equal
to the median income of ETB500 were more likely to practice prevention and control than participants with family Income less than ETB500 (OR=0.68; 95% CI, 0.48, 0.96) This indicated a statistically significant association between the independent variable of “family income” and dependent variable of ”practice” of the respondents. Finally, when attitudes towards TB were examined, those participants with negative attitudes were 60% less likely to practice prevention and control than those with positive attitudes (OR=0.60; 95% CI, 0.43, 0.85).

**Conclusions**

The knowledge levels of the study participants regarding TB were found to be generally high although the concept that the wind was the greatest cause of TB was a concern regarding a lack of understanding of the germ theory. Attitudes were found to be negative towards both persons with TB and the disease itself. Prevention and control practices towards TB were found to be low. Factors associated with practices such as gender, residence, education level, monthly income, and attitudes were found to have significant associations with prevention and control practices towards TB. At the same time, age, family size, and knowledge were found to have no association with the outcome variable.
Recommendations

Serious problems associated with TB and its prevention, treatment, and control, were identified in this research study. These problems concern knowledge issues, attitudes about the disease and persons with the disease, and prevention and control practices. Given these problems, comprehensive health promotion programming is warranted.

1. Health educate the individual, family, and community on TB. This health education needs to be conducted by all health care providers when they see their patients. Health education can be in the form of simple conversations supplemented by posters or brochures. Conversations supplemented by audio-visuals can provide accurate information about the cause, disease signs and symptoms, treatment protocols and, importantly, control and prevention of the disease.

2. Socially mobilize the TB program efforts in the area.

3. Provide ongoing in-service education of all health care providers on the topic and treatment of TB.
4. Involve community leaders in encouraging TB awareness, prevention, and control in the community setting. This can be done by community conversations, coffee ceremonies, and other culturally sensitive avenues in both the rural and urban settings.

References


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Tuberculosis in HIV-positive Patients After Initiation of HAART at Adama Hospital, Adama, Oromia Regional State, Ethiopia

Birru Shigut

Abstract

Background: Tuberculosis (TB) remains the major opportunistic infection and the leading cause of morbidity and mortality in people living with HIV/AIDS (PLWHA) in the least developed countries globally including Ethiopia. This infection occurs even in the presence of highly active anti-retroviral therapy (HAART). There is a lack of adequate and recent evidence on the extent of TB after the initiation of HAART.

Objective: The objective of the study was to determine the incidence rate of TB and the risk factors associated with incidence of TB among HIV-positive patients after beginning HAART.

Methods: A retrospective, longitudinal, follow-up study was conducted. Routinely collected patient baseline and follow-up data from July, 2008 to January, 2011 were collected and analyzed. The incidence rates of TB were determined at various periods after HAART initiation. The Cox proportional hazard regression model
was used to identify risk factors associated with the incidence of TB.

Results: Medical records of 816 patients were reviewed. The median follow-up of HAART was 21 months. A total of 74 (9.1%) TB cases were observed over 1,336 person years of follow-up. The overall TB incidence rate was 5.54 cases per 100 person-years (py) 95% CI [4.35, 6.95]. The incidence rate of TB per 100 py [95% CI] at 0-3, 4-6, 7-12 and above 12 months of follow-up were 13.37 [8.81, 19.45], 11.52 [7.22, 17.4], 3.74 [1.99, 6.39] and 2.02 [1.04, 3.52], respectively. The TB incidence rates were independently associated with WHO clinical stage VI and a low initial hemoglobin level (adjusted hazard ratio [95% CI]); 4.03 [1.59, 10.23] and 3.10 [1.53, 6.26], respectively.

Conclusions and Recommendations: The incidence rate of TB was found to be high during the first six months of HAART and it decreased six fold after one year. The baseline advanced WHO clinical stage IV and anemia- at moderate to severe levels- were independently associated with risk of TB infection during HAART. Aggressive case finding for TB should be an essential component of standard clinical care in HIV-positive patients and especially during their initial period on HAART.
Introduction

Tuberculosis is the major opportunistic infection and the leading cause of morbidity and mortality in people living with HIV/AIDS (PLWHA). (1) The rapid growth of the HIV epidemic in many developing countries has resulted in an equally dramatic rise in the estimated number of new TB cases in these countries. (2) Highly active anti-retroviral therapy (HAART) has reduced TB incidence among PLWHA. However, patients on HAART continue to develop active TB or suffer from subclinical TB following the introduction of HAART. (3)

Globally, Ethiopia has historically been among the twenty-two high burden TB countries with an estimated annual incidence of new smear PTB and all forms of TB in 2009 at 163 and 378 per 100,000 populations, respectively. (1,4) Literature reveals that HIV infection was the most powerful risk factor for contracting active TB among individual with a latent TB infection. (5)

The magnitude of TB in patients receiving HAART is still greater than among HIV negative individuals. Moreover, TB remains the major cause of morbidity and mortality among patients receiving HAART. In this regard, there is lack of recent evidence on the incidence rate of TB after HAART and an identification of those
risk factors associated with contracting the disease. Evidence-based information in these areas may be important for TB program managers and medical care providers in designing and implementing the right strategies and interventions to improve the quality of services and quality of life of the patients.

**Objectives**

*General Objective:*
The objective of this study was to determine the incidence rate of TB and identify factors associated with TB after HAART among a cohort of HIV-positive patients initiating HAART between July, 2008 and June, 2009 at Adama Hospital, east Showa, Oromia Region State, Ethiopia.

*Specific Objectives:*
1. To determine the TB incidence rate among HIV-positive patients initiated on HAART between July, 2008 and January, 2009 at Adama Hospital.
2. To identify factors associated with the risk of contracting TB after HAART initiation among patients on HAART between July, 2008 to June, 2009 at Adama Hospital.
Methods

Study Area and Period: The study was conducted in Adama Hospital which is one of the public hospitals that has been providing free ART services for more than five years. The Adama hospital is in the Oromia region of Ethiopia. TB diagnostic and treatment, services are provided according to revised national medical guidelines for the disease. (6, 7)

Study Design: The study employed a retrospective, longitudinal, follow-up design.

Source Population: All HIV-positive patients who had initiated HAART in public hospitals in the east Showa zone.

Study Population: The study population included all HIV-positive patients who had initiated HAART between July, 2008 and June, 2009 and who met the inclusion criteria.

Inclusion Criteria: Those included in the study were all HIV-positive patients who had begun HAART and had a complete medical record (i.e. register, intake forms, and complete follow-up forms).

Exclusion Criteria: Those excluded from the study were: (1) patients taking TB treatment or diagnosed with active TB at the initiation of HAART, (2) patients who did not complete their
follow-up visits during the study period, and (3) patients who were ages less than 15 years.

*Sample Size Calculations:* The finite population correction formula for a single population rate was used to determine the required sample size. For the second specific objective, two population proportion formulae were computed to determine the sample size for the exposure variables (WHO Stage I-III, and IV, CD4 <200 and CD4 ≥200 cell/ul). A 10% non-response rate (i.e. an incomplete medical record) was also included.

All eligible records of the patients were reviewed. As a result, out of 1,675 patients who were enrolled and had initiated HAART during the selected one-year period, a total of eight hundred sixteen (816) patients were considered for the current analysis.

**Study Variables**

*Dependent Variable:* The dependent variable was incidence of pulmonary and extra-pulmonary TB after initiation of HAART.

*Independent Variables:* There were multiple independent variables. These included baseline socio-demographic patient characteristics such as age, gender, marital status, residence, occupation, and educational status. Baseline clinical and
immunologic characteristics were also independent variables and included CD4 cell counts, WHO clinical stage, functional status, baseline HGB level, past TB, IPT, and past CPT.

Data Collection Procedures: The routinely collected patient data from July, 2008 (date of initiation of HAART) to January, 2011 (the end of the study) were collected by using observation checklists. These data were collected during the months of February and March, 2011. Data on the incidence of TB was reviewed from follow-up charts and laboratory reports. Varied formats were used for a single patient in the case of incomplete records. Two data collectors and one supervisor were recruited and trained for one day on proper data collection procedures.

Data Management: The completeness and consistency of collected data were checked and corrected. Data were cleaned and coded manually before data entry. Epi Info Version 6 was used for data entry. SPSS Version 16 and OpenEpi software were used for data analysis. Person-years and person-months of follow-up were computed. A MS-Excel window spreadsheet and OpenEpi software were used to compute the incidence rates of TB with a 95% CI for rates.

Statistical Analysis: Simple frequency distribution was calculated to describe the characteristics of the study participants. Median
with inter-quartile ranges (IQR) were used to describe continuous variables. The Cox proportional hazards regression modeling was used to evaluate those factors associated with the incidence of TB. Independent variables were included in multivariate models if univariably associated with risk of TB at a p < 0.2 significance level. Baseline CD4 cell counts, age, and gender were included in the model. Statistical tests were considered significant if the two-sided p-value was < 0.05 at a 95% CI.

Ethical Considerations: Ethical clearance was secured from Addis Continental Institute of Public Health. Letters of permission were obtained from Oromia Regional Health Bureau. The Adama Town Health Office and the Adama Hospital were contacted and received official letters of permission to conduct the study. Patient records and routinely collected clinical information were collected and were used only for the intended purpose of research.

Results

Socio-demographic Characteristics of the Study Subjects: Out of the 816 study participants, 61% were from the urban area and 57% were females. One-third of study subjects (243) had no primary education. A total of 9% of the study subjects were working and
7.2% did not work due to poor health. The median age at initiation of HAART was 35 years IQR [31- 44]. A total of 77% (619) study subjects had a working baseline functional status. Of all of the study subjects, only 12.8 % (102) patients had received IPT, but 74 (75%) had completed the six month IPT course before the initiation of HAART.

Clinical and Immunologic Characteristics of the Study Subjects:
Out of the 816 study subjects, 693 (85%) had a WHO clinical stage III and IV while only 15% had a WHO stage I and II. Twenty-three percent (189), 41% (323) and 36% (289) had baseline CD4 cell counts at <100 cell/ul, 101-200 cell/ul, and >200 cell/ul, respectively. Baseline median CD4 counts, HGB levels and weights were 167cells/ul [IQR; (105-224)], 12.6gm/dl [IQR; (11.2-13.6)], and 52 kg [IQR; (45-59)], respectively. The median follow-up duration in months [IQR] was 21.4 [16-27].
Incidence of TB after Initiation of HAART: Seventy-four (9.1%) TB cases were diagnosed over 1,336 person-years (PY). The overall incident rate of TB was 5.54 cases per 100-person years. No incident TB was recorded after 24 months of HAART over 608 py. At the time of diagnosis of TB, the median CD4 cell counts for 74 new TB cases was 195 cell/ul [IQR; (138-288)] which was greater than the baseline median CD4 cell count of 167 [IQR; (108-228)] for the whole study population. Of the 74 new TB cases diagnosed, 55% were females. The majority (88%) had a baseline WHO clinical stage III or IV.
Figure 2. Incidence Rate of TB and Duration after HAART among Study Subjects from July, 2008 to January, 2011, Adama Hospital, Ethiopia

Risk Factors Associated with Incident TB During HAART: In Univariate Cox-regression analyses, the socio-demographic characteristics of the patient (age, gender, marital status, residence, and education) were not associated with incident TB. Similarly, baseline CD4 cell level, the regimen type, past history of TB and CPT were not associated with the risk of TB during HAART. However, a baseline WHO clinical stage IV, anemia, and functional status were found to be significantly associated with risk of contracting TB in bivariate Cox regression analysis. In multivariate analysis, only baseline anemia and WHO clinical stage IV were independently associated with risk of contracting TB during HAART.
Table 1. Multivariate Cox Regression Analyses and Model Fit of Risk of TB Incidence after HAART Initiation among Study Subjects in Adama Hospital from July, 2008 to January, 2011, Adama, Ethiopia

<table>
<thead>
<tr>
<th>Variable</th>
<th>Bivariate</th>
<th>Multivariate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Crude HR[95%CI]</td>
<td>P value</td>
</tr>
<tr>
<td><strong>Base Line WHO</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clinical Staging</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stage I &amp; II</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Stage III</td>
<td>1.51 [0.69, 3.33]</td>
<td>0.30</td>
</tr>
<tr>
<td>Stage IV</td>
<td>3.86 [1.56, 9.58]</td>
<td>0.004</td>
</tr>
<tr>
<td><strong>BaseLine CD4 Counts</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; 200 cells/ul</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>101-200 cell/ul</td>
<td>1.182[0.65, 2.20]</td>
<td>0.573</td>
</tr>
<tr>
<td>≤ 100 cells/ul</td>
<td>1.92 [0.70, 2.01]</td>
<td>0.538</td>
</tr>
<tr>
<td><strong>CPT</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Yes</td>
<td>0.470[0.19, 1.17]</td>
<td>0.10</td>
</tr>
<tr>
<td><strong>Baseline IPT Status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>No</td>
<td>4.02[0.96, 16.39]</td>
<td>0.052</td>
</tr>
<tr>
<td><strong>Baseline Anemia</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No anemia</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Mild anemia</td>
<td>0.99[0.603,1.624]</td>
<td>0.967</td>
</tr>
<tr>
<td>Moderate to severe</td>
<td>3.28[1.637,6.582]</td>
<td>0.001</td>
</tr>
</tbody>
</table>

*Controlled for the effect of gender and age, base line CD4 level HR= Hazard Ratio, AHR= Adjusted Hazard Ratio, CI confidence interval
Discussion

It was revealed in this study that the overall incidence rate of active TB among patients on HAART at Adama hospital was 5.54 per 100 person years. The incidence was higher in the first few months and decreased over time. The baseline WHO disease Stage IV and baseline anemia were independently associated with risk of contracting TB during HAART.

The overall TB incidence rate of 5.54 per 100 person years with 74 cases in 1,336 person years was consistent with finding from a cohort study in Burkina Faso with 5.77/100 person-years. (8) The rate was less than the findings from Arbamich Hospital located in southern Ethiopia which was 3.7 per 100 py at 6 cases in a 162 person year observation. (9) In comparison with other findings from sub-Saharan African countries, the incidence rate was lower than in Kenya at 17.6 per 100 per py and Malawi with 14.3 per 100 py (10) The discrepancy in the incidence rate might be due to differences in the follow-up period of the study and difference in the overall burden of TB in the general populations of the countries under study.

The incidence rate of TB was significantly higher during the first six months of follow-up compared with the months that followed. The incidence rate continued to decrease six fold from 12.47 per
100 py during first six months to 2.02 per 100 py after 12 months. This is consistent with published studies in sub-Sahara Africa. (8, 11, 12)

The peak in TB incidence shortly after HAART initiation may be due to the unmasking of previous subclinical disease or the deterioration of a pre-existing disease as a result of the reconstitution of the immune system during the initial months of HAART. (13, 14).

Baseline WHO Stage VI [AHR: 4.03 and p=0.003] and anemia [AHR: 3.1, P=0.002] were found to be independently associated with the risk of TB incidence during HAART. Similarly, a mild or moderate baseline hemoglobin level was identified as an independent risk factor for incidence of TB after HAART initiation (adjusted hazard ratio [95%CI]: 4.95 [1.36, 13.29]). This finding is consistent with a recent study from a South Africa prospective cohort study revealing baseline anemia as the strongest risk factor for early and late development of TB during HAART. (15)

The relative hazard of TB during HAART among patients without IPT were 3.95 times higher than those with IPT (95% CI; [0.98, 16.9]; p= 0.06] which was not statistically significant at p<0.05. Even though previous evidence had shown IPT could protect against a reactivation of latent TB up to 60% over a two to
three year period (6), the low power of the study in detecting the protective effect of IPT against incident TB may have been a possible reason in this current study.

Limitations of the Study: The effects of some variables that were not captured by routine services records (HMIS) were not controlled in the analysis of risk factors and the analysis of some variables were difficult due to a lack of power for some of the variables.

Conclusions

It was concluded that the incidence rate TB is higher during the few months after HAART initiation. After six months of HAART follow up, however, the risk of TB incidence is significantly reduced over the remaining follow-up period. The reduction was most marked in the patients who had a longer follow-up duration. Patients with initial WHO clinical stage VI and moderate to severe anemia had a greater risk of developing TB during HAART follow-up. Delaying HAART initiation until an advanced WHO clinical stage would increase the risk of TB incidence after HAART initiation.
Recommendations

1. A high TB incidence rate during first six months of HAART initiation indicates the need for TB preventive therapy as a priority intervention during pre-HAART phase.

2. Aggressive TB case finding must be an essential element of standard clinical care in HIV-positive patients.

3. Continuous symptomatic screening for TB and careful monitoring of HIV infected patients during the initial months of HAART is crucial for early detection and treatment of TB.

References


Tuberculosis in HIV-infected Adults who Completed Isoniazide Preventive Therapy in Four Public Health Facilities of Dire Dawa City Administration, Ethiopia

Demelash Habtie

Abstract

Background: Tuberculosis (TB) is the most frequent life-threatening opportunistic disease and the leading cause of death in HIV-infected people. At the same time, antiretroviral therapy (ART) is the single most important way to reduce the incidence of TB in people living with the HIV infection. However, people with HIV on ART remain highly vulnerable to TB. Taking a six-month course of Isoniazide Preventive Therapy (IPT) is known to reduce the risk of TB in people with HIV and latent TB by 32-64% for two to three years. This study attempts to examine these issues further.

Objective: To determine the TB incidence rate and the predictors of TB incidence among HIV-infected adult patients who completed IPT in a public health facility providing both IPT and ART services in Dire Dawa City Administration in Ethiopia.

Methods: The study design was a retrospective cohort with HIV-
positive patients who completed IPT. A total of 388 HIV-positive patient records of those who initiated IPT in HIV chronic care between May, 2008 to July, 2009 were reviewed retrospectively from the date of IPT completion until January, 2011. Time to development of TB was estimated using the Kaplan-Meier method. The bivariate and multivariate Cox proportional hazards regression model was used to evaluate the relative effect of selected variables on the incidence of TB.

Results: The overall TB incidence rate was 1.43 per 100 person-years of observation (95% CI: 0.57, 2.95). The median follow-up time following completion of IPT was 16 months. The Kaplan Meier estimates of 16 months of cumulative TB-free survival were 97.5%. BMI was found a predictor as HIV-infected patients who completed IPT and had a BMI <16.9Kg/m² were at a greater risk of TB incidence (AHR: 7.57, 95% CI: 1.51, 37.91).

Conclusions and Recommendations: The TB incidence rate was 1.43 per 100 person-years of observation which was low in comparison with other studies in Ethiopia. The body mass index was the independent predictor of TB incidence identified in this study. Therefore, a decrease in TB incidence in HIV-infected patients who complete IPT can be expected if the nutritional status of the patients is adequate.
Introduction

Globally, there were 9.27 million cases of TB in 2007. Most of the cases were located in Asia and Africa constituting 55% and 31% of all cases, respectively. (1) Of the 9.27 million TB cases, an estimated 1.37 million were with HIV-positive persons. (1, 2) Ethiopia, which continues to be one of the least developed countries (LDC) in the world, is seventh in the world for TB with an estimated annual incidence of 163 per 100,000 for new smear positive pulmonary TB and 378 per 100,000 for all forms of TB cases. In addition, the TB/HIV co-infection rate in Ethiopia is estimated at 19%. (1,3).

Ethiopia implemented an IPT program as a part of a collaborative TB/HIV intervention in 2004 to more effectively deal with the TB/HIV problem. However, a WHO 2009-2010 report showed that only 23% of people living with HIV/AIDS (PLWHA) were taking the IPT intervention. (4) Statement of the Problem: The HIV and TB co-infection is a major public health threat to people living with HIV. It directly jeopardizes the success of any ART effort. (2) ART is the single most important way to reduce the incidence of TB in people living with HIV. However, people with HIV on ART remain
highly vulnerable to TB (2, 5). Urgent action is thus required to prevent, diagnose, and treat TB in people living with HIV. Their families and their communities must also be involved. IPT decreases the risk of progression to active disease in those with recent infection and decreases the risk of reactivation of latent disease. Yet, published data on IPT effectiveness integrated into routine health care services are limited. The risk of TB in HIV-infected patients who completed IPT and time to TB occurrence has not been studied in this area. Understanding of this issue provides information to optimize an effective implementation of IPT programs among HIV-infected patients.

**Objectives**

**General Objective:**
To determine the TB incidence rate and predictors of TB incidence among HIV-infected adult patients who completed IPT in a public health facility providing IPT and ART services in the Dire Dawa City Administration.

**Specific Objectives:**
1. To determine TB incidence rate among HIV-positive patients who completed IPT.
2. To determine time to TB incidence among HIV-positive
patients who completed IPT.

3. To determine any predictors of TB incidence among HIV positive patients who completed IPT.

Methods

Study Area and Period: The study was conducted in four public health facilities providing ART and IPT services in Dire Dawa City Administration. They included Dile Chora Referral Hospital, Sabian Health Center, Dire Dawa Health Center, and the Legehare Health Center. The study period was from November, 2008 to January, 2011.

Study Design: The study design utilized was a retrospective cohort study of HIV-positive patients who had completed IPT. Hence, the charts of HIV-positive patients who initiated IPT between May, 2008 to July, 2009 were reviewed retrospectively from the date of IPT completion until January 2011.

Source Population: The source population was all PLWHA who had initiated IPT in four selected public health facilities providing ART and IPT service.

Study Population: The study population was all PLWHA who had initiated IPT between May, 2008 to July, 2009 and had completed the six-month regimen of IPT from the date of initiation.
Sample Size Determination: A single population rate for the incidence of TB among HIV-infected patients who completed IPT was calculated. First, the IPT completion rate was estimated using a finite population correlation formula for a single population proportion with 95% CI, 3% margin of error, \( p=0.78 \) (where \( p \) referred to expected IPT completion rate taken as 0.78 from another study. (6) The required number of IPT completers became 496. The final sample size (n) was 307 and was calculated manually using the finite population correlation formula for an estimation of the single population rate for incidence of TB among HIV-infected individuals who completed IPT. A 95% CI, \( d = 1 \) per 100 PYO and expected incidence rate, \( r =1.39 \) per 100 PYO from another study was considered. (7)

Sampling Procedures: One public hospital and three health centers in Dire Dawa City Administration were used. Those patients who started ART and IPT services earlier were selected to have long follow-up data. The calculated final sample size was 307, but it was decided by the principal investigator to review all eligible adult clients charts who initiated IPT between May, 2008 to July, 2009 and had completed their six month regimens of IPT in HIV-chronic care on the facilities.

Study Variables: The dependant variable of this study was
incidence of TB after IPT completion. The independent variables included socio-demographic factors like age, gender, educational status, marital status, WHO clinical stage at the start of IPT, CD4 cell count at the start of IPT, time of ART initiation, functional status, and a baseline nutritional status using the BMI formula.

Data Collection Methods and Instrument Used: To ensure consistency of the data, HIV care forms, ART follow-up forms with the IPT register including the patient intake form, the PRE and ART registers, and finally, the patient clinical files were used to extract the study data. The data were collected using an altered and structured checklist from the HIV care ART follow-up forms.

Data Quality Control: Before data collection, data collectors were trained on the data collection methods. The principal investigator and supervisor made regular follow-up visits to monitor the quality of the data collection process. In addition, every filled checklist was checked on a daily basis and feedback was given to data collectors to encourage accuracy.

Data Analysis: The data were entered using EPI - Info Version 3.5.1, and then exported, cleaned and analyzed using SPSS Version 16. Descriptive analysis using frequency and summary statistics was conducted to describe the study subjects. Open EPI
was used to calculate the incidence rates of TB with a 95% CI. TB-free survival was estimated using the Kaplan-Meier method. Bivariate and multivariate analysis using stepwise Cox proportional hazard model was used to identify the independent predictors of TB incidence.

_Ethical Considerations:_ The study was approved by an ethics committee in the Addis Continental Institute of Public Health. A supportive letter to the four selected facilities was obtained from Dire Dawa Regional Health Bureau before conducting data collection.

**Results**

A total of 534 HIV-positive patients were IPT-initiated between May, 2008 and July, 2009. Of these 534, 146 were excluded because 46 did not have a patient clinical folder, 17 were less than 15 years of age, and 83 patients had not completed the 6 month IPT regimen. Therefore, a total of 388 HIV-positive adults who completed 6 months of INH prophylaxis were analyzed. Among them, 56.2% (n=218) were from health centers and the remaining 43.8% (n=170) were from Dile Chora Referral Hospital. Females accounted for 69.1% (n=268) of
the study subjects. At the base line, the median age was 31 years (IQR=27-38). The majority of the study subjects were from urban Dire Dawa (89.6%, n=336). About half of the study subjects were married (49.2%, n=191) and 73.84% (n=285) had a primary education and above.

**Baseline Clinical and Laboratory Profile of Patients:** At IPT initiation, 61.6% (n=237) of patients were in WHO clinical stage I and II, 34.3%, (n=132) were in WHO stage III, and 4.2% (n=16) were in WHO stage IV. The majority of the patients (93.4%, n=355) were in the functional status of working and only 6.6% (n=25) of the patients were in the functional status of ambulatory and bed ridden. At baseline, the median CD4 cell count and body mass index (BMI) were 302 cells/µl (IQR, 194-458) and 20.29 kg/m² (IQR, 18.49-22.36), respectively. The majority (74.2%) of the client CD4 cell counts were greater than 200 cells/µl (n=279). Over half (56.7%) of the clients were ART-initiated. Among them, 40.5% (n=89) were initiated before IPT initiation, 38.7% (n=85) of them simultaneously and after IPT initiation, and the remaining 20.9% (n=46) were after IPT completion.

**TB Incidence Rates:** A total of 388 patients contributed 489 person-years of observation (PYO) after IPT completion. Seven
TB cases were diagnosed during the follow-up period which yielded an incidence rate of 1.43 per 100 PYO (95% CI: 0.57, 2.95). The TB incidence rate in a follow-up duration of 6-12 months and more than 12 months after IPT completion was 1.78 per 100 PYO (95% CI:0.36, 5.19) and 2.99 per 100 PYO (95% CI:0.80, 7.64), respectively.

*Time of TB Occurrence after IPT Completion:* The median follow-up period after IPT completion was 16 months (IQR, 13-18). The majority (79.9%, n=310) of the patients were followed over a 12 month period. The median follow-up period between IPT completion and TB diagnosis was 13 months. No TB cases were diagnosed before 6 months after IPT completion. Four TB cases were diagnosed between six and twelve months, and after 12 months of IPT completion, respectively. The overall 16 month cumulative TB-free survival and cumulative hazard of TB incidence was 97.5%, and 2.5% after IPT completion, respectively.

*Predictors of TB Incidence After IPT Completion:* In bivariate Cox regression analysis, age, gender, educational status, marital status, baseline WHO staging number, CD4 cell count, functional status, and time of ART initiation were not statistically significant. However, a BMI<16.9Kg/m was significantly associated with TB incidence. In multivariate Cox regression analysis, only those
variables whose p-values of less than 0.5 in Bivariate Cox regression analysis were entered into the final model. After adjusting for other variables, a BMI of <16Kg/m remained the most powerful predictor of TB incidence (AHR: 7.57, p=0.014).

Discussion

The overall TB incidence rate in HIV-infected adult patients after IPT completion in four public health facility providing IPT and ART services was 1.43 per 100 PYO. The overall cumulative 16-month TB incidence was 2.5% and the Body Mass Index of <16Kg/m² was the independent predictor of TB incidence. In general, the incidence of TB is usually low in chemoprophylaxis studies. This study showed even a lower incidence of TB after IPT completion. This might be explained, in part, by the smaller sample size and a short follow-up period post IPT completion compared to other studies. Also, half of the IPT completers took ART before initiation of IPT and there was the protective effect of IPT on the incidence of TB. This lower rate of TB after isoniazid treatment is closer to a previous incidence rate report with 1.6 per 100 patient-years and 1.7 cases per 100 person-years. (8, 9) This study incidence rate was lower than in
previous study report with 3.5 cases per 100 PYO (10) and 8.9 per 100 PYO (11).

The cumulative hazard of TB was close to, but lower than, the findings from other studies with cumulative 1-year and 2-year TB incidence of 2.1% and 4.6% in 7096 IPT completers, respectively. (12) The efficacy of isoniazid in preventing TB in HIV-infected patients has been shown in both retrospective and prospective studies. (11, 13, 14) The degree of protection described after isoniazide, however, has ranged from six TB cases who received six months IPT in median period of eight months (9) to eleven TB cases in 316 patients observed during a follow-up of two years. (10) The observed differences in outcomes might relate to study design and geographic setting, a smaller number patients in the current study, and a shorter duration of follow-up after IPT completion. Others could include the criteria established for the diagnosis of TB and the degree of immunodeficiency of the patients studied.

In Cox regression analysis, the WHO clinical staging and CD4 cell counts were not significantly associated with TB incidence. This was not consistent with the findings observed in other studies. (8, 12) The observed difference could be due to the small sample size and low number of TB cases which limited
the power of the study to detect significant differences in the subgroups. After controlling other variables, the hazard of TB incidence among HIV-infected patients who completed IPT who had a BMI <16.9Kg/m was 7.73 times that of those with a BMI >=18.5Kg/m (AHR: 7.73; p=0.013). As this study was a retrospective review of records, the influence of unmeasured confounding and the small sample size can not be ruled out. These were, of course, the major limitations of the study.

Conclusions and Recommendations

The TB incidence rate in HIV-infected adult patients who completed IPT was 1.43 per 100 PYO and was found lower than in other studies. The cumulative probability of TB at sixteen months after IPT completion was 2.5%. The Body Mass Index <16.9Kg/m² was the independent predictor of TB incidence identified in this study. Nutritional status of the patient was identified as an important factor in TB case onset.

Therefore, TB incidence can be decreased if the nutritional status of HIV-infected patients is carefully assessed and considered for some kind of action. The BMI should be computed and considered, and interventions must be investigated.
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Knowledge and Practices Related to Tuberculosis in HIV-positive Persons in Addis Ababa, Ethiopia

Rahel Abebe

Abstract

Background: Tuberculosis (TB) and the human immunodeficiency virus (HIV) are a lethal combination. Ethiopia is highly affected by this combination which often leads to death. Poor knowledge and practices regarding TB are believed to pose major challenges to the control of the disease and to life among HIV-positive patients.

Objective: The objective of this study was to assess the knowledge and the associated practices related to tuberculosis in HIV-positive people living in Addis Ababa, Ethiopia.

Methods: A health facility-based, cross-sectional survey using a structured and pretested questionnaire was conducted in January, 2011 on people living with HIV (PLWHA) in Addis Ababa. The study subjects were selected by a multistage probability sampling technique. Univariate, bivariate, and multivariate logistic regression analysis was conducted.

Results: Complete data were collected from 636 study subjects for a response rate of 96.2%. Out of these 636, 624 (98.1 %; 95% CI: 216
96.8%-98.9%) had heard about TB and 50.2% (95% CI: 46.3%-54.0%) had a satisfactory overall knowledge about TB. Those with a primary education [Adjusted OR (95% CI) =1.74 (1.15, 2.62)] and secondary education and above [Adjusted OR (95% CI) = 4.08 (2.62, 6.35)] were more likely to have a satisfactory knowledge level when compared with their illiterate counterparts. Of the 624 respondents, 64.1% did not often open windows of cars or vehicle during travel. Of those who had pulmonary TB (194), 22.7% did not cover their mouths and noses during coughing and sneezing. Their main reason for not doing so was “not paying attention.” From those who received medical treatment for TB (228), 14.5% did not complete their treatment regimen and of those who took preventive treatment (228) 8.8% did not complete the treatment. The frequently-mentioned reason was because of the drug side effects. The intended health seeking practice was 96.8%.

Conclusions and Recommendation: This study suggests that PLWHA in Addis Ababa have gaps in knowledge and acceptable practices. Therefore, a clear, planned, and targeted health education program is needed for this population.


**Introduction**

Tuberculosis (TB) and human immunodeficiency virus (HIV) are widely recognized as the high burden infectious diseases. They have a synergic effect that poses a major challenge to their control efforts globally. This co-infection is particularly common in the developing world. (1) Africa has the greatest amount of the co-infection burden. Approximately 80% of the HIV-positive TB incident cases in 2009 were in sub-Saharan Africa. (2) Ethiopia is one of the most highly affected countries of TB-HIV co-epidemic. In 2009, 17% of the new cases of TB in the country were among HIV-positive persons. (2)

Raising the knowledge and improving the practices in communities about TB is a key action to help bring TB under control in this country. The interest and willingness of communities to demand better quality health services for TB is insured by raising knowledge and improving the attitudes in the community. This can reduce TB transmission, improve health, and save lives. (3)

A lack of knowledge and practices about TB has an impact on high transmission, delayed health seeking behaviours, and TB treatment adherence. Poor practice in the community leads to persistent infection, drug resistance, treatment failure, relapse, and
death. (3, 4) Not educating the community about TB is a significant contributor to TB control failure in Ethiopia and Africa. (3) Even though there have been a number of TB knowledge, attitudes, and practices (KAP) studies conducted in different communities throughout Ethiopia (5-8), the gap and associated factors of HIV-infected people has not been well studied. This study was conducted specifically on PLWHA and identified the gaps in knowledge and practices related to tuberculosis.

**Objectives**

*General Objective:* To assess the knowledge, practices, and associated factors of TB on HIV-positive people in Addis Ababa, Ethiopia.

*Specific Objectives:*

1. To estimate the proportion of satisfactory knowledge regarding tuberculosis among HIV-positive people in Addis Ababa.
2. To estimate the proportion of TB prevention and treatment practices among HIV-positive people in Addis Ababa.
3. To determine factors associated with knowledge about tuberculosis in HIV-positive people in Addis Ababa.
Methods

Study Area and Period: The study was conducted in Addis Ababa in January and February, 2011.
Study Design: A health facility-based, cross-sectional survey was conducted.
Source Population: The source population included all people living with HIV/AIDS in Addis Ababa during the study period.
Study Population: The study population was PLWHA getting comprehensive long-term HIV/AIDS care services in the different health centers in Addis Ababa.
Study Subjects: The study subjects were selected by using a probability sampling technique with the study population.
Sample Size: The sample size was calculated using a single population proportion formula and taking the proportion of satisfactory knowledge of community on TB at 53% derived from a study conducted in Tigray in 2005 (9), and considering the assumptions of a 95% confidence interval, a 5% level of precision, a design effect of 1.5, and a 15% non-response rate. The calculated sample size was calculated at 661 persons.
Sampling Technique: A multistage probability sampling technique was used to select the study subjects. From the health centers in the
city, ten were selected with one from each sub-city using the lottery method. Based on last month of client flow in the selected health centers, the expected number of clients during the data collection period was calculated at 6,236 clients. This sample size was divided among the health centers based on patient load. Starting from the fifth client (a random start) on the first day of data collection, every ninth client (N/n=6236/661) was interviewed.

**Variables**

*Dependent Variable:* The dependent variable was knowledge of TB.

*Independent Variables:* The independent variables included gender, age, religion, educational level, current employment status, and previous history, diagnosis, and treatment of TB.

**Operational Definitions**

*Tuberculosis:* Diagnosed when active TB affected the lungs and caused a persistent cough, occasional bloody sputum, chest pain, exhaustion, night sweats, fever, and a loss of appetite, weight loss, and shortness of breath.
Knowledge: Knowledge was based on the respondent’s ability to respond to fifteen questions about TB. These questions included the cause of TB, infectiousness, seriousness, the modes of transmission, prevention, TB signs and symptoms, curability, the free TB detection and treatment policy, consequences of stopping treatment, how TB is cured, the high risk of PLWHA to TB, and preventive therapy for latent TB for PLWHA.

Practices: Practices in this study included both the actual and intended actions related to TB that the respondents were taking in different situations and under different conditions.

Data Collection: The tool for data collection was an interviewer-administered, structured, and pretested questionnaire adapted from the WHO guidelines for TB-KAP surveys. (4) Some changes were made for this study. There were ten data collectors. The majority of them were nurses and health officers. All had worked in comprehensive HIV/AIDS care rooms in different health centers. In some health centers, however, the case managers were responsible for data collecting. Data were collected from January, 2011 to February, 2011. Data quality was maintained by pre-testing the Amharic version questionnaire on 5% of the sample size. Standard training was given to the data collectors and supervisors. Daily
supervision and checking for data completion was also conducted by three supervisors.

Data Processing and Analysis: Data were entered using Epi-Info Version 3.5.1 and cleaned. It was transferred to SPSS Version 15 for analysis. Univariate analysis was conducted to determine the characteristics, knowledge, and practices of the sample population. To identify people with a satisfactory knowledge level of TB, fifteen questions were asked and ‘1’ was coded for a correct answer and ‘0’ for an incorrect answer. A median score was used as the cut off. Those who scored less than the median were considered to have a low knowledge level and labelled ‘0’/ failure. Those who scored equal to or greater than the median were considered to have a satisfactory knowledge level and labelled ‘1’/success. Bivariate and multivariate analyses were conducted to determine the association of knowledge with the independent variables.

Ethical Considerations: Ethical clearance was obtained from the ethics committee of the Addis Continental Institute of Public Health. Permission to conduct the study was also obtained from Addis Ababa Health Bureau and from the selected health centers. Signed consent was obtained from all respondents prior to any data collection. All information was secured to maintain confidentiality.
and no information including names of respondents was recorded to insure anonymity.

**Results**

A total of 636 PLWHA were included in this study. The response rate was 96.2%. The age of respondents ranged from 18 to 68 years with a mean age of 33.34 (±8.06) years. Of the respondents, 67.5% were female and 31.1% were illiterate. The median monthly income was ETB 350.

Overall, 624 (98.1%, (95% CI: 96.8%-98.9%)) had heard of TB from different sources. Only one in four (24.2%) reported that a bacteria/germ caused TB and 75.8% mentioned non-biomedical causes. Many did not know. A productive cough, a cough lasting longer than two weeks, and weight loss were mentioned as symptoms and signs of TB by 65.3%, 52.2%, and 39.0% of respondents, respectively. The vast majority (95.4%) knew that TB was an infectious disease and 91.2% knew it had an aerosol mode of transmission. Less than half of respondents mentioned ventilation as a method of preventing TB. Only 7.9% knew that opening a car window was a preventive method. Most (95.4%) said that TB was curable and 82.4% knew that TB in PLWHA was curable. Some (9.7%) mentioned non-biomedical cures, while 4.7% did not know
of any cure for TB. Only 16.8% mentioned MDR TB as a possible consequence of stopping the TB drug regimen. A bit more than half (53.3%) knew the presence of preventive therapy for TB with PLWHA. More than a quarter (27.5%) did not know about the free TB diagnosis and treatment policy in Ethiopia. Less than half (45.4%) knew PLWHA were at a higher risk for TB. The majority (85.8%) considered TB a very serious disease, and 78.9% considered it as very serious problem in Ethiopia. Of a maximum of 15, the mean and median scores of respondents were 9.23 (61.5%) and 10 (66.7%), respectively. Using the median score as a cut off point, the respondents were categorized as having a satisfactory TB knowledge (50.2%; 95% CI: 46.3%-54.0%) or a low knowledge (49.8%; 95% CI: 46.0%-53.7%). In bivariate analysis, satisfactory knowledge was found to be positively and significantly associated with the 33 to 37 year old age group, educational status, employment status, and income while there was no association with gender and previous TB history. However, in multivariate analysis, satisfactory knowledge was only associated with educational status. Health workers, radio, and TV were the first three preferred sources of information for the future.

Of the 624 respondents who have heard about TB, 152 (24.4%) did not open windows and doors at home. Ignorance or not giving
attention 83 (54.6%), and fear of cold air 49 (32.2%), were the frequently mentioned reasons for not opening windows or doors. The majority 400 (64.1%) did not often open windows of cars during travel. The reasons were that they did not give attention 113 (28.3%), they were afraid of cold air 197 (49.3%), or that their friends or other travellers did not allow it 169 (42.3%).

From the 194 respondents who had pulmonary TB before or during the study, 44 (22.7%) did not cover their mouths or noses during coughing and sneezing. Their reasons for not covering were “not giving attention/ignorance” 28 (63.6%), “did not know they have to” 11 (25%), and the “pain was high only to think about it” 25 (56.8%). Their sputum disposal methods were 65.5% using small caps with lids, 23.2% soft/tissue paper, 3.1% spitting anywhere, and 8.3% mentioned other methods or they did not remember.

If one had symptoms of TB, the intended health seeking behavior was 604 (96.8%) would go to a health facility, 6(1%) to a pharmacy, 13 (2.1%) to get holy water or use self-medication.

There were 231 respondents who took preventive treatment for TB, but 20 (8.7%) did not complete their drug regimens. There were also 228 who had TB and took medical treatment to manage it, but 33 (14.5%) did not complete their treatment. The frequently mentioned reason first non-adherence was the drug side effects.
Table 1: Selected factors association with satisfactory TB knowledge of PLWHA, Addis Ababa, 2011

<table>
<thead>
<tr>
<th>Variables</th>
<th>Satisfactory Knowledge</th>
<th>Low Knowledge</th>
<th>Crude OR (95% CI)</th>
<th>Adjusted OR¹ (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age of Respondents</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;= 27</td>
<td>68 (44.7)</td>
<td>84 (55.3)</td>
<td>0.99(0.64-1.53)</td>
<td>0.89 (0.56-1.43)</td>
</tr>
<tr>
<td>28-32</td>
<td>102 (54.8)</td>
<td>84 (45.2)</td>
<td>1.49(0.98-2.25)</td>
<td>1.33 (0.85-2.08)</td>
</tr>
<tr>
<td>33-37</td>
<td>69 (57.5)</td>
<td>51 (42.5)</td>
<td>1.66(1.04-2.64)*</td>
<td>1.33 (0.80-2.20)</td>
</tr>
<tr>
<td>&gt;= 38</td>
<td>80 (44.9)</td>
<td>98 (55.1)</td>
<td>1.00#</td>
<td>1.00#</td>
</tr>
<tr>
<td>Gender of Respondents</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>111 (53.6)</td>
<td>96 (46.4)</td>
<td>1.23(0.88-1.71)</td>
<td>0.92 (0.62-1.35)</td>
</tr>
<tr>
<td>Female</td>
<td>208 (48.5)</td>
<td>221 (51.5)</td>
<td>1.00²</td>
<td></td>
</tr>
<tr>
<td>Educational Status</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illiterate</td>
<td>64 (31.8)</td>
<td>137 (68.2)</td>
<td>1.00#</td>
<td>1.00#</td>
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<tr>
<td>Primary Education</td>
<td>101 (47.4)</td>
<td>112 (52.6)</td>
<td>1.93(1.29-2.88)*</td>
<td>1.74 (1.15-2.62)*</td>
</tr>
<tr>
<td>Secondary and Above</td>
<td>154 (69.4)</td>
<td>68 (30.6)</td>
<td>4.85(3.21-7.32)*</td>
<td>4.08 (2.62-6.35)*</td>
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<tr>
<td>Employment Status</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>209 (54.9)</td>
<td>172 (45.1)</td>
<td>1.60(1.16-2.21)*</td>
<td>1.38 (0.97-1.96)</td>
</tr>
<tr>
<td>Unemployed</td>
<td>110 (43.1)</td>
<td>145 (56.9)</td>
<td>1.00#</td>
<td>1.00#</td>
</tr>
<tr>
<td>Income in ETB</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;= 200 month</td>
<td>74 (38.1)</td>
<td>120 (61.9)</td>
<td>1.00#</td>
<td>1.00#</td>
</tr>
<tr>
<td>201-400 month</td>
<td>90 (48.4)</td>
<td>96 (51.6)</td>
<td>1.52(1.01-2.29)*</td>
<td>1.30 (0.85-2.00)</td>
</tr>
<tr>
<td>401-600 month</td>
<td>70 (57.4)</td>
<td>52 (42.6)</td>
<td>2.18(1.38-3.46)*</td>
<td>1.51 (0.91-2.51)</td>
</tr>
<tr>
<td>&gt;= 601 month</td>
<td>85 (63.4)</td>
<td>49 (36.6)</td>
<td>2.81(1.78-4.44)*</td>
<td>1.58 (0.94-2.67)</td>
</tr>
</tbody>
</table>
Previous History of TB

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>120 (52.2)</td>
<td>110 (47.8)</td>
<td>1.14 (0.82-1.57)</td>
</tr>
<tr>
<td>No</td>
<td>199 (49.0)</td>
<td>207 (51.0)</td>
<td>1.00*</td>
</tr>
</tbody>
</table>

**Note:** Reference categories (groups expected to have less satisfactory knowledge than the others), * showed a statistically significant association, 1 Adjusted for age group, gender, educational status, current employment status, and income variables.

**Discussion**

This study demonstrated that there is a knowledge gap in some specific TB knowledge measures. Of the study participants, 98.1% had heard about TB which is better than other community-based studies in different parts of Ethiopia. (6-9) About half (51.1%) of respondents had a satisfactory overall knowledge about TB. This can be considered only fair at best. It was nearly the same as the findings in a community in Tigre ten years prior. (9) This lack of knowledge may indicate that health education for PLWHA is not yet efficient and effective. Only 24.2% were able to mention the right cause of TB and 20.0% did not know of any cause. The remaining subjects (55.8%) related TB to other medically incorrect causes similar to other studies in Ethiopia. (5, 6, 8) A cough that lasted more than two weeks was regarded as symptom of TB by
52.2% of the respondents which was less than in the findings from other studies. (8,9) Coughing with sputum was more frequently mentioned by 65.3% of the study subjects. This might have some impact on treatment-seeking for a non-productive cough; it could affect the early detection and treatment of control programs.

Contradictory knowledge was identified. For example, knowing TB was contagious and transmitted by aerosol while also believing that the cause of TB was physical from cold air or other non-contagious causes indicated that the respondent knowledge on prevention methods was very limited.

As HIV-positive persons, they were not aware of their higher risk for contracting TB. This could cause delays in seeking care and a failure in drug adherence among PLWHA. (11) Less than half (45.4%) of the respondents knew that PLWHA were at a higher risk of contracting TB. This could have an impact on preventive activities and control measures among PLWHA.

Drug resistant TB is a well know and serious threat to PLWHA. (12) However, only 16.8% of the respondents in this study knew drug resistant TB could result from not finishing the TB treatment properly.

Of the participants, 72.5% knew that TB diagnosis and treatment were free of charge. However, still more than a quarter did not
know of the policy which could impact programs attempting to control the illness.

In the present study, the educational status was the only significantly associated factor with TB knowledge. Better educated individuals were more likely to have satisfactory knowledge which is consistent with findings elsewhere. (7, 8) Previous TB history was found to have no significant association with knowledge which was different from an eastern Ethiopia study with prisoners. (5) This may indicate that the involvement of standardized patient education during the TB curative service is not adequate; it is not effective.

From those who had been diagnosed with pulmonary TB, 23.2% used soft/tissue paper to dispose of their sputum. Though it is better than spitting sputum everywhere, it does not contribute to the control of TB if the soft tissue is thrown anywhere which is common in Ethiopian society. Health education about appropriate ways to dispose of soft tissues after use is important. Improving the environmental health service (i.e. the provision of dust bins in different areas and working towards using the dust bins properly) could be a solution.

It is obvious that there is limited ventilation and even suffocation in public transportation vehicles in Addis Ababa. Despite the high
risk, it was found that awareness and practice of the PLWHA towards the importance of opening windows was low. Vehicles with little or no ventilation catalyze the transmission of TB.

The findings on drug non-completion were a good supplement to the retrospective adherence study conducted recently with PLHV in Addis Ababa. This study indicated the default rate was less than expected. (13) Default indicated the need for further educational efforts.

There are limitations with this study. There is no truly excellent method to measure TB KAP. This made the comparison of the findings with other studies difficult. The absence of baseline data on the specific target population of PLWHA for comparison was also a problem. The study was not supported by qualitative data collection because of resource limitations.

**Conclusions and Recommendations**

Half of the study population (49.8%; 95% CI: 46.0%-53.7%) had a low overall knowledge level about TB. Their knowledge varied with respect to specific TB awareness measures. Wider gaps were identified on the causes and curability of TB, the advantage of opening windows in vehicles, the need for ventilation in enclosed spaces, the consequences of not finishing TB treatments, the high
risk of TB in PLWHA, and the free TB diagnosis and treatment policy in Ethiopia. With these findings, health promotion and education activities are necessary. This health promotion and education should be comprehensive and focus on the identified gaps in knowledge. PLWHA should be a primary target of this programming and education although the community should learn about these issues through community education. Health workers, the TV, and the radio can be the media for education on all of these matters. Organized and planned patient education in all clinical settings should be conducted. Finally, further study in this area is recommended.

Acknowledgements

I express my gratitude to Dr Meaza Demissie for her unlimited support and guidance throughout the work on this research. My heartfelt appreciation goes to Addis Ababa Health Office, the health centers in the study, the data collectors, and finally, the study participants for their cooperation and time during field work and data collection. I also extend my heartfelt appreciation to Father Paddy Moran for funding this thesis. Finally I thank my friends and families for their invaluable advice, comments, and suggestions.
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www.duo.uio.no/sok/work.html?WORKID=97988&lang=en
Assessment of Tuberculosis Care in Private Health Facilities in West Amhara, Ethiopia

Yonas Yilma

Abstract

Background: Since 2000, the Ethiopian smear positive tuberculosis (TB) case detection rate has remained within the 31% to 38% range despite the global target of 70%. Among others agencies, the World Health Organization (WHO) recommendation to enhance TB-case detection has included private sector involvement in national TB programs. In accordance with this WHO recommendation, Ethiopia initiated the Private-Public Mix-Dots program in October, 2006. Currently, there are three hundred eighteen private facilities nationwide and eighty-two facilities in Amhara that provide TB diagnosis and treatment services.

Objective: To assess the performance of the private health facilities in TB prevention and control programming in west Amhara, Ethiopia.

Methods: The study design was cross-sectional. Both quantitative and qualitative research methods were used in data collection.
Results: Twenty-two PPM-DOTS facilities contributed 16.4% of TB case detection of all forms of TB. The EQA results showed a 1.5% discordance rate, 3.5% false negative rate, and a 0.4% false positive rate. These results were within the nationally acceptable standard of 5% false-negatives and 2% false-positives. The treatment success rate in the private health facilities was 79.8%, which was less than the regional achievement of 85.5%. There were no major gaps identified regarding adherence to the private sector guidelines.

Conclusions and Recommendations: Private facility performance in case detection was determined commendable. The quality of the laboratory services was assessed as excellent. However, efforts should be made to improve treatment outcomes by enrolling patients that could finalize their full course treatment in the initial facility. Defaulter tracking should be intensified; this can occur through more supportive supervision and mentoring.

Introduction

Background: TB is a significant and substantial problem for the national public health care systems of the world. The estimated global burden of disease caused by TB in 2009 was 9.4 million
incident cases, 14 million prevalent cases, 1.3 million deaths in HIV-negative persons and 38 million deaths in HIV-positive persons. (1) Globally, Ethiopia is ranked seventh among the twenty-two TB high burden countries. WHO estimated the prevalence, incidence, and mortality of all cases at 572, 359, and 64 per 100,000 populations, respectively.

The millennium development goals (MDGs) of reducing deaths from TB can be achieved if TB controls efforts approach the global goals for case detection of smear positive TB at 70% and a cure rate of 85% or above. (2) Currently, Ethiopia’s case detection rate of smear positive cases stands at 34% (3) and unless the current efforts are intensified, it will be difficult to control TB in Ethiopia. (4, 5) It includes involvement of all relevant health care providers in service delivery to all segments of Ethiopia’s population.

Increasing case detection, in particular, depends on involving the private health sector in TB control to a much greater extent than it is presently involved. As a result, Ethiopia’s Federal Ministry of Health committed to involving the private sector in TB control. (5) Ethiopia initiated the PPM-DOTS program in 2006. (6)

Statement of the Problem: There are currently 318 private health facilities, with eighty-two in Amhara that are participating in the PPM-DOTS program. (7) However, only limited information has
been available about the quality of the private sector TB care service provision and its contribution to the national TB program.

With this background, this study intended to assess and provide evidence-based information on the performance of private health sector TB care. It was meant to assess the role of the private sector in national TB prevention and control programming and, based on positive findings, build trust and confidence between both the public and private health sectors.

**Objectives**

*General Objective:*
To assess the performance of the private health facilities in TB prevention and control programming in the west Amhara, Ethiopia.

*Specific Objectives:*
1. To assess the achievements of the private health facilities in TB case finding.
2. To examine the treatment outcome of PPM-DOTS facilities.
3. To examine private health facility adherence with the national TB care management protocol.
4. To explore the quality of the Microscopic AFB diagnosis in the private health facilities.
Methods

Study Setting: The study was conducted in seven towns in the Amhara Regional State. These towns included Bahir Dar, Gonder, Burie, Derbre-Markos, Metema, Chagnie, and Bichena. Private health facilities in these towns are up-and-coming and it has been suggested that these facilities are providing an enormous amount of health care to the town populations.

Study Design: The study design was a facility-based cross-sectional study. Both quantitative and qualitative research methods were used for data collection. By using a quantitative study design, the achievement of TB case detection, appraising the quality of Microscopic AFB diagnosis, and assessing the treatment outcomes could be conducted. Also, examining compliance with national manuals and protocols could be completed.

Study Population: The study population included private health facilities that provided TB care services in the Amhara region from October 2009 to September, 2010.

Sample Size and Sampling Procedures: Twenty-two PPM-DOTS facilities were included with one hospital, eleven higher clinics, one higher medical center, and nine medium clinics. These were located in seven selected towns. The PPM-DOTS program
implementation areas were clustered into Addis Ababa, east Oromia, west Oromia, east Amhara, and west Amhara. This particular study was conducted in west Amhara based on convenience in that there were more concentrated numbers of PPM-DOTS facilities.

Data Collection Procedures: The quantitative portion of the study included summaries of the quarterly TB case findings, the treatment outcomes, and the regional laboratory quality assurance reports from October, 2009 through September, 2010. A facility assessment national checklist was used. For the qualitative portion of the study, an in-depth interview guideline was prepared and ten in-depth interviews were conducted. These were conducted with four key informants including town health office TB-focal persons and persons from the Amhara regional laboratory. The remaining six in-depth interviews were conducted with PPM-DOTS services providers.

Results

Seventy-nine trained providers delivered TB care and management. They were from different disciplines including nurses, physicians, a health officer, and thirty-six laboratory workers. They
cooperatively provided services in the PPM-DOTS facilities. Four of the facilities did not have a trained nurse, seven of the facilities (32.8%) did not have a trained physician, and one facility (4.5%) did not have a trained laboratory worker. However, all facilities had either a trained nurse, physician, or health officer. Twenty-one of the facilities (95.45%) had a designated TB room that had good ventilation and adequate lighting. Also, they had a waiting area for TB patients. A weight scale was present in 16 (73%), and IE/BCC health education materials were accessible and available in seventeen (77%) of the TB rooms.

From October, 2009 through September, 2010, 5,509 new TB patients with all forms were diagnosed by the twenty-two selected PPM-DOTS facilities. Of all TB diagnosed patients, 594 (10.7%) patients were enrolled for treatment in the PPM-DOTS facilities. Of these patients, 156 were smear positive and accounted for 25% of the total. Again, among smear positive TB patients, 150 patients (81 male and 69 female), were new and the remaining six were retreatment TB cases. Smear negative pulmonary patients were 204 (35%) and extra pulmonary TB cases were 234 (40%). There were also twelve patients who were categorized as “other” as these were patients who defaulted from their treatment and returned for treatment. Their smear results, however, were negative.
The age distribution of TB patients (all forms) indicated that only 0.7% of patients were under-five years of age, and 7% of the patients were between the ages of five and fifteen years. A total of 93% of the patients were above the age of 15.

Of all of the TB-diagnosed patients, 4,915 (89%) were referred to other health facilities to begin treatment. This referral was made because of the facility proximity to the patient’s residence. Only eleven percent of all diagnosed TB patients (all forms) started their medical treatment in the facilities where they were first diagnosed. The majority (89%) were referred to other health facilities for start-up of their treatment.

A total of 668 TB patients (all forms) were enrolled for treatment. This included 650 new cases and eighteen retreatment cases. Among the new patients, 176 (27%) were smear positive, 234 (36%) were smear negative, and the rest 240 (37%) were extra pulmonary TB cases. The cure and treatment success rate among smear positive TB patients were 60.8% and 79.6%. However, there were 4.6% deaths, 4% defaulters, and 9.8% transfer-out cases.

During this study period, two rounds of External Quality Assessment (EQA) were conducted by the Amhara Regional Research Laboratory. All of the facilities received written feedback. A total of 680 slides were collected for variation of the
private health facilities laboratory services quality using the blind verification method. The EQA results showed a 1.5% discordance rate, 3.5% false negative rate and a 0.4% false positive rate. Sensitivity was 97% and specificity was 99%, respectively. These results were within the nationally acceptable standards of 5% for false negatives and 2% for false positives.

Qualitative research data were collected through in-depth interviews. In these interviews, the respondents from the private sector strongly argued that the private sector was more sensitive in complying with the standards. They mentioned that they were practicing TB care according to DOTS principles. The respondents from the public sector also admitted that the private sector was responsive in accepting and implementing feedback, but the high staff turnover and unavailability of reagents were a drawback in the private sector.

The interviewed respondents from town health offices had not heard or received complaints of dissatisfaction with the private sector TB services. However, the public sector providers complained about higher number of patients who transferred out. In general, no major gaps in adhering to the national manuals and guidelines for TB care were identified. The finding was contrary to similar studies in Nigeria (8) and Iran (9).
Discussion

The study revealed that the private health facilities contribution in TB case detection was significant. Of the 479 TB diagnostic centers/AFB Microscopic Centers in the Amhara region, the 22 (4.6%) private health facilities contributed 16.4% of all TB detection in the region. The study also illustrated that the private facilities contributed more in case finding than in case holding. Case holding was only 11% of the total TB cases detected in the private health facilities.

The overall Amhara region treatment success rate was 85.5%, which exceeded the WHO target of 85%. There were, however, unwanted or unfavorable treatment outcomes. The PPM-DOTS registered 4.5% deaths, 4% defaulters and 11.9% transfers out, while the overall regional level finding showed 3.5%, 2.8%, and 7.1%, respectively. This indicated that with the unfavorable outcomes, the private health facilities scored higher. The laboratory service was seen as an essential part of the TB care services, as sputum smear microscopy is a “gold standard” for TB diagnosis particularly in resource-limited countries like Ethiopia.

Regarding the adherence to the manuals, there were no major gaps identified. This is unlike a study finding in Iran (10) and
Nigeria (11). Private sector providers were found to be reluctant to adhere to the national standards. It was also contrary to a study conducted in 2001 in Ethiopia. (15) Unlike the study findings in Indonesia where only 45% of the PPM facilities signed a memorandum of understanding, here all of the facilities signed one with the regional health bureaus. (12)

**Conclusions**

The twenty-two PPM-DOTS facilities in west Amhara were found to contribute 16.4% of the entire Amhara region annual TB case notification. However, this was only about 10% of the patients diagnosed in the PPM-DOTS facilities. Alternatively, the treatment outcomes of the private health facilities were short of the regional achievement and the WHO targets. Fortunately, there were no treatment failure cases identified. The finding of EQA from the regional laboratory showed that the quality of the private health facility laboratory services was acceptable in standard. Problems regarding the supply availability of AFB reagents were identified. There were no major gaps that indicated non-adherence of the private sector with the national manual. Rather, the laboratory assessments justified a high level of adherence to the guidelines. It
was strongly argued that the private sector was more sensitive in complying with the standards and those interviewed mentioned that they were practicing according to DOTS principles. Respondents from the public sector also admitted that the private sector responsiveness in accepting and implementing feedback was good but high staff turnover and the unavailability of reagents were drawbacks.

The respondents from town health offices had never heard about or received any complaints about dissatisfaction with the private sector TB services. The public sector providers complained about higher rates of patients transferring out that they received from the private sector. In general, there were no major gaps in adhering to the national manuals and guidelines in TB care.

**Recommendations**

1. To learn the private sector contributions, the national program needs to design a reporting system that tracks private sector contributions.
2. The private sector needs to pay more attention to informing patients about starting the treatment in the health facility where they can take a full course of treatment.

3. The microscopic diagnosis of TB in the private sector laboratories was found acceptable. However, to have a consistent outcome, AFB reagents need to be provided centrally by the research laboratory in the region.

4. Public-private partnership needs to be strengthened to enhance mutual understand and trust between these two health sectors.

References


whqlibdoc.who.int/hq/2006/WHO_HTM_STB_2006.368_eng.pdf


9. Improved Tuberculosis Case Detection through Public-Private Partnership and Laboratory-based Surveillance in Kannur District, Kealar, India. 2001-2002


Family Planning Service Utilization of HIV/AIDS Clients at World Wide Orphan’s Family Health Clinic, Addis Ababa, Ethiopia

Sawra Getnet

Abstract

Background: Globally, 16.5 million women in the fifteen to forty-nine age group are living with HIV infection. Sub-Saharan Africa (SSA) has the highest HIV prevalence in the world. At the same time, with the inclusion of HIV-positive women, it is estimated that thirty-five million women globally have an unmet need for family planning (FP) services. In the SSA countries where unmet need is measured, it is estimated that 35% of all women between the ages of fifteen and forty-nine have an unmet need for FP. Family planning of HIV-positive women, in particular, could reduce the number of unintended pregnancies, dangerous abortions, and importantly, either prevent or reduce the number of cases of mother-to-child transmission of HIV.
Objective: To assess the utilization and need of FP services among HIV/AIDS clients who are in follow-up at the World Wide Orphan’s Family Health Clinic located in Addis Ababa, Ethiopia.

Methods: A cross-sectional study design was employed. Data were entered using EPI-Info 3.3.2, and were then analyzed using SPSS Version 15. Binary logistic regression was computed to identify the predictors of contraception utilization and fertility desire.

Results: A total of 384 clients participated in this study. Their knowledge about contraceptives was very high with 164 (99.4%) of the married women having heard about at least one contraceptive method. They had heard about birth control pills 352 (91.7%), male condoms 340 (88.5%), and injectables 322 (83.9%). The most commonly used contraceptive was the male condom (65.7%) followed by injectables at 58% and pills at 51.9%. Only 37% of respondents were using a contraceptive. Contraceptives were used for child spacing 63 (43.8%) and limiting the number of children 51(35%). The unmet need for FP was identified at 28.1%. Marital status, age, and number of children were significant predictors of contraceptive use. The fertility desire was associated with parity.

Conclusions and Recommendations: An elevated unmet need for FP was determined in HIV-positive women from this research. Therefore, an integration of FP services in the already existing
health services system could address the FP service needs of women of reproductive age who are living with HIV.

**Introduction**

*Background:* Since the discovery of HIV/AIDS, Ethiopia has been greatly affected by the disease. The EDHS-2005 indicated that 1.4% of adults were infected with HIV. Urban residents had a significantly higher risk of infection (6%) than rural residents (0.7%). The country’s highest rate of HIV infection was in Addis Ababa at 5%. Little has changed since this report was published in 2005.

Women of reproductive age make up 44% of the total population in Ethiopia and they are characterized by high fertility with 5.4 children per woman. There is a CPR at 15% with a MMR estimated at 673/100,000 live births. These statistics are some of the highest in the world.

Approximately 85% of the world’s young people live in the developing countries like Ethiopia. Most of these young people are sexually active before their twentieth birthday. In this age group, rates of HIV/AIDS/STI infection, early and unplanned pregnancy, unsafe abortion, and maternal death are very elevated.
Women face the risk of unintended pregnancy and the need for access to FP remains high in most countries. As HIV is a STI, separating prevention, care, and treatment from sexual and reproductive health context hampers long-term prevention efforts. There are strong arguments for and against FP and HIV/AIDS integration. Potentially, FP services can offer a path to HIV prevention. At the same time, people living with HIV/AIDS have a continuing need for assistance with FP both in making decisions about their fertility and to obtain FP services. The need for contraceptives is high among women living with HIV/AIDS and particularly those in SSA. Meeting this need could improve reproductive health, their autonomy and human rights as persons, as well as prevention of HIV mother-to-child transmission.

**Objectives**

*General Objective:*
To assess among women with HIV/AIDS the utilization of FP services and the need for FP services at the WWO-AHF family health clinic in Addis Ababa.
Specific Objectives:

1. To determine which modern contraceptive methods are used- and intended to be used most- among HIV/AIDS clients at the clinic.
2. To make internal comparisons and assess the users and non-users of FP services in relation to their socio-demographic characteristics in HIV/AIDS clients.

Methods

Study Area and Period: The WWO family health clinic provides comprehensive care including HIV/AIDS care and treatment in the Yeka sub-city located in Addis Ababa. The study was conducted from November, 2010 to May, 2011.

Study Design: A facility-based, cross-sectional study design using quantitative data collection was conducted in this selected health facility.

Source Population: All women living with HIV/AIDS of reproductive age who had follow-up appointments at the WWO family health clinic were the source population.

Study Population: The study population included women living with HIV/AIDS of reproductive age who came for follow-up
appointments during the data collection period at the WWO family health clinic.

*Sample Size:* A single proportion estimate method was used to determine the sample size. The assumptions included $p=0.5$, $d=0.05$, 95% confidence level, and a 10% non-response rate.

\[
    n = \frac{Z^2 (p)(q)}{d^2} \\
    n = \frac{(1.96)^2 (0.5)(0.5)}{(0.05)^2} \\
    n = 384 + 38 = 422
\]

*Sampling Technique:* A simple random sampling technique was used to select the participants.

*Data Collection Method and Instrument Used:* Data were collected using an English version questionnaire that was translated into Amharic for the interviews.

*Data Quality:* The structured questionnaire was pre-tested and data completeness and supervision was conducted throughout the data collection period by the principle investigator.

*Data Analysis:* Data were analyzed using SPSS Version 15. Descriptive analysis was conducted. Binary logistic regression and multivariate analysis was then conducted.

*Ethical Considerations:* Ethical clearance for the study was received from an ethics review committee in ACIPH.
Results

A total of 384 women participated in the study. They were predominantly Orthodox Christian 320 (83.3%) and Amhara 234 (60.9%). A total of 165 (43%) were married. Three-fourths 289 (75%) had attended formal education and more than half 244 (63.5%) of the respondents earned below ETB 600 per month.

Table 1. Distribution of Women Living with HIV/AIDS Socio-Demographic Characteristics At WWO Family Health Clinic, Addis Ababa, 2010

<table>
<thead>
<tr>
<th>Characteristics of Women</th>
<th>No</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age in Years</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15-24</td>
<td>27</td>
<td>7.0</td>
</tr>
<tr>
<td>25-34</td>
<td>215</td>
<td>56.0</td>
</tr>
<tr>
<td>35-49</td>
<td>142</td>
<td>37.0</td>
</tr>
<tr>
<td><strong>Religion</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Orthodox Christian</td>
<td>320</td>
<td>83.3</td>
</tr>
<tr>
<td>Muslim</td>
<td>17</td>
<td>4.4</td>
</tr>
<tr>
<td>Protestant</td>
<td>46</td>
<td>12.0</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>.3</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td>Oromo</td>
<td>94</td>
<td>24.5</td>
</tr>
<tr>
<td>Amhara</td>
<td>234</td>
<td>60.9</td>
</tr>
<tr>
<td>Tigre</td>
<td>19</td>
<td>4.9</td>
</tr>
<tr>
<td>Gurage</td>
<td>26</td>
<td>6.8</td>
</tr>
<tr>
<td>Other</td>
<td>11</td>
<td>2.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Marital Status</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Married</td>
<td>165</td>
<td>43.0</td>
</tr>
<tr>
<td>Single</td>
<td>42</td>
<td>10.9</td>
</tr>
<tr>
<td>Divorced or separated</td>
<td>105</td>
<td>27.3</td>
</tr>
<tr>
<td>Widowed</td>
<td>72</td>
<td>18.8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Literacy Status</th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Illiterate</td>
<td>83</td>
<td>21.6</td>
</tr>
<tr>
<td>Read and write</td>
<td>12</td>
<td>3.1</td>
</tr>
<tr>
<td>1-8 grade completion</td>
<td>140</td>
<td>36.5</td>
</tr>
<tr>
<td>9-12 grade completion</td>
<td>112</td>
<td>29.2</td>
</tr>
<tr>
<td>12th and above</td>
<td>37</td>
<td>9.6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Income (birr/month)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;=300</td>
<td>118</td>
<td>30.8</td>
</tr>
<tr>
<td>301-600</td>
<td>126</td>
<td>32.8</td>
</tr>
<tr>
<td>&gt;600</td>
<td>140</td>
<td>36.4</td>
</tr>
<tr>
<td>Total</td>
<td>384</td>
<td>100.0</td>
</tr>
</tbody>
</table>
From the 342 ever-married women, 174 (51%) were first married at age <=18 years. From the 341 ever-pregnant women, 113 (33%) were first pregnant at age <=18 years. Knowledge about contraceptives was very high 164 (99.4%) among the married women. A total of 121 (73.3%) were currently using a contraceptive. Contraceptive pills 352 (91.7%), male condoms 340 (88.5%), and injectables 322 (83.9%) were the most commonly known methods. Male condoms were the most commonly used method (65.7%) followed by injectables (58.9%) and pills (51.9%). Only 144 were using a contraceptive. The desire for child spacing 63 (43.8%) was higher than the need for limiting the number of children 51 (35%).

From the 238 non-users, 66 (27.7%) intended to use a contraceptive in the future and the condom 114 (58.1%) was the most preferred method followed by injectables 53 (27%). A total of 24 women (12.2%) of future users planned to use dual methods of contraception.
Table 2. Respondent Distribution by Reproductive Health Characteristics of Women Living with HIV/AIDS in Follow-up at WWO Family Health Clinic, Addis Ababa, 2010

<table>
<thead>
<tr>
<th>Reproductive Health Characteristics</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age a First Marriage</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; =18 years</td>
<td>174</td>
<td>50.9</td>
</tr>
<tr>
<td>Above 18 years</td>
<td>168</td>
<td>49.1</td>
</tr>
<tr>
<td>Total</td>
<td>342</td>
<td>100</td>
</tr>
<tr>
<td><strong>Age at First Pregnancy</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; =18 years</td>
<td>111</td>
<td>32.6</td>
</tr>
<tr>
<td>Above 18 years</td>
<td>230</td>
<td>67.4</td>
</tr>
<tr>
<td>Total</td>
<td>341</td>
<td>100</td>
</tr>
<tr>
<td><strong>Number of Live Children</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>10</td>
<td>2.6</td>
</tr>
<tr>
<td>1- 3</td>
<td>252</td>
<td>65.6</td>
</tr>
<tr>
<td>4 and above</td>
<td>122</td>
<td>31.8</td>
</tr>
<tr>
<td><strong>Ever Experienced an Unintended Pregnancy</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before diagnosis of HIV infection</td>
<td>145</td>
<td>37.8</td>
</tr>
<tr>
<td>After diagnosis of HIV infection</td>
<td>28</td>
<td>7.3</td>
</tr>
<tr>
<td><strong>Outcome of Unintended Pregnancy</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terminated by abortion</td>
<td>125</td>
<td>72.3</td>
</tr>
<tr>
<td>Baby Delivered</td>
<td>46</td>
<td>26.6</td>
</tr>
<tr>
<td>Currently pregnant</td>
<td>2</td>
<td>1.1</td>
</tr>
<tr>
<td>Total</td>
<td>173</td>
<td>100</td>
</tr>
</tbody>
</table>

262
### Ever Had Sexual Relations with a Non-regular Sexual Partner in the Last Six Months

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>39</td>
<td>345</td>
<td>384</td>
</tr>
<tr>
<td></td>
<td>10.2</td>
<td>89.8</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 3. Modern Contraceptive Practices by Status, Type, and Reason of Women Living with HIV/AIDS in Follow-up at the WWO Family Health Clinic, Addis Ababa, 2010

<table>
<thead>
<tr>
<th>User Characteristics</th>
<th>No</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ever Used Contraceptive</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>297</td>
<td>77.3</td>
</tr>
<tr>
<td>No</td>
<td>87</td>
<td>22.7</td>
</tr>
<tr>
<td><strong>Desire to Space or Limit Number of Children</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>382</td>
<td>99.5</td>
</tr>
<tr>
<td>No</td>
<td>2</td>
<td>.5</td>
</tr>
<tr>
<td><strong>Current Contraceptive Use</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>144</td>
<td>37.2</td>
</tr>
<tr>
<td>No</td>
<td>238</td>
<td>62.2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>382</td>
<td>100.0</td>
</tr>
</tbody>
</table>

| Type of Contraceptive Used                    |     |     |
| Pills                                         | 7   | 4.8 |
| Injectables                                   | 24  | 16.6|
| Condoms                                       | 108 | 75.0|
| Other                                         | 5   | 3.4 |
| **Total**                                     | 144 | 100.0|

263
### Reason for Current Use of Contraceptives

<table>
<thead>
<tr>
<th>Reason</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spacing of births</td>
<td>63</td>
<td>43.8</td>
</tr>
<tr>
<td>Achievement of desired number of children</td>
<td>51</td>
<td>35.4</td>
</tr>
<tr>
<td>Delay or prevent unwanted pregnancy</td>
<td>26</td>
<td>18</td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>144</td>
<td>100</td>
</tr>
</tbody>
</table>

### Reason for Not Using Currently

<table>
<thead>
<tr>
<th>Reason</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Want children/a pregnancy</td>
<td>24</td>
<td>10.1</td>
</tr>
<tr>
<td>Currently pregnant</td>
<td>6</td>
<td>2.5</td>
</tr>
<tr>
<td>No sexual relations</td>
<td>200</td>
<td>84</td>
</tr>
<tr>
<td>Religious prohibition</td>
<td>4</td>
<td>1.7</td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
<td>1.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>238</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Of the 173 clients who experienced an unintended pregnancy, 54 (32%) and 55 (32%) claimed to have experienced the unintended pregnancy because of lack of awareness and did not know the source, respectively. Unintended pregnancy due to contraceptive failure occurred in 35 (21%) while 13 (37%) and 11 (31%) of the failures were blamed on contraceptive pills and the calendar method. More than sixty percent of the unintended pregnancies ended in termination. Out of 192 married/in-union clients and who wanted to limit or space births, 54 of the clients were not using any form of contraceptive. This made the total unmet need for FP at 28.1%.
After adjusting for family income, level of education, and ART treatment, it was found that marital status, age, and number of children were significant predictors for contraceptive utilization. Fertility desire of the women was found to be significantly association with parity.

Table 4. Contraceptive Use by Socio-demographic Characteristics of Women Living with HIV/AIDS at the WWO Family Health Clinic, Addis Ababa, 2010

<table>
<thead>
<tr>
<th>Characteristics of Women</th>
<th>Users</th>
<th>Non-users</th>
<th>Crude OR(95%CI)</th>
<th>Adjusted OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15-24</td>
<td>11 (41)</td>
<td>16 (59)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>25-34</td>
<td>97 (45)</td>
<td>118 (55)</td>
<td>1.96 (0.53-2.69)</td>
<td>0.99 (0.28-3.41)</td>
</tr>
<tr>
<td>35-49</td>
<td>36 (25)</td>
<td>106 (75)</td>
<td>0.49 (0.21-1.16)</td>
<td>0.22 (0.06-0.816)*</td>
</tr>
<tr>
<td><strong>Marital Status</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>6 (14)</td>
<td>36 (86)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Married</td>
<td>121 (73)</td>
<td>44 (27)</td>
<td>16.5 (6.50-41.84)</td>
<td>15.41 (5.09-46.6)*</td>
</tr>
<tr>
<td>Divorced/Sep</td>
<td>14 (13)</td>
<td>91 (87)</td>
<td>0.92 (0.32-2.58)</td>
<td>0.72 (0.226-2.30)</td>
</tr>
<tr>
<td>Widowed</td>
<td>3 (4)</td>
<td>69 (96)</td>
<td>0.26 (0.06-1.10)</td>
<td>0.19 (0.04-0.94)*</td>
</tr>
<tr>
<td><strong>Family Income ETB</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No income</td>
<td>1 (4)</td>
<td>25 (96)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>1-300</td>
<td>13 (14)</td>
<td>79 (86)</td>
<td>0.03 (0.004-0.24)</td>
<td>3.28 (0.31-34.07)</td>
</tr>
<tr>
<td>301-600</td>
<td>53 (42)</td>
<td>73 (58)</td>
<td>0.13 (0.06-0.26)</td>
<td>7.04 (0.72-68.29)</td>
</tr>
<tr>
<td>Above 600</td>
<td>77 (55)</td>
<td>63 (45)</td>
<td>0.59 (0.36-0.96)</td>
<td>4.85 (0.50-46.83)</td>
</tr>
</tbody>
</table>
### Educational Level

<table>
<thead>
<tr>
<th></th>
<th>Illiterate</th>
<th>Read and Write</th>
<th>1-8 grade</th>
<th>9-12 grade</th>
<th>12 and above</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<tr>
<td>Number of Children</td>
<td></td>
<td></td>
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</tr>
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<td>68 (72)</td>
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</tr>
<tr>
<td>1-3</td>
<td>108 (41)</td>
<td>156 (59)</td>
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<td>2.08 (0.99-4.34)</td>
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</tr>
<tr>
<td>&gt;=4</td>
<td>10 (39)</td>
<td>16 (61)</td>
<td>1.63 (0.65-4.06)</td>
<td>4.92 (1.16-20.92)</td>
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</table>

### ART Treatment

<table>
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<tr>
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<th>No</th>
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<tbody>
<tr>
<td></td>
<td>105 (37)</td>
<td>176 (63)</td>
</tr>
<tr>
<td></td>
<td>39 (38)</td>
<td>64 (62)</td>
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</tbody>
</table>

### Discussion

This study investigated several issues. Knowledge about and levels of utilization of family planning services among HIV/AIDS clients were the focal points. Knowledge about contraceptive was very high with 164 (99.4%) of the married women having heard of at least one of the modern contraceptive methods. Pills 91.7%, condoms 88.5%, and injectables 83.9% were the most commonly known methods. This finding is similar to the EDHS- 2005 report where knowledge was calculated at 88%.
Three-fourths 121 (73.3%) of the married women were using contraceptives while 11.5% were not using because they desired a child. The most common source of contraceptives was government health facilities. The majority of the respondents 90.2% said they preferred to get contraceptives from the same facility where they were getting ART treatment follow-up. This is in agreement with other studies that support the integration of HIV/AIDS treatment and FP services.

Unlike the EDHS-2005 report where injectables were the most commonly used contraceptive, here the condom was the most commonly used contraceptive. This was followed by injectables and contraceptive pills. The difference in the most commonly used method might be because this study was conducted with HIV/AIDS clients while the EDHS survey was conducted on the general population. It is widely known that the condom prevents HIV infection. Over thirty percent of the non-users who intended to use and the majority of prospective users preferred injectables and condoms. Thus, the condom was the most frequently used method in the past and was planned for use in the future. Excellent condom availability and easy distribution at the facility was observed. From the 195 condom users, 97.4% of them had received them from the health facility.
Dual methods of contraception were used by a small proportion 15% and only 22 (15.3) were using these methods and 24 (12.2%) planned to use dual methods in the future. Dual methods remain underused among women living with HIV/AIDS globally. In Rwanda, women use contraceptives to space rather than to limit. Similarly, the need for spacing 43.8% was higher than the need for limiting 35%. Fertility intention was high and similar to the studies conducted in Cameroon and Nigeria where 62.2% desired to have more children. Of those desiring children, 38%, 35.6%, and 26.4% desired having one, two, and three or more children, respectively. The increased desire among women living with HIV/AIDS is seen in multiple studies. This desire might be to ensure the preferred number of children in their lives.

The sero-status of the male partner can have a significant effect on contraceptive use. Contraceptive use was less among women living with HIV/AIDS using HAART. Marital status, age of the woman, and number of live children were significant predictors of contraceptive utilization. Fertility desire of the women was found to be associated with parity.
Conclusions

This study empirically supports the integration of family planning and reproductive health services into existing HIV/AIDS care and treatment services. This study demonstrated a high-unmet need and contraceptive use was related to marital status, age of woman, and number of live children. Only a small portion of the respondents used a dual method of contraceptive. Early marriage and teenage pregnancy was also found in a remarkable proportion of respondents. Finally, a lack of effective communications about FP by ART providers with women living with HIV/AIDS was identified. This identified the need for more effective patient education and clinical services delivery for FP by ART providers.

Recommendations

1. Family planning services including patient education should be integrated at all levels of medical care. This includes care of women of reproductive age living with HIV/AIDS.
2. The dual method of contraception should be given emphasis especially among HIV/AIDS clients.
3. Local, regional, and national policies should be written and followed based on evidence which supports the integration of HIV/AIDS care and family planning and reproductive health services.

4. Further research is recommended that can identify the extent of unmet need for family planning and reproductive health services. This research can be conducted with different groups of women of reproductive age.

References


Survival in HIV/AIDS Patients on Highly Active Antiretroviral Therapy in Gurage Zone, Ethiopia

Teshome Yilma Weldetensay

Abstract

Background: Highly active antiretroviral therapy (HAART) has been scaled up in developing countries in recent years. However, there is limited information describing survival determinants in HIV-infected patients after enrollment in HAART in Ethiopia.

Objective: To assess the independent determinants of survival in HIV/AIDS patients enrolled to ART in Gurage zone, Ethiopia.

Methods: A retrospective cohort study was conducted with 580 adults over the age of fifteen who started ART between Tahisas 20,1998 and Tahisas 19,2001 E.C. The survival time and differences were estimated by the Kaplan-Meier and log-rank tests. The Cox-proportional hazard model was used to analyze the survival determinants. The mortality rate was measured with a byar approximation Poisson distribution.

Results: A total of 580 patients from a Butajira Hospital (53%) and Atate Hospital (47%) were enrolled in the study. Of these 580
patients, 336 (58%) were women and the median age was 31 years (IQR 28 to 38 years). The majority of the patients were categorized in baseline WHO Stage III (55%) and Stage IV (23%). Major opportunistic infections included chronic and acute diarrhea (26.4%) and pulmonary tuberculosis (10.8%). The baseline median CD4 cell count and body weight were 135 cell/ul and 49.07 kg, respectively. The crude mortality rate was 3.62/100 (95% CI 2.74-4.68). The probability of survival in the first, second, and fifth years was 93.0%, 91.3%, and 86.8%, respectively. Patients with baseline pulmonary tuberculosis, chronic or acute diarrhea, and CD4 cell counts below 49 cell/ul were the independent determinants of survival.

Conclusions and Recommendations: Although this study expounds the survival benefits of ART programs in the study area, early diagnosis and easy access to care should be promoted. Priority should be given to patients with chronic or acute diarrhea, low CD4 cell counts, and with pulmonary tuberculosis. Finally, linking opportunistic infection management and HAART is recommended.
**Introduction**

In 2009, the World Health Organization reported that Ethiopia was one of twenty-one countries moving closer to achieving the universal access target of 50% to 80% for antiretroviral therapy. (1, 2, 3, 4) However, the question of ART effectiveness under real-life conditions still requires attention. (5, 6) It is necessary to assess HIV/AIDS therapy with HIV-infected individuals. The determinants and rates of survival among HIV-infected patients enrolled in HAART need study in Ethiopia.

**Objectives**

*General Objective:*
To assess the independent determinants of survival in HIV-positive patients on highly active antiretroviral therapy.

*Specific Objectives:*
1. To estimate the time to death of people living with HIV/AIDS (PLWHA) who are enrolled in HAART.
2. To determine the independent determinants of survival in HIV-positive patients enrolled in HAART.
Methods

Study Area and Period: This study was conducted in the Gurage zone from Tir 20,1998 to Tir 30,2003 E.C.

Study Design: An institutionally-based retrospective cohort study was conducted.

Source and Study Populations: The source population was all adults with HIV/AIDS enrolled in HAART in the zone. The study population was a cohort of ART-naïve patients who initiated ART between Tahisas 20,1998-Tahisas 19,2001E.C in Butajira Hospital and Atate Hospital.

Sample Size Determination: The sample size for this study was calculated by two sample population proportions. It was based on prior studies that a CD4 cell count below 50cell/ul as exposed and CD4 cell count above 50cell/ul as unexposed at the baseline required a large number compared with other independent determinants. A 0.05 level of significance and an 80% power of study were decided. Ten percent was added for incomplete data. The final total was 502 subjects. However, during the data collection period, all available patient data were reviewed for a total of 580 subjects. Three hundred eight patients and 272 patients were from Butajira and Atate hospitals, respectively.
Data Collection Procedures: A data collection form was developed for the study. Information was collected from pre/ART registration forms, lab requests, follow-up forms, ART intake forms, patient cards, adherence supporter reports, and death certificates. Patient baseline socio-demographic data, clinical information, laboratory information, and ART information was examined. Data quality was ensured by providing two days of training for a supervisor and a primary data collector. Training focused on using the standardized data collection materials.

Data Analysis: Data were entered into Epi-Info 3.5.1. It was then analyzed by SPSS Version 16. The mortality rate was measured by the approximation Poisson distribution. The survival time of patients still alive on Tir 30,2003, those lost-to-follow-up, and those transferring out to other facilities were censored.

The Kaplan-Meier model was used to estimate the survival probability after ART initiation and a log-rank test was used to compare survival curves. Significant variables in the bivariate analysis (P<0.005) were subsequently fitted into the step-wise Cox proportional hazard model to predict the determinants of patient survival. Multicollinearity was checked by using Spearman's correlation coefficient at p<0.01. All statistical tests were considered significant if the two-sided p-value was <0.05.
Ethical Considerations: Ethical clearance for the study was obtained from the Addis Continental Institute of Public Health ethics committee and the Gurage Zone Health Department.

Results

A total of 580 patients were followed for a sum of 1575.53 PYO. The median was thirty-four months (IQR 17 and 48). Of these patients, 336 (58%) were women and the median age was 31 years (IQR 28 to 38 years). Three hundred twenty-two (55.5%) were married and 50% lived in urban areas. Forty-three percent of the patients were not educated and 48.3% were not employed. IPT and CPT were initiated for 45.4% and 92.84% of the cohort, respectively. Eighty-two percent of the patients had started the Stavudine-based regimen and a low rate (20%) of regimen change was observed in the patients. The reasons for regimen changes included toxicity/side effects in 50% of the cases and newly diagnosed TB in 14%. Most of the patients were at baseline WHO Stage III (55%) and Stage IV (23%), respectively. Major opportunistic infections included chronic or acute diarrhea (26.4%), an unexplained fever (26.4%), pulmonary tuberculosis (10.8%), and oral/orophreanal candidiasis (22%). The median CD4
count and body weight were 135 cell/ul and 49.07 kg, respectively. At the end of the study, fifty-seven patients (10%) had expired. Among the censored patients, 316 (55%) were active and on follow-up and 40 (11%) were lost-to-follow-up, and 168 (29%) had transferred out to other facilities.

The crude mortality rate was 3.62/100 (95% CI 2.74 - 4.68) PYO. The median survival time of the expired cases was 10.1 months (IQR 3.4 to 19.2), and 12 (21%), 21 (37%) and 33 (58%) persons died within the first three months, six months and within the first year, respectively. The probability of survival for the first, second, and fifth years was 93.0%, 91.3%, and 86.8%, respectively. The respective mortality rate at the first 3 months, 3 to 6 months, 6-12 months, 12-24 months, 24-36 months of starting ART was 10.04 (5.18-17.54), 8.02 (3.66-15.21), 5.55 (2.86-9.69), 3.04 (1.32-4.57), 1.97 (0.51-3.44) PYO, respectively. Those who were employed had an improved survival rate (log-rank test p<0.047). Those patients with CD4 cell counts below 49 cell/ul were less likely to survive when compared to those with a cell count of equal to or more than 200/ul (log-rank test p<0.001). Patient who were bedridden (log-rank test p<0.001) were less likely to survive. Those with pulmonary tuberculosis (log-rank test p<0.007), with chronic or acute diarrhea (log-rank
test (log-rank test $p<0.002$) and oral/orophrengeal candidiasis (log-rank test $p<0.002$) were less likely to survive. Finally, those with unexplained fever (log-rank test $p<0.004$) were less likely to survive.

**Discussion**

This four-year retrospective cohort study provides survival data and survival determinants of PLWHA enrolled in HAART. Patients with a prior history of pulmonary tuberculosis, those with chronic or acute diarrhea, and CD4 cell counts below 49 were the independent determinants influencing survival in PLWHA on HAART.

In this study, only 7% of the patients were lost-to-follow-up which is lower than the national lost-to-follow-up rate of 21.3%. (13) The characteristics of lost cases were not similar to expired cases with a median CD4 cell count of 120 and 100 cells/ul. As with this study, mortality differences due to baseline CD4 cell counts have been documented in previous studies. (14, 15) Patients with baseline CD4 cell counts below 49 were less likely to survive (log-rank test $p<0.001$). The cumulative survival rates of patients with CD4 cell counts below 49 at three and six months at
the onset of ART was limited. From early deceased patients (within three months of ART initiation), 41% had baseline CD4 cell counts below 49. In this study, 10% of the patients had prior pulmonary tuberculosis at the baseline. This is lower than in other studies. (10, 16, 17) In those HIV patients with baseline pulmonary tuberculosis, 20% died in the first three months, and 30% died in the first four months of ART onset.

In the current study, 26.4% of the study subjects had a history of chronic or acute diarrhea at the baseline. This was not high when compared with other studies. (18) However, there were differences in the probability of survival observed with greater risk for dying among those with a history of chronic or acute diarrhea. There are currently no effective treatments for chronic diarrhea in HIV-positive and immune-compromised individuals. Also, ART itself can induce diarrhea as a side effect of treatment. Patients with candidiasis had a 1.77 fold increase risk of death (UHR 2.26 (1.34-3.83) p<0.002) in bivariate analysis. A total of 35% of these patients also had CD4 cell counts of 49 at baseline and 48% of them had current or a history of chronic or acute diarrhea. This suggests that candidiasis serves as a surrogate marker for the presence of undiagnosed opportunistic infections, a rapid disease progression, and severe immune
suppression. (14)

In this study, 58% of the patients had an ambulatory/bedridden functional status. Also, survival differences were observed (log-rank test, p<0.0001). Those patients working at baseline were 36% more protected from dying than the bedridden/ambulatory patients (UHR, 0.357(0.188-0.676) p <0.02). There were no survival differences based on the gender of the patients (log-rank test, p<0.07). Presenters were male, but therapy compliance and adherence differences were not noted with an equal proportion of lost-to-follow-ups. (10, 12, 19, 20).

Conclusions and Recommendations

This study provides further evidence-based data that ART extends life. The survival benefit of ART programs in the study area should be promoted in the community. Early diagnosis of HIV infection and prompt access to medical care should also be promoted. Public health responses that improve treatment outcomes include initiation of ART at earlier disease stages and an emphasis should be given to patients with chronic or acute diarrhea, a low CD4 cell count, and those with pulmonary tuberculosis. The study showed the importance of close linkages between opportunistic infection
management and ART. Mortality of HIV patients resulting from opportunistic infections after implementation of HAART appears to be decreasing over time. However, failure to achieve this implies that there is a still need to educate PLWHA about the prevention of diarrhea. Baseline screening, treatment, and prophylaxis of opportunistic infections (CPT and IPT, screening for TB) are required for best clinical care. The low lost-to-follow-up rate needs to be maintained. This maintenance can be provided through adherence support and the focused actions of ART case managers and peer-educators.

Limitations of the Study: These analyses were based on routinely collected data and some of this data were incomplete for baseline variables. Also, there was the issue of patient recall bias in the collected data. There was also the problem of knowing the exact cause of death among the subjects. The mortality rate and frequency of opportunistic infection reporting was low in comparison with other studies and this could be a point of concern. The crude mortality rate of 3.6/100 PYO might be an overestimation because mortality was considered only AIDS-related in nature. Finally, the period of study was four years long and improvements in the treatment of opportunistic infection have occurred and now influence survival.
Acknowledgements

I am deeply grateful to my advisor, Dr. Alemayehu Worku, for his relevant, timely, and constructive comments and guidance during the entire research process. I also thank Addis Continental Institute of Public Health and Haramaya University for all of the efforts to provide me with the necessary knowledge and skills to conduct this thesis study.

References


16. Houlihan CF, Mutevedzi PC, Lessells RJ, Cooke GS,


Trachoma Prevention, Assessment of Face Washing, and Environmental Control Components of the SAFE Strategy in Model Families in Adama Woreda, Oromia Regional State, Ethiopia

Asfaw Wondimu

Abstract

Background: Trachoma which leads to blindness can be prevented. This prevention can occur through improvements in face washing and environmental controls in the community. The SAFE strategy can assist this prevention in Ethiopia.

Objectives: This thesis assessed the implementation, practices, predictors of the implementation of the face washing and environmental control component of the SAFE strategy in model families who graduated before July 7, 2008 and trained for three months, and later among those who were trained for two weeks. These activities occurred in the Adama woreda of the Oromia National Regional State in Ethiopia.

Methods: The study was a community-based, cross-sectional study and used a multistage cluster sampling method. Questionnaires
were used to collect data from five hundred twenty-one (521) heads of households.

Results: The proportion of households containing children between the ages of one and nine with clean faces in the before-July 7, 2008 group was 0.5 times lower than that of the after-July 7, 2008 group. The proportion of households owning and using latrines was 3.5 times higher in the before-July 7 group than in the after-July 7 group.

Conclusions and Recommendations: The number and proportion of households that had children with unclean faces were high in both groups studied. The proportion of households with unclean faces and using latrines were higher in the before-July 7 group and after-July 7 group, respectively, compared with their counterparts. Being a female head of household and living in a clean compound were found to be predictors for facial cleanliness in children. Knowledge about the communicable nature of trachoma and the training of selected families for three months were found to be predictors of both latrine use and the maintenance of a clean latrine. Persistent and continuous health education about trachoma and its prevention should be provided to the families, in particular, and the community-at-large. This health education can improve the facial cleanliness of children in the woreda. Health education can also
lead to the improved use of latrines. A change in strategy of latrine construction was also identified through the research and is recommended.

**Introduction**

Avoidable blindness is a public health tragedy throughout the globe. Such blindness has personal, family, and socio-economic consequences. The World Health Organization (WHO), based on the 2002 population, showed that trachoma was responsible for 3.6% of all global blindness. (1,2) If, however, appropriate measures were to be taken in a timely manner, visual impairment from trachoma would be avoidable. Therefore, the WHO recommends a program called SAFE which stands for Surgery to correct trichiasis, Antibiotics to treat active trachoma, Facial cleanliness to reduce possible communicable disease transmission, and selected Environmental improvements to affect the determinants of vulnerability. These are seen by WHO as a key pathway to achieve the Global Elimination of Trachoma (GET) by 2020 that is a part of the VISION-2020 Program. (3)

Low vision and blindness are major public health problems in Ethiopia. Trachomais is consistently identified as one of the top
three causes of blindness. (4) The SAFE strategy with mass antibiotics distribution has been launched as a component of the national VISION-2020 program since 2002.

Environmental sanitation—particularly latrine construction and use—is a priority of the Ethiopian government. This promotion of environmental sanitation and other related health programs is conducted by health extension workers (HEWs) delivering services in rural and urban communities. (6) These HEWs visit households and teach their members about health programs including personal hygiene and environmental sanitation.

At the initial phase of this program, the duration of the training was three months but was reduced to two weeks effective 2008. This training was expected to enable the members of households to acquire and practice the required knowledge and skills in the use of environmental sanitation and personal hygiene. (7) Since environmental sanitation and personal hygiene (i.e. face washing) are components of SAFE strategy, many trachoma prevention activities are implemented with and integrated into the health extension programs.
Objectives

General Objective:
To assess the practice of face washing and environmental control components of the SAFE strategy among selected families who graduated from the 3-month program before and the later 2-week program in 2008 in the Adama woreda.

Specific Objectives:
1. To assess the practices of face washing and environmental control components of the SAFE strategy among model families who graduated before and after July 7, 2008.
2. To identify those factors affecting the implementation of practices of face washing and environmental control components of the SAFE strategy among the model families.

Methods

Study Area and Period: The study was conducted in the Adama woreda, Oromia Regional State, Ethiopia in February, 2011.

Study Design: A comparative cross-sectional survey was used.

Sample Size and Sampling Procedures: The sample size was calculated using a formula of two proportion. A multistage
sampling procedure was used to identify the respondents for the survey. The primary sampling unit was the kebeles and was selected by the proportional population size method. Three and six kebeles were selected as a cluster and included in the study as a member of the before-July 7 group and trained in the after-July 7 group, respectively. Secondary sampling units were households and selected by using a modified EPI cluster sampling method. The proportions of households which contained children between the ages of one and nine with clean faces and where latrines were used included the main outcome measures.

Data Collection Tools and Quality Control: Data were collected using structured questionnaires. Training was provided to the data collectors and their supervisors to ensure quality in the data collected.

Data Management: The data were entered and analyzed using Epi-Info Version 3.5 and SPSS Version 15.

Ethical Clearance: The ethics review board of Addis Continental Institute of Public health provided ethical approval for this study. Informed verbal consent was obtained from all adult individuals who participated in the study.
Results

A total of 521 heads of households were selected. All participated upon request for a response rate of 100%. These heads of households included 174 before July 7, 2008 and 347 after July 7, 2008. All were interviewed.

A total of 84% and 77% of the respondents in the before July 7 group and after July 7 group were males, respectively. The median age was 38 and 42 for the before and after groups, respectively. Over 90% of both groups were farmers by trade. Christians and the Oromo ethnic group constituted 66.1% and 90.5% and 96.6% and 81.6% for each group, respectively.

*Implementation Practices of the F Component of SAFE:* The odds of a face washing habit of children in the earlier group were 1.3 times higher than in the later group. Also, the odds of the proportion of households which contained 1-9 years old children with clean faces in the earlier group was 0.5 times lower than in the later group.
Table 1. Comparison of the Practices of Facial Cleanliness of Children Ages One to Nine and Associated Factors in Adama Woreda, Ethiopia, 2011

<table>
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<th>Variables</th>
<th>Before July 7</th>
<th>After July 7</th>
<th>COR</th>
<th>95% CI</th>
</tr>
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<td></td>
<td>#</td>
<td>%</td>
<td>#</td>
<td>%</td>
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<td>n=232</td>
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<td>28.4</td>
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<td>106</td>
<td>82.8</td>
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<td>71.6</td>
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<td>96.1</td>
<td>225</td>
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<tr>
<td></td>
<td>5</td>
<td>3.9</td>
<td>7</td>
<td>3</td>
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<td>93</td>
<td>53.4</td>
<td>283</td>
<td>18.4</td>
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<tr>
<td></td>
<td>n=174</td>
<td></td>
<td>n=347</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt;30 mint</td>
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</table>

*E component of Safe strategy:* The odds of the proportion of households who owned a latrine was 3.47 times higher in before July 7 group than after July 7 group. The floors of 82% of the latrines in the earlier group were made of local materials compared with 69.7% in the later group. The odds of a clean latrine in the earlier group were 0.4 times lower than the later group.
Determinants of Practices of “F” and “E” Components of the SAFE Strategy: A clean face was associated with the gender of the respondent, belonging to the earlier group, the knowledge of the head of the household about the communicable nature of trachoma, the knowledge of Tetracycline/Zithromax as the treatment of trachoma, and the cleanliness of the living compound when visited by the HEWs. Latrine ownership and use was associated with per capita water consumption, a good knowledge level on trachoma, the knowledge of the head of household about communicability of trachoma, good access to a water source, cleanliness of the living compound, and belongingness to the earlier group.

Logistic analysis showed that gender of the respondents and cleanliness of the living compound remained significantly associated with facial cleanness. On the other hand, latrine use was found significantly associated with being knowledgeable on the communicability of trachoma and “belongingness” to the group of model families who were trained for 3 months.
Table 2. Results of Logistic Regression for Possible Explanatory Variables of Latrine Use and Facial Cleanliness in Adama Woreda, Ethiopia, 2011

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<tr>
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<td>13</td>
<td>3.36(1.19,9.51)</td>
<td>4.03(2.01,8.07)</td>
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<td>After July 7</td>
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<td>76</td>
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<td><strong>Facial Cleanliness</strong></td>
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<tr>
<td>TTC/Zithromax are Drugs for Treatment of Trachoma</td>
<td>Yes</td>
<td>11</td>
<td>13</td>
<td>3.21(1.34,7.62)</td>
<td>2.42(0.99,5.93)</td>
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<td></td>
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<tr>
<td>Is Trachoma a Communicable Disease</td>
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<td>164</td>
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<td>1.58(0.86,2.92)</td>
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<td></td>
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<td></td>
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<tr>
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<td>Before July 7</td>
<td>After July 7</td>
<td></td>
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<tr>
<td>----------------</td>
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<td>166</td>
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<td></td>
<td>2.79(1.44,5.35)</td>
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<td>0.52(0.30,0.90)</td>
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<tr>
<td></td>
<td>2.72(1.35,5.45)</td>
<td>1.0</td>
<td>0.62(0.35,1.10)</td>
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</table>

**Discussion**

Members of the earlier and later groups lived in the same village and shared many things. Therefore, it was not possible to exclude contamination of information and practices between the members of the two groups. Comparison of these study findings with other reports was not possible due to the absence of other identified published studies.

The average per capita water consumption of 8.2 liters in the selected households was similar to the finding in another study conducted in central Ethiopia. Moreover, this value is still lower than the internationally recommended per capita water need of 20 liters per day. Water, the universal cleansing agent for body and home, was used little in the households studied.

There was also a disparity between the high rate of face washing behaviors reported (>76.4%) and the objective observational findings that <29% of the households contained children with clean faces. Similar findings have been reported in the other studies.
(9,10) This may be due to the tendency to over report when a questionnaire is used to measure behaviors.

The Ethiopian Eye Care Strategic Plan of 2006-2010 targeted an increase in the proportion of children with clean faces above 80% by 2010. (5) However, contrary to this target of above 80%, the current study indicated that the proportion of children with clean faces was 28.4% with a significant difference. Similar low proportions of clean faces among children were also reported from four different trachoma control projects in Ethiopia. (9)

A review of several studies has shown that sustainable behavioral change must be attained in the community to reduce the prevalence of active trachoma. However, this study and a review of the literature indicate that behavioral change is very difficult to bring about in a community. (11)

The proportion of households with latrines was found to be higher in the earlier group than in the later group. The overall latrine coverage in the study area of 78% was higher than in the reports from other studies at an average of 24%. (9,10) This is a significant difference. Latrine construction has recently become one of major health issues receiving attention by the Ethiopian government. Fallout from this attention could possibly be the reason for an observed difference in latrine coverage and use.
Conclusions

It is widely known in public health and medicine that unclean faces among children are predictive of the transmission of trachoma which, ultimately, can lead to blindness. The proportion of households with unclean children’s faces was high in both groups which is a community health concern. But, the proportion of households with unclean faces and using a latrine was higher in the earlier group than the later group. In addition, most of the latrines were observed to be unclean for use and their floors were made of local materials. This situation also predisposes the dwellers to other communicable diseases besides trachoma.

Female heads of households and living in a cleaner compound were found to be predictors for facial cleanliness among their children. At the same time, knowledge about the communicability of trachoma and the training of selected families for the three months period were found to be a predictor for latrine use.

Recommendations

It is recommended that persistent and continuous health education about the importance of face washing, the use of latrines, and
latrine maintenance for cleanliness, should be planned and provided. The problem of trachoma is truly a health education problem and can be solved through culturally sensitive, effective, ongoing health education programming. This can be conducted at the individual, family, and community levels.

More efforts by prominent health and social members of the community to increase the latrine coverage and use are needed. Finally, the common existing latrine construction methods should be dropped and improved latrine building should be introduced to the community and used.

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School Sanitary Conditions and Assessment of Knowledge and Personal Hygiene Practices among Primary School Students in Lideta Sub-city, Addis Ababa, Ethiopia

Mahmmed Ahemed

Abstract

Background: The disease burden from unclean and limited water, poor sanitation, and modest personal hygiene practices among school children is high. Many African nations, including Ethiopia, organize around and focus on basic educational needs of school children with little consideration of school sanitation and children’s hygiene needs. Health problems among these children result.

Objective: To assess school sanitary conditions and the knowledge and personal hygiene practices among primary school students in Lideta Sub-city, Addis Ababa, Ethiopia.

Methods: An institutionally based, cross-sectional study was conducted in Lideta sub-city of Addis Ababa from November, 2010 to June, 2011. The source population was all primary school...
students from grades five to eight. A total of 789 students were selected using a multistage sampling method. Data were collected using a structured questionnaire and an observation checklist. Epi-Info Version 3.5.1 and SPSS Version 16 were used to enter, clean, and analyze the data.

Results: The majority (83.5%) of the students had good sanitation knowledge. Out of all the students, 76.8% had good hygienic practices. The water taps and latrine seats-to-student ratio was 1:65 and 1:83, respectively. Knowledge of proper hygiene was associated with hand washing after defecation (OR=3.77, 95% CI 2.05-6.93). Those students who had received hygiene and sanitation education were more likely to have proper hygienic knowledge (OR=1.73, 95% CI 1.22-2.46).

Conclusions and Recommendations: The hygiene knowledge and practices of the students was found to be generally good. However, the sanitation of the facilities in the schools was inadequate even when compared with very weak Ethiopian standards. Hygiene knowledge and practices of students can be improved by health education programming in the schools and with well designed and properly located hand washing facilities, latrines, and showers. An adequate amount of soap and water to promote hygiene is required.
Introduction

There were 1.1 billion people who did not have access to an improved water supply and 2.7 billion who did not have adequate sanitation in 2007 globally. (1-4) The situation was most severe in the African region where the percentage of the population using improved sanitation facilities has increased very slowly from 30% in 1990 to 34% in 2008. (5, 6). A lack of access to clean water and sanitation remains one of the greatest threats to global health, and arguably, the largest of the environmental risks to health. (1) The sanitation national coverage was 18% in Ethiopia in 2005. It is reported that up to 60% of the disease burden in Ethiopia is related to poor sanitation and hygiene and 15% of the total deaths in the country are a result of diarrhea. (7)

More than 1.4 billion school children between the ages of 5 and 14 years live in developing countries and face serious environmental health-related challenges. Children in this age group are 14 times more likely to die between their fifth and fourteenth birthdays than their counterparts in the more industrialized nations. (2, 8) Additionally, children who suffer ill health cannot regularly attend school and their educational, social and intellectual development suffers. This lack of development is reflected later in
life by their reduced and limited contributions to development and society. (9)

After the home, the school is the most important place for learning in children. Schools should be stimulating learning environments and for initiating behavioral changes. It is recognized that childhood is the best time for children to learn hygiene behaviors. Children are future parents and what they learn is likely to be applied for the rest of their lives. Children spend a significant amount of their time in and around schools and these environments need to be healthy, safe, and secure to be conducive to learning. Children who learn good hygiene practices in school can also become important primary health promoters at home. (10, 11)

**Objectives**

1. To assess the sanitary condition of selected primary schools in Lideta sub-city, Addis Ababa.
2. To assess the knowledge and hygiene practices of selected primary school children in Lideta sub-city, Addis Ababa.
Methods

Study Area and Period: The study was conducted from November, 2010 to June 2011 in Lideta sub-city, which is one of the ten sub-cities of Addis Ababa. The selected sub-city had eleven woreda administrations and an estimated population of 214,583. At the time of this study, there were twenty-two governmental and fourteen private primary schools with total number of 21,502 students. Of these, 10,286 were students in grades five through eight.

Study Design: An institutionally-based descriptive cross-sectional study was conducted from November, 2010 to June 2011.

Source Population: All primary schools with grades five to eight in Lideta sub-city were the source population.

Study Population: Seven primary schools were selected.

Study Participants: A total of 798 randomly selected students from the seven schools was the study.

Sample Size Determination: Sample size (n) was determined using two assumptions: proportion of students with sanitation knowledge (weighted mean) 72% and 40% of the students who had hygienic practices (12), with a design effect of 2, expected margin of error (d), and with P=.05 confidence level (zα/2) with contingency for
non-response rate of 10%. Accordingly, the required sample size was 812 students.

Sampling Technique: After it was distributed proportionally among the seven primary schools, school grades and sections, the sample was selected by a systematic random sampling method using class attendance as the sampling frame.

Study Variables

Dependant Variables: Knowledge of students on personal hygiene and sanitation (knowledge about diseases transmitted through poor personal hygiene and sanitation and prevention methods), hygienic practices of students (taking bath, hand washing at critical time, face washing) and sanitation of facilities in the school environment (water supply, toilet, playing ground, classroom, and solid waste disposal).

Independent Variables: Socio-demographic factors such as age, gender, school grade, religion, ethnicity, and ownership of the school.

Data Collection Methods and Instruments: Ten health diploma graduates collected data. Three B.Sc. environmental health persons were supervisors. All were recruited and training on the objectives
of the study and techniques of data collection for two days. Each student was interviewed using a structured questionnaire in a quiet and secluded room selected for this study. An observational checklist and a photo camera were used to describe the school sanitation. The observations were conducted one week before and during the questionnaire survey by the three selected environmental health persons.

**Data Quality Control:** The questionnaire was initially drafted in English, translated into Amharic, and pretested in a primary school other than the study schools in the sub-city. Spot-checking and reviewing the completed forms were conducted by the supervisors and principal investigator on a daily basis to maintain data quality. Proper categorization and coding of data were conducted. Furthermore, 5% of the collected information was checked by the principal investigator for accuracy.

**Data Analysis:** Epi-Info Version 3.5.1 was used for data entry and SPSS Version 16 was used for both cleaning and analysis of the data.

**Ethical Considerations:** Ethical clearance was obtained from Haramaya University and ACIPH ethics committee. Written Permission was obtained from the Lideta Sub-city education and health offices. Verbal consent was obtained from each of the study
subjects. Interviewing was conducted privately.

**Results**

The results were obtained from seven schools. A total of 812 students were randomly selected for the study. Fourteen (1.72%) were categorized as non-respondents. The results were derived from 798 (98.27%) interviewed students. The mean and standard deviation of age of the study subjects were found to be 13.44 and ±1.77 years, respectively. The ages ranged from 10 years to 24 years. The majority of the study subjects were females 445 (55.8%). A total of 23.9%, 21.4%, 26.9%, 27.7% were from the 5th, 6th, 7th, and 8th grades, respectively.

The vast majority 777 (97.4%) knew that contaminated water transmitted diseases like diarrhea and parasitic worm diseases and 728 (91.2%) and 694 (87%) understood that contaminated water could be treated through boiling and by chemicals, respectively. A total of 685 (86%) of the students understood that human feces could transmit disease and 775 (97.1%) understood that poor personal hygiene transmitted diseases including skin diseases, eye diseases, teeth diseases, and diarrhea, respectively. A majority 726 (91%) and 709 (88.8%) of the students understood that hand
washing before meals and after defecation was important, respectively. The preferences of students for hand washing was 741 (92.9%) before meals and 688 (86.2%) after defecation. Generally, 666 (83.5%) of the students were classified as having had good sanitation knowledge. Above half (57.1%) of the students received their hygiene and sanitation education from their school, the mass media, and health institutions, respectively.

A total of 762 (95.5%) of students reported that they bathed at least once a week. A total of 672 (94.2%) and 752 (84.7%) of the study subjects reported washing hands before meals and after defecation, respectively. Most of them (88.2%) washed their hands with soap when available for use.

A total of 777 (97.4%) of the study subjects reported using latrines. Also, 520 (70.7%) drank water using their hands at school. Generally, 613 (76.8%) of the study subjects had good hygiene practices. Those with good knowledge of proper hygiene were more likely to have a hand washing practice after defecation (OR=3.77, 95% CI 2.05-6.93). Those who reported to receive hygiene and sanitation education were more likely to have hygiene knowledge (OR=1.73, 95% CI 1.22-2.46).
Table 4. Hygiene Knowledge of Students in Relation to Selected Socio-demographic Variables in Primary Schools in Lidate Sub-city, Addis Ababa, 2011

<table>
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<th>Variables</th>
<th>Poor Hygienic Knowledge</th>
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<td>Female</td>
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315
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Data were collected from seven schools with four (60\%) from governmental and three (40\%) from private schools. These schools represented 20\% of the total schools of Ledeta sub-city. All schools had a source of a water supply in the school compound that was connected with the town water pipe line. A total of 105 water taps were functional at the time of observation and served 6,868 students in the six schools. The overall water tap-to-student ratio was 1:65 in the schools. There was a complete absence of any shower facilities for students at the schools. All of the schools studied had some type of latrines. A total of 114 latrine seats were identified and 88\% were functional for use. VIPs and pit latrine were the commonest type of latrines. The overall latrine seat-to-
student ratio was 1:83. This ratio varied by ownership of the school and the gender of the students for use.

*The majority of the elementary schools did not provide suitable, usable, or clean latrines. Most of latrines had no doors to provide privacy. Only one school had urinals. There were no hand washing facilities adjacent to the latrines in any of the schools. Students used the same water taps for both drinking and hand washing after defecation.*

Most of the governmental schools buildings, windows, rooms, chalkboards, walls and ceilings were relatively well constructed. However, the classrooms and school compounds were not clean. In most of the private schools, the classrooms were narrow, short, and had few windows for adequate ventilation. The distance between student desks and chalkboard was very limited. Generally, all of the schools could be easily classified as having poor sanitation conditions.
Discussion

A total of 91.2% of the study subjects knew that boiling water could kill germs. Students in this study were much better versed with this concept than students in the primary schools of Hawassa at 74.5% (12) and students in Angolela in the Amhara region at 61.4% (13). In general, out of the students surveyed in this study, 83.5% could be classified as having good sanitation knowledge and is better than a study done in Hawassa 71.7% (12) and Amhara region at 52%. (13) This variation may be due to the study subjects in Addis Ababa having better access to information, their grade in school, or their ages.

While open field defecation continues to be a very common cultural practice in Ethiopia, almost all of the students (97.4%) reported using a latrine. The reported practice of using a latrine was greater than with students in primary schools in Hawassa at 51.2% (12). This difference may be due to the actual availability of latrines and knowledge. Most of the students reported that bathing at least once in a week (97%). Only 58.7% of the students in the Amhara region took a shower once a week (13). This variation may be due to availability of any shower facilities. Water and soap are probably
more available in urban areas. Cultural factors arising from the family regarding personal cleanliness may also be at work.

Overall, the majority of the students studied in Addis Ababa reported washing their hands before meals and after defecation. The percentages of children who reported the importance of, the preference for, and actual hand washing before eating was 91%, 92.9% and 88.8%, respectively. These high proportions are consistent with the higher proportion of children who reported washing their hands before meals 94.2% and after defecation at 84.7%. A total of 88% of the students who washed their hands reported using soap while doing so. This hand washing practice with soap was better than in the Amhara region wherein only 36.2% washed their hands with soap (13). The difference may be due to the provision of soap in greater in urban areas.

Washing hands after defecation is widely known to be one of the most effective ways to prevent diarrheal diseases and gastro-intestinal parasitic infections (1). A total of 88.8% of students reported that washing hands after defecation was important. In addition, 84.7% reported actually following this practice. The self-reported frequency of hand washing after defecation among children in this study was substantially higher than frequencies reported from other studies. This may be because hand-washing facilities are
more readily available in urban areas. The culture in the urban area may better support these behaviors.

All the study schools had a source of water in the school compound. All were connected to the city pipeline. This was found similar to the findings in the Hawassa primary schools (12), but better than in a national survey of school water supply coverage. (14) Overall, the water tap-to-student ratio was 1:65. This ratio varied by ownership of the schools. The water tap-to-student ratio in this study was better than in other schools of urban Ethiopia where the the ratio was 1:466 (12). While the national recommendations indicate one shower for every fifty students, no shower facilities for students were found in this study. This indicated a true disregard for young women students who may have problems with menstruation. (14)

All of the observed schools had access to some kind of latrine technology. This was encouraging if compared with the national latrine coverage of schools of 76% (14) and this finding is similar with the Hawassa primary schools (12). However, accessibility was limited to only one latrine seat to 83 students. The student-to-latrine ratio was different between genders. Again, the female students were at a dramatic disadvantage. Females had one seat per 98 students while males had one seat per 69 students. National
guidelines recommend one seat per thirty students. (16) In fact, girls had a lower level of access to sanitation services when compared to males. This finding is similar to other studies. (14, 15 and 16) This is perhaps another example of gender inequality.

In general, most of the schools did not have an adequate number of latrines for their students. In addition, most of the latrines were not clean, usable, or suitable for use. There were no hand washing facilities adjacent to the latrines in most schools. Students used the same water taps for drinking and hand washing after defecation, which leads to a contamination of the drinking water supply and transmission of infection.

**Conclusions**

The hygienic practice of the students was poor. The sanitation of the schools was very poor. These sanitation and hygiene problems are consistent with the least developed countries in the world of which Ethiopia is one. If Ethiopia plans to move forward in development, an increased focus on sanitation and hygiene must become conducted. Personal hygiene including bathing, eliminating common open-field defecation, building proper latrines, maintaining those latrines so they are usable ad water availability
for hand washing must all be conducted. Usable latrines for the students cannot continue to be an afterthought to school administrators. Cultural norms must change.

Poor hygiene and sanitation creates favorable conditions for disease transmission. To improve this problem, activities must be undertaken at the personal, family, school, regional, and national levels.

**Recommendations**

1. Formal hygiene education must be given in both the government and private schools to the students beginning in kindergarten and beyond. This education would include the discussion of the germ theory; clearly identifying those diseases related to poor sanitation and hygiene; and demonstrating proper personal hygiene practices.

2. School latrines cannot be ignored and left filthy and unusable without doors and privacy. Well-designed, well built, and maintained latrines are mandatory in any school setting. Clean and usable latrines should be available to both female and male students. Filled water buckets at the
pit latrine seats should be provided for obvious sanitary reasons.

3. Shower facilities should be available on school campuses.

4. An adequate and regular water supply with hand soap should be provided at the latrine locations for hand washing.

5. Paid personnel should be identified to be responsible for the school water supply, latrine cleanliness and inspection, and the sanitation of the campuses. Their work should be closely monitored.

6. Family members of the school children should advocate for improved sanitation and hygiene of the school campuses and for sanitation and hygiene education programs for the students. If the parents of the children demand improvements in sanitation, things could improve.

References


Menelik Legesse

Abstract

Background: Health care waste includes hazardous organic and inorganic materials. Disposal management of this waste is currently seen as unscientific in Ethiopia. The national waste management practices in Ethiopia’s health facilities are poor and need great improvement. This study may help health care organizations, stakeholders, and policy makers to improve the existing waste disposal situation.

Objective: To assess the existing generation and management practices of health care waste in selected government health centers of Addis Ababa.

Methods: An institutionally-based, cross-sectional survey was conducted to quantify the waste generation rate and evaluate the waste disposal management systems. The study area was Addis Ababa. The sample size was determined by a simple random
sampling technique wherein the sampling procedure involved ten sub-cities of Addis Ababa and selection of health centers within them. Data were collected using both waste collecting and measuring equipment and a formal checklist. Data were entered using Epi-Info Version 6.04 and analyzed using SPSS Version 15.

**Results:** The mean health care waste generation rate was 9.61 kg/day (±3.28) or 57.37 (±24.99g)/patient/day, of which 38% was general or nonhazardous waste and 62% 5.97 (± 2.31) kg/day was hazardous waste. The mean health care waste generation rate among the health centers was found to vary significantly using the Kurskal-Wallis test ($x^2=21.83$, p-value=0.009). All health centers used safety boxes for collection of sharps wastes and all health centers used plastic buckets without lids for collection and transportation of health care waste. Pre-treatment of infectious wastes was not practiced by any of the health centers. All health centers used incinerators. All health centers under study had a placenta pit for the disposal of pathological waste, however, only seven out of ten pits had proper covering materials.

**Conclusions and Recommendations:** Waste management and disposal practices were identified as poor in the health centers studied in Addis Ababa. Both the segregation of wastes at the point
of generation with appropriate collection materials and the pre-
treatment of infectious waste before disposal should be practiced. A
commitment to improvement and training should be given to health
care workers and waste handlers. Incinerators must be constructed
in a manner that facilitates complete combustion. Finally, the
linings of placenta pits should be constructed of watertight
materials.

**Introduction**

In the lesser developing countries like Ethiopia, the international
policies that the generators of waste are responsible for the proper
management, treatment, and disposal of waste are yet to be
implemented or realized. The notion that waste is the responsibility
of government authorities has proven to impact negatively on
proper waste disposal. Designated persons must be accountable for
its proper disposal.

Biomedical waste can be defined as the total waste stream
generated from health care establishments. Hospitals, health
centers, medical laboratories, medical research facilities,
pharmaceutical manufacturing plants, pharmacies, blood banks,
and home health care organizations are the major generators of
health care waste. Biomedical waste generated from diagnostic activities can be broadly categorized into either general waste or hazardous waste. This, however, remains true only when proper segregation and separation of waste is practiced according to the type at the source. (1)

One study in Ethiopia showed that the mean (± SD) of health care waste generation rate per health center was 1.79 (± 0.57)kg/day. A total of 52.0% 0.93±0.3kg/day and 48.0% 0.86 (± 0.33)kg/day were general or non-hazardous waste and hazardous waste, respectively. (2) There are different estimates regarding the proportion of hazardous and non-hazardous constituents of health care waste indicating that the mean generation rates of health care waste produced is 0.5kg/patient/day and 1.6kg/bed/day. (3) In most health facilities, the segregation of health care waste at a point of generation is weak, indicated that the wastes produced are assumed non-contaminated and possess no risk of infection to those in contact with the waste. Concomitantly, WHO reports that from the total waste generated by health care activities, 85% is general waste and the balance is hazardous as it is infectious, toxic, or radioactive. (4).
There are sixty-eight health care facilities at different levels in Addis Ababa. Of these facilities, five are government hospitals and twenty-six are government health centers. The management of health care waste is being conducted by traditional means while some of the waste handling and disposal is being conducted properly as a result of the goodwill of more knowledgeable managers.

There are waste disposal limitations in the existing health facilities in Addis Ababa and throughout Ethiopia. These limitations include a lack of adequate health care institutional arrangements and protocols for waste disposal. There exists operational and administrative inefficiency and incompetence resulting from disregard and/or ignorance. Local governmental authorities are complacent.

Such biomedical waste threatens the public since health care facilities are situated in the heart of the city. Medical waste, if not properly managed, can cause dangerous infection and poses a threat to the surrounding environment, the persons handling it, and to a vulnerable public.

The health, disease, and environmental effects along with the uncertainty regarding regulations and negative perceptions by
waste handlers are important concerns in health care waste management in Ethiopia. (6)

There are limited studies in Ethiopia on health care waste generation and handling practice. At the present time, aside from anecdotal information, there is little available information that describes the actual practices regarding the handling of health care waste in the health centers of Addis Ababa. Whether there is any effective management in the proper disposal of the waste is uncertain.

This study focused on health centers because they are the primary health care facilities in Addis Ababa. These health centers are the foundation to primary care in the city. The outcome of the study may be used for planning and implementing waste-related activities. It can also help the policy makers, advocates, researchers, and other concerned persons to assist in the development of an effective health care waste management system in Addis Ababa and the country.

**Objectives**

*General Objective:*
To assess the existing generation and management practices of health care waste in selected government health centers located in Addis Ababa.

**Specific Objectives:**

1. To determine the health care waste generation rate at selected government health centers.
2. To describe the types of health care waste generated from selected government health centers.
3. To assess the practice of waste management at selected government health centers.

**Methods**

*Study Design:* An institutionally-based, cross-sectional study was conducted to quantify the waste generation rate and to evaluate the waste management systems in January, 2011 in selected governmental health centers of Addis Ababa.

*Study Area:* The study area was Addis Ababa with the total population of approximately three million persons. The city has three layers of administration which are the city administration at the highest level, 10 sub-city administrations in the middle, and 116
woredas at the lowest level. Each sub-city administrations has a population of 300,000 and each woreda administration has a population of 30,000. There are five referral hospitals and twenty-six health centers under government administration and budgeted from city administration.

Study Population: This study was conducted in the government health centers of Addis Ababa City Administration. Data were collected from ten of the twenty-six health centers. These ten health centers were selected by a simple random sampling method from each sub-city.

Variables

Dependant Variables: These variables including the amount of waste generated, the type of waste generated, and the waste management practices.

Independent Variables: These were materials used for waste collection and transportation, the presence or absence of local or international waste management policies, and the segregation of waste at the sources.
Sample Size Determination: This was determined by previous studies mean generation: 1.79 kg per day; SD 0.57 kg per day over 80 measurements in ten health centers.

Sample size \( n \) = \( \left( \frac{Z_{\alpha/2}}{2} \right)^2 \cdot \frac{\delta^2}{d^2} \)

Calculation of sample size \( n \) for Addis Ababa

Standard normal variate of approximately 95% confidence \( (Z_{\alpha/2}) =1.96; \)

\( \delta = \) population Standard Deviation (SD), estimated by sample Standard Error (SE)

\( d = (Z_{\alpha/2}) \cdot SE \)

\( SE = \frac{SD}{\sqrt{n}} = 0.0637 \)

\( d = \) margin of error corresponding 95% of certainty; \( 1.96 \cdot 0.0637 = 0.1248 \)

0.1248 of 1.79=7% (i.e. within 7% from 1.79)

Using the above formula and 7% precision, ten health centers were identified as required for the study.

Data Collection Procedures: Data were collected using a pre-tested checklist and an interview tool. The checklist was prepared for the measurement of the amount of health care waste rate at the health
centers for seven consecutive days. The checklists were used by trained assistants. Data were collected for 24 hours from each sampling unit in different color-coded polyethylene bags. The colors of the bags were yellow, red, and black. Yellow bags contained infectious clinical wastes. Safety boxes for sharps wastes were yellow. Black bags contained non-infectious (non-risk) wastes. The red bags contained drugs and radioactive hazardous wastes. The site visits were conducted using a check list to review the segregation, handling, collection, and storage practices at the selected health centers. Interviews were conducted with health center managers about the management of waste at their centers. Care was taken during waste collection and data collectors used gloves, masks, gowns, and antiseptics to prevent possible infection. Twelve case teams were created for the delivery, emergency, injection and dressing room, laboratory, HIV counseling and testing and ART, pharmacy, FANC, EPI, FP, TB and leprosy, OPD, and IMNCI and growth monitoring. The incinerators and deep burial and placenta pits were examined and evaluated.

Measurements were conducted using a weighing scale which was analog and digital and used at the study units. Measurements were recorded. The measuring instruments were calibrated using known
weights and the values. For the purpose of data collection, ten enumerators who completed TEVT training with a diploma, and three supervisors with diploma nurse training underwent one day of training. The data collectors and supervisors were trained by the principal investigator. A training manual was prepared on how to use the checklist and how to weigh the health care waste. Pre-testing was conducted with two alternate health centers.

Data Quality Management: Data quality was assured by the measurement of waste using a weighing scale (a baby scale with a capacity range from 0 to 15kg and model 4 capacity range 20 kg). Calibration was done by using standard 20g, 100g, 500g and 1000g weighting objects every morning before the actual measurement began. The standard value was recorded for comparisons with the daily activities. Data collection checklists were pre-tested in two alternate health centers. Training was provided to data collectors and supervisors before data collection commenced. Daily onsite supervision was conducted by the supervisors and the principal investigator during the actual measurements and use of tools to assure reliability.

Data Entry and Analysis: Data were entered to Epi-Info Version 6.04 and analyzed by SPSS Version 15 to estimate the waste generation
rate in each of the health centers. The average quantity of health care waste in the health centers was computed. The mean, standard deviation, and Kurskal-Wallis test were computed for statistical analysis. The Kurskal-Wallis test was used for any non-normal distribution of the data.

Ethical Considerations: Ethical clearance was obtained from an ethics committee in Addis Continental. Permission was obtained from the Addis Ababa City Administration Health Bureau and from the managers/directors of the selected ten health centers. Consent was obtained from each health center. The participants were free to either participate or not. Data collectors were trained to use protective equipment when handling health care wastes. Supervisors were alert to any possible injuries in the waste and data collection for the study.

Dissemination of the Results: The results of this study were submitted to Addis Continental Institute of Public Health and to Haramaya University. In addition, a paper will be written and distributed to the Addis Ababa City Administration Health Bureau, the health centers studied, and the Environmental Protection Authority. Finally, a paper will be prepared for possible
publication in a natural or international journal concerned with biomedical waste matters.

Results

There were a total of 22,045 patients visits of which 4,647 (21.1%) of the patients visited OPDs in the health centers in the seven days. The mean (±SD) patient flow per day in all sections and the mean patient flow at in the OPDs were 316.6 ±104 and 66.9 ±23.97, respectively. More patients were seen at Nefas Silk No 2 Health Center and the Kolfe Health Center with 3,864 and 3,041 patients, respectively. Lesser numbers of patients were seen at Ledeta Health Center and Entoto No 1 Health Center with 1,396 and 1,641, respectively.

Daily Waste Generation in Health Centers: The mean (±SD) health care waste generation rate was 9.61±3.28 kg/day, of which 3.64±1.45 kg/ day or 38% was general waste and 5.97±2.31 kg /day and 62% was hazardous waste. High amounts of health care waste per day was generated at the Kolfe and Nefas Silk No 2 health centers with 14.49 kg/day and 12.55 kg/day, respectively. Small
amounts of health care waste were recorded at the Ledeta and Kebena health centers with 3.95 kg/day and 5.5 kg/day, respectively.

The types of hazardous waste generated from study health centers were sharps, infectious materials, and pathological materials. Pharmaceutical and radioactive wastes were not generated in any of health centers. The mean (±SD) generation rate of sharps, infectious and pathological waste in each health center was 0.87 ±0.28 (14.57%), 2.2±0.84 (38.36%) and 2.8±1.4 (47.24%) kg/day, respectively.

The amount of the health care waste generated rate varied. The mean (±SD) health care waste generation rate in each section was 8.66±10.95 kg/day. A great amount (40.1%) of the health care waste was from the delivery case team whereas lesser amounts (0.97%) were generated by the IMNCI case team. There were statistically significance means of waste generation among the different sections in study health centers (X²=19.62, p-value<0.033)
Table 3. Distribution and Daily Amount of Health Care Waste Generation Rate by Point Source in Selected Health Centers, Addis Ababa City Administration, 2011

<table>
<thead>
<tr>
<th>Case Teams</th>
<th>HCW (kg/day) Mean ± (SD)</th>
<th>Percent</th>
<th>Mean Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPD</td>
<td>3.029257±0.15</td>
<td>3.20</td>
<td>8.67</td>
</tr>
<tr>
<td>Pharmacy</td>
<td>12.39988±0.65</td>
<td>13.10</td>
<td>31.00</td>
</tr>
<tr>
<td>Laboratory</td>
<td>11.58593±0.5</td>
<td>13.11</td>
<td>24.25</td>
</tr>
<tr>
<td>Emergency</td>
<td>12.405743±0.5</td>
<td>13.11</td>
<td>25.33</td>
</tr>
<tr>
<td>FNAC</td>
<td>2.759357±0.16</td>
<td>1.37</td>
<td>11.67</td>
</tr>
<tr>
<td>Delivery</td>
<td>38.600157±2.03</td>
<td>40.79</td>
<td>25.00</td>
</tr>
<tr>
<td>TB</td>
<td>1.973357±0.14</td>
<td>2.09</td>
<td>8.67</td>
</tr>
<tr>
<td>EPI</td>
<td>3.055186±0.16</td>
<td>3.23</td>
<td>11.67</td>
</tr>
<tr>
<td>FP</td>
<td>4.950214±0.2</td>
<td>5.23</td>
<td>16.33</td>
</tr>
<tr>
<td>VCT &amp; ART</td>
<td>3.596643±0.25</td>
<td>3.80</td>
<td>13.67</td>
</tr>
<tr>
<td>IMNCI</td>
<td>0.914971±.097</td>
<td>0.97</td>
<td>6.00</td>
</tr>
<tr>
<td>Mean</td>
<td>8.66</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SD</td>
<td>10.95</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\[ X^2 = 19.62, \text{p-value}<0.033 \quad \text{degree of freedom} = 10 \]

The estimation of health care waste generated per year could be calculated in two ways. The first calculation could be by using the annual flow of patients and the mean health care waste generation
rate per patient per day. The assumption would be that each patient who visited the health center might generate the same amount of waste throughout the year.

The mean (±SD) patient flow per day per health center was 202.36 ± 147.75. The mean (±SD) health care waste generation rate was 57.37±24.99 gram per patient per day or 9.61±3.28 kg/day. The annual mean (±SD) of health care waste generated per health center was 3501.86± 1204.29kg/year.

Visitors and HCW Generation Comparison: Patient flow, the health care waste generation rate and its types such as general and hazardous waste (sharps, infectious, and pathological waste) among different health centers were compared using the Kruskal-Wallis test to check for the presence of significant difference among their values. There was no statistically significant difference for the mean patient flow ($x^2=14.504$, p-value=0.106) and the mean general waste ($x^2=13.41$, p-value=0.145) but it was statistically significant for the mean of health care waste ($x^2=21.83$, p-value=0.009) and the mean hazardous waste ($x^2=26.75$, p-value=0.002) among study health centers.
Table 4. Comparison of Visitors, HCW Generation Rate and its Types Among Health Centers, Addis Ababa, 2011

<table>
<thead>
<tr>
<th>Name of Health Center</th>
<th>Patient Flow</th>
<th>Mean Rank Total HCW</th>
<th>General Waste</th>
<th>Hazardous Waste</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addis Ketema</td>
<td>36.79</td>
<td>42.57</td>
<td>46</td>
<td>38</td>
</tr>
<tr>
<td>Kality</td>
<td>31.21</td>
<td>38.14</td>
<td>27</td>
<td>42.71</td>
</tr>
<tr>
<td>Kasainchis</td>
<td>36.57</td>
<td>25</td>
<td>31.57</td>
<td>20.29</td>
</tr>
<tr>
<td>Kebena</td>
<td>33.43</td>
<td>20.14</td>
<td>21.71</td>
<td>22.14</td>
</tr>
<tr>
<td>Nefas Silk No 2</td>
<td>53.71</td>
<td>44.43</td>
<td>38.86</td>
<td>48.86</td>
</tr>
<tr>
<td>Bole</td>
<td>38.36</td>
<td>41</td>
<td>33.86</td>
<td>44</td>
</tr>
<tr>
<td>Kolfe</td>
<td>46.86</td>
<td>51.86</td>
<td>47.14</td>
<td>51.86</td>
</tr>
<tr>
<td>Entoto No 1</td>
<td>27.43</td>
<td>40.43</td>
<td>42.14</td>
<td>42.43</td>
</tr>
<tr>
<td>Selam</td>
<td>32.07</td>
<td>37.86</td>
<td>43.43</td>
<td>32.43</td>
</tr>
<tr>
<td>Ledeta</td>
<td>18.57</td>
<td>13.57</td>
<td>23.29</td>
<td>12.29</td>
</tr>
<tr>
<td>Asymp. Sig.</td>
<td>0.106</td>
<td>0.009</td>
<td>0.145</td>
<td>0.002</td>
</tr>
</tbody>
</table>

Degree of freedom = 9
The extent or strength of the linear relationship between numbers of patients and amount of health care waste generated were checked using Spearman’s rank correlation coefficient ($r_s$) in the health centers. Spearman’s rank correlation coefficient showed that there was a positive linear relationship ie. as the number of patients increased, health care waste increased. A strong linear relationship was observed at Kasainchis and Ledeta health centers, the Spearman’s correlation coefficient was 0.955 and 0.929, respectively which is close to perfect linear relationship at Spearman’s correlation coefficient value ($r_s=1$) but was not a strong linear relationship at Kality, Nefas Silk no 2 and Entoto no 1 health centers 0.071, 0.697 and 0.500, respectively which was far from a perfect linear relationship at Spearman’s correlation coefficient value ($r_s=1$).

**Waste Management:** The observation checklist about health care waste management system in the study health centers revealed that all of them used different color plastic buckets for collection of health care waste. Half of the health centers did not have separate containers for the collection of hazardous and non-hazardous wastes. Half of the facilities had no formal or informal separation of the wastes. Moreover, the labeling or marking of the containers
was not apparent at seven of the health centers. In three out of ten health centers, the waste handlers did not wear heavy duty gloves and sturdy shoes while working. All health centers used open buckets for the transportation of health care waste.

In this study, radioactive waste was not observed but pathological, cytotoxics, and reagent wastes were found. The expired pharmaceuticals found in four of the health centers were waiting a decision for disposal.

Nine of the health centers had interim waste storage easy for the staff to access, but in six of the health centers, containers had no lid and the storage time was over 48 hours in the study area.

Treatment of wastes by all health centers was not given thought. All health centers used destruction by burning as the on-site treatment practice, but dumping and incineration were used for placenta and other HCW disposal.

All health centers had an incinerator. The incinerators were built from local bricks but four health centers have no adequate air inlets for facilitating the combustion of wastes. All of the health centers used their incinerators to burn all types of health care waste except pathological waste (placenta). The ash remains for eight health centers were kept at the bottom of the incinerators and two of them
disposed ashes in the open field. The incinerators were fenced at seven of health centers.

In five of the health centers, burial sites, placenta pits and ash disposal pits were away from any water source. Three health centers did not maintain a standard placenta pit, as their slabs were from stone and wood and the coverage of the pits were fenced by plastics with no caution signs to protect the workers and other clients. Two of the health centers used the city municipality to take general wastes to an off-site location.

The responsibility of health care wastes showed that eight of the health centers had different health professionals and administrative staff to run the management and two health centers used sanitarians for this responsibility.

Six health centers had no current operational standard for waste management. It was confirmed by seven health centers that they had no applicable national, regional or local guideline for waste management. Moreover, seven of the health centers did not have waste committee.

*Health Care Workers and Risk:* Six of ten health centers management had no concern about waste management as their routine work. Seven health center managers agreed that waste
posed risk to their waste collectors. In this study, there were at least 48 waste handlers who worked in the ten health centers. Eight managers knew that the waste handlers had gotten needle stick injuries in the past 12 months. All injuries occurred during the work hours. The types of injuries sustained were deep injury, slight skin, superficial and splash by 4, 3, 1 and 2 of the health center managers, respectively. Four of the health centers had no registration book for any injury or waste contamination to their staff.

**Discussion**

The mean (±SD) health care waste generation rate per health centers was 9.61±3.28 kg/day, of which (38%) 3.64±1.45kg/day was general or non-hazardous waste and (62%) 5.97±2.31kg/day was hazardous. There were statistically significant differences ($X^2=21.83$, p-value 0.009) in the total waste generation rate between health centers. This may be due to the similarity of the kinds of health service given among the study health centers. There was no statistically significance difference ($X^2=14.504$, p-value=0.106) in patient flow between health centers.
The amount of health care waste generated in the different case teams varied. High quantity 40.79% of waste was found in delivery case team where as lesser amounts 0.97% of health care waste was generated in IMNCI and growth monitoring case team. There was no statistically significant difference of health care waste generated in different sections of the health center ($\chi^2 = 19.62, p<0.033$). This variation may be due to the difference of number of attendants, the kinds of health care service, and the type and the nature of waste generated at each case team,

The annual mean (±SD) health care waste generation rate per health center was 3501.86 ±1204.29 kg/year. The estimation of the annual mean health care waste generation rate could vary. This may be due to the variation in annual patient flow and seasonal variation. However, the assumption was the preferable method to estimate an annual health care waste generation rate because the mean annual health care waste was determined by annual patient flow with in the health center.

The mean health care waste generation rate in grams per patient/per day/per health center in this study was 57.37. It was higher than in the study done in Ethiopia 35g/per day/per patient, of which 48% and 52% and 500g per patient/per day in health centers and
hospitals, respectively (2,3). It was also different from another study done in Sylhet city, Bangladesh in a diagnosis center and higher clinics. The mean health care waste generation rate was 0.041 kg/patient/day (7). This variation may be due to the geographic location, the season of the year, availability of different facilities, social status of the patients (i.e. income, living standard, awareness about disease), health care waste management, and legislation of the country.

The proportion of general (38%) and hazardous (62%) health care waste in this study was different from a WHO report in the hospital setting where general was 85%, while hazardous was 15%. (4) It was also different from the study done in Sylhet city, Bangladesh in a diagnosis center and higher clinics where general waste accounted for 63.97% and hazardous waste accounted for 36.03%. (8) The differences could be due to seasonal variation, availability of different facilities, resource allocation, and the variation between hospitals and health centers.

The findings of health care waste management systems in this study showed that all health centers used plastic buckets with lids for collection of health care waste disposal. All health centers used safety boxes for collection of sharps wastes. It was better than the
study done by Yeman and Millogo on injection safety in Ethiopia where the safety box was observed only in 2 (4%) of the 52 health facilities assessed. (9)

Waste segregation and treatment are important in the management of hazardous wastes. The waste management system in this study revealed that segregation of wastes at the source was practiced by only half of the health centers. This finding was consistent with the survey conducted in four federal hospitals by the Minister of health in 2004.

In this study, all the health centers used incinerators and no open burning occurred for disposing of used needles and other sharps. Cameroon (1998), Chad (1997), Cotedivoire (1997), Guinea-Bissau (1997), and Uganda (1998) showed that no health centers had the facilities for safe disposal of used needles and other sharps. In Ethiopia (1997-98), like Kenya, Rwanda and Zambia, incineration of used syringes and needles was reported as the common practice. (12) Another study conducted by Yoseph in similar setting revealed that 42.5 % (17 out of 40) of the health institutions incinerators were used for disposing used needles and other sharps and 57.5% of the institutions used open burning and other methods to dispose used needles and other sharps. (13)
All studied health centers used sewer lines for liquid waste from the laboratory and delivery room. It was simply disposed of without any treatment on the premises of the health centers. This was similar with the study done by Ministry of Health in Ethiopia in 1989 in 16 health centers and 48 clinics. It was reported that most of them had no proper liquid waste and solid waste disposal facilities. (14)

For placenta pits for disposing of pathological waste, three of the health centers did not have a concrete foundation.

Sharps and needle stick injuries are the most common form of HIV, HBV, and HCV exposure in health institutions. Segregation of wastes at the source was not practiced at all health centers in this study and also in West Gojam, Ethiopia. (2) Eight out of ten health centers in the study area showed that there were needle stick injuries. Needle stick injuries are related to improper handling of health care sharps. Improper segregation of wastes at the source causes needle stick injuries in health care workers and waste handlers.

The Ministry of Health prepared health care waste management guidelines in 2007 for the handling, disposal, and the promotion of occupational health. The protection of the environment from health
care waste and the promotion of the safe handling and disposal of health care waste are delineated. (15)

In the six out of ten health centers, operational standards and applicable local guidelines about health care waste management were not found. It is believed that other health centers did the same. Seven of ten health centers did not organize safety committees to follow the disposal of health care waste. This is similar to a review done by Solomon on health care waste management in Ethiopia where it was reported that there were no guidelines specifically dealing with hazardous waste and waste from health care activities at micro-level even though there is exists at the federal level prepared by the Environmental Policy of Ethiopia, the Public Health Proclamation No 200/2000 (FDRE, 2000) and the Environmental Pollution Proclamation No.300/2002. (9) The existence of a gap among the study groups may be due to less attention given to health care waste management authorities that are responsible for waste management. Also, a lack of supervision by the Addis Ababa City Government Health Bureau and the lack of a health care waste management committee at the Federal Ministry of Health are serious deficits to public health practices in Ethiopia.
Conclusions

1. The mean health care waste generated in all health centers was greater in amount when compared with similar studies in the country.
2. Sharps, infectious waste, and pathological wastes were the types of health care waste generated in all health centers.
3. All health centers used safety boxes for sharps.
4. Health care waste management systems have been given very little attention in all health centers. Segregation and treatment of health care waste were not practiced. This exposes health care workers, waste handlers, and the public to serious health risks.
5. Three out of ten health centers used a poorly constructed placenta pit that they were not appropriate to waste handlers, the public, and the environment by releasing bad odors to the atmosphere. They were accessible to vector breeding.
6. All health centers have incinerators but mixing wastes for burning can lead to an unhealthy and hazardous environment. Soil and water contamination is likely occurred. The presence of the health centers near to public residences also lead to pollution to the atmospheric air.

7. Health care waste management committees were not found in the majority of the health centers.

**Recommendations**

1. Waste segregation should be done at the point of generation with colored and/or marked containers.

2. Puncture and leak proof containers with a lid should be used to minimize the risks. Pre-treatment of infectious waste and liquid waste must be practiced before disposing to the environment.

3. Incinerators must be fenced. Air inlets should build into the sides to facilitate complete combustion. The residual ash should be buried in pits with low permeable material. The
lining of placenta pits must be constructed in water tight (i.e. concrete and covered with covering material).  
4. Training on health care waste management for waste handlers and health care workers should bring change to practice and management.  
5. Health care waste management committees must be established at all level of health facilities. Operational standards must be used at all levels of health care facilities.  
6. Further research on health care waste generation is strongly recommended.  

Acknowledgments  

First I would like to express my deepest gratitude to my advisor, Dr. Abera Kumie, for his unreserved support through out the study period. I sincerely thank Addis Ababa City Government Health Bureau, head of the health centers, and case teams in the health centers for their unreserved cooperation during the data collection time.  
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Nutritional Status and Associated Factors among Children with HIV/AIDS in Adama Public Health Care Facilities, Oromia Regional State, Ethiopia

Ermias Lemma

Abstract

Background: Ethiopia has experienced many decades of droughts and related malnutrition of its people. Serious malnutrition continues. Since the 1980s, AIDS has become a serious and major killer in the country. Malnutrition in combination with HIV/AIDS plagues the country. At the same time, there is limited evidence-based data on the nutritional status of children living with HIV. As there is an ongoing interest in strengthening programs intended to improve the nutritional status of HIV-infected children, this study was conducted.

Objectives: To assess the nutritional status and associated factors of children living with HIV/AIDS in public health care facilities located in Adama, Ethiopia.
**Methods:** An institutionally-based, cross-sectional study was conducted on HIV-positive children under fourteen years of age undergoing HIV/AIDS care and support in the pediatric ART clinics of Adama Hospital, Geda Health Center, and the two Adama health centers. Weight and height/length measurements were taken using international standard methods. A structured questionnaire and anthropometric measurements of 415 HIV-positive children in the Adama public health facilities was used. Bivariate and multivariate logistic regression analyses, based on UNICEF's analytical framework, were conducted to identify determinants of the nutritional status of each subject.

**Results:** The overall prevalence of acute malnutrition was 12.8%. Moderate malnutrition was at 4.6% and acute malnutrition was at 8.2%. A key determinant of acute malnutrition in the HIV-positive child was the presence of additional children in the household. Other key determinants included vitamin A supplementation and ART initiation.

**Conclusions and Recommendations:** The number of children in the household was a key determinant of acute malnutrition. ART initiation and vitamin A supplementation reduced malnutrition in the HIV-positive children studied. Child nutrition management, the initiation of ART for eligible children, vitamin A supplementation,
and dietary counseling of parents to maintain or improve the nutritional status of their HIV-positive children during HIV/AIDS treatment are recommended.

**Introduction**

Malnutrition and AIDS are intimately related. Severely malnourished children die. Children with AIDS die. The death rates in children who are severely malnourished are six times greater than among those who are nourished in the same population. (1) Concomitantly, there were 280,000 HIV-related deaths among children according to a UNAIDS Report published in 2008. (2) In 2008, an estimated 2.1 million children were living with HIV globally and there were 430,000 new HIV infections in children, and 280,000 HIV-related deaths among children. (2)

Malnutrition and HIV/AIDS are strongly related because HIV/AIDS results in immune system impairment which leads to malnutrition. In turn, malnutrition leads to immune impairment that worsens the effect of HIV and contributes to a more rapid progression to AIDS. Thus, malnutrition can both contribute to and result from the progression of HIV infection. Persons who are malnourished and then acquire HIV are more likely to progress
faster to AIDS because their bodies are already weak and cannot fight infection. (1, 3)

Furthermore, sub-Saharan Africa is a region where chronic food insecurity and threats of famine remain endemic for much of the population. The number of malnourished people in sub-Saharan Africa is steadily increasing. (4) Thus, in a region where food and nutrition insecurity is prevalent, the exacerbating factor of HIV and AIDS is having an especially devastating effect currently.

**Methods**

A facility based, cross-sectional study was conducted in Adama, Ethiopia from April, 2010 to March, 2011. The purpose of the study was to assess the nutritional status and associated factors among HIV-positive children in the Adama public health care facilities. Adama is the largest city in the Oromia Regional State and is east of Addis Ababa. According to the 2007 census conducted by the Central Statistical Agency of Ethiopia (CSA), Adama had a total population of 222,035, of whom 109,659 were men and 112,376 were women. Also, Adama is one of the cities recognized for its high prevalence of HIV/AIDS.

There are three health centers and one government hospital in the Adama area. There are 2,298 HIV-positive children attending
services for their illness in these public health facilities. All of the mothers (or caregivers) of the children who visited the health institutions for follow-up during the study period were included consecutively until the required sample size was obtained in the pediatric ART clinic. A total of 390 children from Adama Hospital, thirteen children from the Adama health centers and twelve from the Geda Health Center were included in the study. An interview was conducted with mothers of the children using a questionnaire. The data were checked for completeness and consistency. Data were coded and entered using EPI 6 software. WHO Anthro and WHO Plus were used to convert nutritional data into Z-scores of the indices.

The data were exported to SPSS for analysis. Frequencies, proportions, graphs, and cross tabulations presented the results. A p-value less than 0.05 was considered statistically significant. Bivariate and multivariate logistic regression analysis, which was based on the UNICEF analytical framework, was conducted to identify determinants of nutritional status. Independent variables that had a role in influencing nutritional status and might account for possible confounding factors were examined with the SPSS standard ENTER method. Eight data collection teams including the principal investigator were involved in data collection. They
were from Adama Hospital, Geda Health Center and the Adama health centers and were health professionals working in the pediatric ART room as counselors. One supervisor, a health professional, was involved in the study activities.

Data were collected using a structured questionnaire and anthropometric measurements were taken. Questionnaires used in similar studies were adapted for use in this study. The questionnaire was prepared in English and translated to the local language then back to English by another person to ensure consistency. The questionnaire was pre-tested before data collection at two health centers in Addis Ababa. Modifications were made after pre-testing. Ethical clearance was obtained from an ethics committee at Addis Continental Institute of Public Health. Verbal consents were taken from all study participants. Confidentiality and the rights of the respondents not to participate were respected. During data collection, nutritional advice was provided to all mothers who had a malnourished child.
Results

Demographic and Socio-economic Conditions: From the 415 selected study subjects, complete responses were obtained from nearly all of them at a 99.5% response rate. Female heads of households was 46.4% and 68.5% of respondents were married. Most were Orthodox Christian. The monthly incomes varied equally between ETB <380 and ETB< 810. Decisions were most often made jointly by the husband and the wife.

From the total number of children, 51% were males. The birth order was 36.8% for first born, 38.7% for second born, and 24.5% for children in birth order of three and above. The location of delivery was at home for 237 (57%) of the children. The remaining 43% were birthed in a health care facility. A total of 405 (97.4%) children were breastfed. The mean duration of breast feeding was 18.4 months (SD 9.6). A total of 252 (60.6%) of the children received the measles vaccine and 48.6% of the children received no vitamin A supplementation in the last 6 months.

The mean age of the mothers was 31.1 (SD 4.5) and the mean age of the mother at first childbirth was 22 (SD 3.7). Mothers who gave first birth at age 18 or less years were 13.2%. The average total of children born to a mother was 4.1 children (SD 1.5) and 34% of the
mothers had given birth to five or more children. No extra or additional food was consumed by the mother from pregnancy to lactation for 161 (38.7%) of the mothers.

Upon examination and calculation of a BMI, a total of 74 (17.8%) of the mothers were malnourished. Among the children, the overall prevalence of acute malnutrition (GAM) was 12.8%, 4.6% moderately malnourished, and 8.2% severely malnourished. Anthropometric indices were calculated using Wt/Ht for the under-five children and a BMI for children five years and older.

Table 1. Nutritional Status of the Children (Birth-14) Years, Adama Public Health Facilities, 2011

<table>
<thead>
<tr>
<th>Nutritional Status</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAM No</td>
<td>396</td>
<td>95.4</td>
</tr>
<tr>
<td>MAM Yes</td>
<td>19</td>
<td>4.6</td>
</tr>
<tr>
<td>SAM No</td>
<td>381</td>
<td>91.8</td>
</tr>
<tr>
<td>SAM Yes</td>
<td>34</td>
<td>8.2</td>
</tr>
<tr>
<td>GAM No</td>
<td>362</td>
<td>87.3</td>
</tr>
<tr>
<td>GAM Yes</td>
<td>53</td>
<td>12.8</td>
</tr>
</tbody>
</table>
An analysis of the prevalence of severe malnutrition by child age group pointed out that severe wasting was highest in children between the ages of two and five years. This indicated that the children were already in the state of wasting as a result of the cumulative effects of multiple risk factors.

**Discussion**

In this study, the overall prevalence of malnutrition (GAM) was 12.8%, with 4.6% moderately malnourished, and 8.2% severely malnourished. Generally, the overall prevalence of child acute malnutrition of this study was lower when compared to two studies conducted in northwest Ethiopia.(5, 6) The findings of those two studies indicated an overall prevalence of 42.9%, with 10.3% severely malnourished. (6) Marasmus was seen in 33 (56.9%) of the children in the study. In those aged five years and older, 28/29 (96.6%) were underweight, 76/81 (93.8%) were stunted, and 62/78 (79.5%) were wasted. Severe wasting was seen in 33.3%. (5)
Bivariate analysis investigated measles immunization status, ART drug initiation, vitamin A supplementation within last 6 months of the study, the birth weight, the presence of a latrine, and the number of under-five children in the household. However, both bivariate and adjusted analyses indicated that only ART initiation, vitamin A supplementation, and the number of under-five children in the household were found to be the key determinants of overall prevalence of acute malnutrition. The risk of developing acute malnutrition among those who did not start ART was three times greater than those who started ART. A late HIV diagnosis and a low monthly family income were significantly associated with malnutrition. This study showed a significant association between acute malnutrition and vitamin A supplementation. Vitamin A supplementation within the last six months was protective against acute malnutrition (AOR=0.4, 95% CI:(0.2-0.9). The explanation could be that vitamin A is an essential component for the proper functioning of the immune system and improving the vitamin A status of children increased their resistance to disease. (8) After all potential confounders in this analysis were controlled for, the adjusted odd ratios for the number of children in the household was found significantly associated with acute malnutrition. The odds of acute malnutrition in the
household with one, two, and three children was 16, 32.4, and 13.1 times greater than in those households with no under-five children with (AOR=16.0, 95%CI:(3.2-79.6), (AOR=32.4, 95%CI:(4.8-220.7) and (AOR=13.1, 95%CI:(0.7-237.8), respectively. A possible explanation for this could be that as the number of under-five children increased in the household, there was increased competition for the available food among the children.

After all confounding variables were controlled for, only the initiation of ART, vitamin A supplementation, and number of under-five children in the household were statistically significant with acute malnutrition.

**Conclusions**

Based on the findings of this study, it is concluded that there are acute nutritional problems among HIV-positive children which influence mortality. In bivariate analysis, the number of under-five children in the household, presence of vitamin A supplementation, and ART initiation were key determinants of acute malnutrition in the study area.
Recommendations

Seven recommendations are offered as a result of this study. These recommendations deal with program issues, education issues, and service delivery issues.

1. Child therapeutic feeding centers and community nutrition programs are critical to tackling the malnutrition problem and its consequences. These must be established without delay.

2. Interventions should focus on nutrition education of the family. This can be done both in the health facilities and in the community.

3. Early HIV child testing and initiation of ART are needed.

4. Vitamin A supplementation is needed.

5. A reduction in the number of children in the families would be helpful. This can be done by improving the family planning services delivered and encouraging smaller families.

7. Research into child care practices accompanied by dietary assessments is required.

References


Health Facility Readiness to Accelerate Nutrition Action in Ethiopia

Israel Hailu

Abstract

Background: In order to both prevent malnutrition and to treat cases of severe acute malnutrition, actions have been taken to develop an institutional framework and to implement actions at the national level in Ethiopia. In spite of these efforts, research has yet to be conducted on the readiness at the health facility level to scale-up nutrition action and to strengthen the identified weak areas.

Objective: To assess health facility readiness to accelerate nutrition action in terms of existing capacity and commitment.

Methods: This study was conducted in sixteen health facilities in Ethiopia in March, 2010 and March 2011. A cross-sectional survey design was used to conduct the study. Data were collected through interviews with thirty-eight health workers undertaking nutrition interventions and through observations using a health facility checklist. Data analysis was conducted in Open Code Version 3.4 and SPSS Version 15. Content analysis was performed for the
Results: A total of sixteen health facilities were formally assessed. Thirty-eight health facility workers were interviewed. The study revealed that one out of two (50%) of the health facilities were evaluated as having a commitment and one out of three (37%) had the capacity to do the work. However, only one in five or 19% of the facilities was found to have a readiness to accelerate action for nutrition. Furthermore, this study found that the lack of resources was the primary barrier to scaling up nutrition action in all of the health facilities studied.

Conclusions and Recommendations: The study findings reveal that the vast majority of the health facilities were not ready to accelerate nutrition action in Ethiopia. Therefore, equipping health workers with up-to-date knowledge on basic nutrition interventions; ensuring the sustainability of drugs and supplies for nutrition interventions; and conducting a large-scale study to assess the readiness of all types of health facilities in accelerating nutrition action are recommended.
Introduction

Globally, more than 3.5 million children under the age of five years die annually due to the underlying causes of malnutrition. It is also estimated that 55 million are wasted and 178 million are stunted. Of the 178 million stunted cases, 160 million (90%) live in 36 of the least developed countries including Ethiopia. (1) Currently, in Ethiopia, 38% of the children below five years of age are underweight, 47% are stunted, and 11% suffer from wasting. (2) To address this crisis and to accelerate the rate of progress with nutrition in Ethiopia, multiple steps have been taken in setting up institutional frameworks and implementing actions. Numerous strategic documents and programs aimed at improving the nutrition status of children and mothers have been published in Ethiopia. Nutrition and food security are explicitly addressed in the Poverty Reduction Strategy Paper/Action Plan (3), the National Nutrition Strategy (4), and the National Nutrition Programme. (5) Since 2005, the Productive Safety-net programs (PSNP) have been implemented. (6) Ethiopia’s Enhanced Outreach Strategy (EOS) was also rolled out in 2004 to enhance the coverage of basic child
survival interventions including nutrition screening, vitamin A supplementation, and use of de-worming tablets. (7)

In spite of these efforts to avert malnutrition, the Federal Ministry of Health faces serious challenges in its efforts to improve child and maternal nutrition. Research has shown that there are seven major challenges that program managers face in countries with the highest levels of child and mother under-nutrition. These challenges include: getting the topic of nutrition on the national government agenda, taking the right actions, not taking the wrong actions, scaling up, better reaching those in need, using data for nutrition decision-making, and building strategic and operational capacity. (8)

In response to these challenges, the World Health Organization has taken the lead to mobilize countries. International and UN agencies have taken action to scale up nutrition programs. The purpose of this effort is to ensure that under-nutrition is a major priority area in international forums and in any of the development plans of the affected countries. To this end, a global task force under the leadership of WHO identified eligible and interested countries; developed each country’s readiness assessment tools, and invited countries to join in the assessment. The assessment,
which is known as “The Landscape Analysis”, measures readiness among the counties to scale up nutrition action. (9) Although actions are being taken to increase the readiness for the implementation of accelerated nutrition actions at the national level, research has yet to be undertaken regarding the level of existing capacity and the commitment of health facilities in Ethiopia to implement these nutrition actions. Therefore, the findings of this assessment may help to clarify how existing commitment and capacity at the health facility level can be utilized to scale-up nutrition interventions and to further strengthen weak areas. In addition, the research establishes a baseline related to the current status of nutrition action at the health facility level in Ethiopia.

Objectives

General Objective:
To assess the current readiness of health facilities to accelerate nutrition action in terms of existing capacity and commitment in Ethiopia.
Specific Objectives:
1. To review the existing barriers and constraints faced by health facilities in accelerating nutrition action.
2. To determine the existing readiness at the hospital, health center, and health post level to scale up nutrition interventions.
3. To assess the existing commitment at the hospital, health center, and health post level to scale up nutrition interventions.
4. To assess the existing capacity at the hospital, health center, and health post level to scale up nutrition interventions.

Methods

Study Design, Area, and Population: This study employed a cross-sectional design. Semi-structured interview questionnaires were administered to health facility workers implementing nutrition interventions in selected health facilities in Addis Ababa, Afar, Oromia and SNNP.

Sampling Technique: The Federal Ministry of Health led a country assessment team and the team was composed of representatives from bilateral organizations, UN agencies, and international NGOs supporting nutrition programs in the country. The primary data
were collected in March, 2010 by an interagency team from seventy-two purposively sampled governmental, non-governmental, bilateral, and donor organizations for the country nutrition landscape analysis. Out of these seventy-two facilities, sixteen were public health facilities, which were purposively selected for detailed analysis for this study. Two nutrition experts further collected incomplete data from seven health facilities (three hospitals, three health posts and one health center) in the four regions in February, 2011.

Data Collection Procedures: All data collected from the selected sixteen health facilities were included in this study. Incomplete and missing data were further collected from seven health facilities in Addis Ababa, Afar, Oromia and SNNP regions using a semi-structured interview questionnaire developed by World Health Organization and adapted for use in Ethiopia.

Data Management and Analysis: Data were edited and checked for missing items. The coding of data and cleaning were carried out both manually and using EPI-Info software. The qualitative data were saved in a text document and then imported into an open-code software program, coded, categorized, and summarized into different themes using content analysis and then presented in a
narrative. The quantitative data were pre-coded and entered using Epi-Info software. Data were then exported to SPSS Version 15 for analysis. Descriptive analysis was conducted for the quantitative variables.

*Data Quality Assurance:* Two nutrition experts were recruited for data collection. They were provided a one-day refresher training course on the data collection tool for competent use of the tool.

*Ethical Considerations:* Ethical clearance was secured from the Institutional Research Ethics Review Committee in the College of Health Sciences at Haramaya University. Approval for utilization of the data was secured from the Federal Ministry of Health. Further clearance and a permission letter were secured from the regional health bureaus in Addis Ababa, Afar, SNNP and Oromia regions. Informed consent was obtained from all health workers before the commencement of any interviews. Names and other personal information of health workers were not recorded during data collection. The confidentiality of the interviewed health personnel was maintained by keeping the findings anonymous.
Results

A total of sixteen health facilities were included in the study. They were located in four regions of Ethiopia. These regions were Afar, Oromia, SNNP and Addis Ababa. Six facilities were hospitals, five were health centers, and five were health posts. Thirty-eight health facility workers were interviewed. Sixteen were facility managers, sixteen were health workers, and six were ART site nutrition managers and counselors.

The greatest barrier and constraint faced by health facilities to accelerate nutrition action was a lack of human, financial, and supply resources. Similarly, a study conducted in Ghana revealed that inadequate human resources were identified as the important barrier to scaling up nutrition interventions. (10)

Most respondents declared that nutrition management was progressively improving; however, they believed that it needed more attention for it to be scaled up and improved. Moreover, respondents from the health facilities suggested that preventive nutrition interventions should become a priority.

Two respondents at the health post level emphasized that the problems related to Ready to Use Therapeutic Food (RUTF) abuse
needed to be addressed by the woreda health office. Bearing in mind the consequences of mismanagement of malnourished cases, it is essential to act at all levels to create awareness and change the attitude of the public to RUTF. It is also important to consider legal measures to address this problem.

Program commitment was measured using three variables that included the presence of nutrition interventions, the availability of nutrition protocols, and staff with a satisfactory knowledge level of the nutrition protocol. Fifty percent of the health facilities were identified as having a commitment. The proportion of health facilities having a commitment was slightly higher at the health center level followed by hospitals and then the health posts.
Table 1. Commitment of Health Facilities to Accelerated Nutrition Action, 2011

<table>
<thead>
<tr>
<th>Variables (n=16)</th>
<th>Health Facility Type</th>
<th>Hospital</th>
<th>HC</th>
<th>Health Post</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Presence of Nutrition Interventions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Available</td>
<td>4</td>
<td>25</td>
<td>4</td>
<td>25</td>
<td>1</td>
</tr>
<tr>
<td>Not available</td>
<td>2</td>
<td>12.5</td>
<td>1</td>
<td>6.25</td>
<td>4</td>
</tr>
<tr>
<td>Availability of Nutrition Protocols</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Available</td>
<td>3</td>
<td>18.75</td>
<td>3</td>
<td>18.75</td>
<td>2</td>
</tr>
<tr>
<td>Not available</td>
<td>3</td>
<td>18.75</td>
<td>2</td>
<td>12.5</td>
<td>3</td>
</tr>
<tr>
<td>Staff with Satisfactory Knowledge of Nutrition Protocols</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Satisfactory knowledge</td>
<td>2</td>
<td>12.5</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Unsatisfactory knowledge</td>
<td>4</td>
<td>25</td>
<td>5</td>
<td>31.25</td>
<td>2</td>
</tr>
</tbody>
</table>

Capacity was measured through four variables. These included distribution of staff with appropriate training on nutrition, the availability of drugs and supplies for nutrition interventions, the presence of IEC materials on nutrition, and community involvement and support for nutrition interventions. A total of 38% of the health facilities were found to have capacity.
Table 2. Capacity of Health Facilities to Accelerated Nutrition Action, 2011

<table>
<thead>
<tr>
<th>Variables</th>
<th>Type of Health Facility</th>
<th>No.</th>
<th>%</th>
<th>No.</th>
<th>%</th>
<th>No.</th>
<th>%</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Distribution of Staff with Appropriate Training on Nutrition</strong></td>
<td>Hospital</td>
<td>1</td>
<td>6.25</td>
<td>1</td>
<td>6.25</td>
<td>5</td>
<td>31.25</td>
<td>7</td>
<td>43.75</td>
</tr>
<tr>
<td></td>
<td>Health Center</td>
<td>5</td>
<td>31.25</td>
<td>0</td>
<td>0</td>
<td>9</td>
<td>56.25</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Health Post</td>
<td>3</td>
<td>18.75</td>
<td>4</td>
<td>25</td>
<td>0</td>
<td>0</td>
<td>7</td>
<td>43.75</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>9</td>
<td>56.25</td>
<td>9</td>
<td>56.25</td>
<td>12</td>
<td>75</td>
<td>16</td>
<td>100</td>
</tr>
<tr>
<td><strong>Availability of Drugs and Supplies for Nutrition Intervention</strong></td>
<td>Available</td>
<td>4</td>
<td>25</td>
<td>3</td>
<td>18.75</td>
<td>1</td>
<td>6.25</td>
<td>8</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Unavailable</td>
<td>2</td>
<td>12.5</td>
<td>2</td>
<td>12.5</td>
<td>4</td>
<td>25</td>
<td>8</td>
<td>50</td>
</tr>
<tr>
<td><strong>Presence of IEC Materials on Nutrition</strong></td>
<td>Present</td>
<td>4</td>
<td>25</td>
<td>2</td>
<td>12.5</td>
<td>2</td>
<td>12.5</td>
<td>8</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Not present</td>
<td>2</td>
<td>12.5</td>
<td>3</td>
<td>18.75</td>
<td>3</td>
<td>18.75</td>
<td>8</td>
<td>50</td>
</tr>
<tr>
<td><strong>Community Involvement and Support for Nutrition Intervention</strong></td>
<td>Present</td>
<td>2</td>
<td>12.5</td>
<td>2</td>
<td>12.5</td>
<td>5</td>
<td>31.25</td>
<td>9</td>
<td>56.2</td>
</tr>
<tr>
<td></td>
<td>Not Present</td>
<td>4</td>
<td>25</td>
<td>3</td>
<td>18.75</td>
<td>0</td>
<td>0</td>
<td>7</td>
<td>43.75</td>
</tr>
</tbody>
</table>

Program readiness was measured through two variables which included commitment and capacity of health facilities to accelerate nutrition action. A total of 19% of the health facilities were identified as ready for program action. This was proportional for all
health facilities where only one health facility each showed readiness in accelerating nutrition action.

Table 3. Readiness of Health Facilities to Accelerated Nutrition Action, 2011

<table>
<thead>
<tr>
<th>Variables</th>
<th>Hospital</th>
<th>Health Center</th>
<th>Health Post</th>
<th>Total</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Commitment of Health Facility to Accelerate Nutrition Action</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Have Commitment</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>8</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>No Commitment</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>8</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td><strong>Capacity of Health Facility to Accelerate Nutrition Action</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Have Capacity</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>6</td>
<td>37.5</td>
<td></td>
</tr>
<tr>
<td>No Capacity</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>10</td>
<td>62.5</td>
<td></td>
</tr>
<tr>
<td><strong>Readiness of Health Facility to Accelerate Nutrition Action</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ready for Action</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>18.75</td>
<td></td>
</tr>
<tr>
<td>Not Ready for Action</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>13</td>
<td>81.25</td>
<td></td>
</tr>
</tbody>
</table>

**Conclusions**

The study findings revealed that only twenty percent, or one in five of the health facilities, was ready to accelerate nutrition action. The
study also revealed that the lack of human, financial, and supply resources was the primary barrier to scaling up nutrition action in all health facilities.

**Recommendations**

There is a need to design and implement effective strategies to accelerate nutrition action. The following actions are recommended:

1. The Federal Ministry of Health should ensure that health workers are equipped with up-to-date knowledge on nutrition during their pre-service training and during their professional experience. Pre-service and in-service training should be required of all health workers in these programs.
2. A system to monitor RUTF utilization and problems related RUTF abuse must be created and used.
3. Identify additional ways of programmatic intervention at the health facility and the community level.
4. Professional commitment must be enhanced among the facility managers, regional managers, and woreda-level
nutrition experts. A sense of ownership is needed for actions to scale up sustainable nutrition interventions.

5. More attention should be given to preventive nutrition interventions at the facility level to address the underlying causes of malnutrition. This includes nutrition health education at the individual, group, and facility levels.

6. The Federal Ministry of Health, the regional health bureaus, and woreda health offices need to ensure the sustainability of drugs and supplies for nutrition interventions.

7. Comparative studies are needed to assess the readiness of health facilities to accelerate nutrition action on a national scale in Ethiopia.

References


Hanım Ali

Abstract

Background: While often medically and therapeutically problematic, self-medication (SM) is a common initial response to illness. Although health care providers often attach negative connotations to SM for obvious reasons, the World Health Organization (WHO) acknowledges its existence to self care. This study was conducted to assess the practice of self-medication of prescription medicines in a sub-city of Addis Ababa and consider ways to reducing the sometimes dangerous practices of SM.

Objectives: To assess the SM practices in private pharmacies in the Kolfe Keraneo sub-city in Addis Ababa, Ethiopia.

Methods: The study was conducted in private pharmacies located in the Kolfe Keraneo sub-city. A quantitative cross-sectional survey and an exploratory qualitative study were conducted. All customers seeking self-medication during the data collection period visiting the selected pharmacies were included in the study.

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study population also included pharmacists working in the pharmacies. The research was conducted from January 1, 2011 to February 30, 2011. Data were collected by administering a structured questionnaire and by conducting in-depth interviews. The data were analyzed using EPI-Info.

Results: Out of four hundred SM drug purchasers, seventy-two percent of the respondents were between the ages of 15 to 44 years. The median age was 31.5 (±13.5) with a male to female proportion of 1:0.98.

Conclusions and Recommendations: The practice of SM included an extensive variety of drugs. Antibiotics were the major proportion of drugs purchased for SM. Respiratory symptoms were the major cause for the purchases. Self-medication can be dangerous and it should be discouraged at every opportunity. While there may be some limited advantages of practicing SM, regulatory enforcement of pharmacy technicians, pharmacists, and pharmacy stores must evolve. Public education for the heightened awareness to the dangers of SM must be conducted.
Introduction

SM is the practice of taking prescription medicines without professional consultation or medical diagnosis. SM is done to alleviate an illness or a condition. It is defined as the selection and use of medicines by individuals or a member of the individuals’ family to treat self-recognized conditions or symptoms. (1)

SM with prescription medicines is popular, especially in the developing world where medical human resources are limited. While non-prescription medicines may be justifiably sought, legitimate concerns about wrong self- or pharmacist-diagnosis, choice, purchase of the wrong prescription medicine, and drug resistance exists. Access to good information to help consumers make informed decisions about SM and prescription and non-prescription drug use is critical. (2) Inappropriate SM results in ever-increasing resistance to pathogens and entails serious health hazards including adverse drug reactions, delays in proper diagnosis and treatment, and prolonged personal sufferings. (3)

There are irrational drug use practices at large in the community. These practices may be due to a lack of knowledge by consumers and how to use medicines properly. As laypersons, how can they be expected to know? There is also the serious problem of pharmacists
attempting to practice medical care with counter diagnoses and treatment in the money-oriented business of selling drugs. To the danger of the customers, the national drug policy in Ethiopia that clearly differentiates “prescription only” and “over the counter” drugs it is not being practiced by most pharmacists. (4)

**Objective**

*General Objective:*  
To assess SM practices in private pharmacies in the Kolfe Keraneo sub-city, Addis Ababa, Ethiopia.

*Specific Objectives:*  
1. To assess the patterns of SM practices.  
2. To explore possible influencing factors for SM practices.

**Methods**

*Study Area and Period:* From the eighteen private pharmacies located in the kolfe keranio sub-city, four pharmacies were excluded from the study because they were not actively open for business during the visit. Therefore, only fourteen pharmacies were included in the study from January to February, 2011.
Study Design: A descriptive, cross-sectional study design supported with qualitative research was conducted.

Study Population: The study populations included all of the customers coming to the selected pharmacies during the study period and the pharmacists working at these selected pharmacies.

Sample Size and Sampling Procedure: A single population proportion was used with estimation of 50% SM practice in Addis Ababa. (6) The sample size was estimated by considering a 95% level of confidence \((Z_{\alpha/2} =1.96)\) and 5% precision, \(n = Z^2 [p (1-p)]/d^2\) and a non-response rate of 10%. The calculated maximum sample size was 423. All customers choosing self medication visiting the selected pharmacies during data collection period and fulfilling the inclusion criteria were included in the study. For the qualitative portion, purposive recruitment of eighteen pharmacy personnel working in the selected pharmacies was completed for interviews.

Operational Definitions
1. Self-medication: Use of “prescription only” drugs without the diagnosis, advice, and medical care of a medical professional.

2. Drug Retail Outlet: A pharmacy, drug shop, or retail drug vendor.

3. Self-care: Selection and use of medicines by individuals to treat illnesses or symptoms of illnesses.

4. Over the Counter Drugs: These are medicines considered safe and approved to be taken without a medical provider’s prescription and advisement.

5. Drug Consumers: Customers who come to pharmacies to purchase medicines.

6. Prescription Drugs: Selected drugs sold by the pharmacist based on a prescription by a physician.

7. Rational Drug Use: Patients receive the correct medicine to treat their medical condition or illness, in doses that meet their individual requirements, for an adequate period of time, and at the lowest cost to them.

8. Patterns: Assessing which type of drug, for what purpose it is taken, and who decided or gave advice to practice self medication.
9. Antibiotics: Drugs for bacterial infection at any site of the body. These can include, for example, drugs for urinary tract infections and respiratory tract infections.

Data Collection Tool and Procedures: Face-to-face exits interviews with a prepared questionnaires were done for each customer practicing SM of “prescription-only” medicines from the selected pharmacies during the study period. For the qualitative study portion, pharmacists working in the selected fourteen pharmacies were interviewed with open-ended, semi-structured questions. Probing was conducted. The in-depth interviews were tape recorded after informed consent was received.

Data Quality Control and Management: The data collectors were instructed on the objectives of the study. They were trained on the data collection tools, the procedures, and associated ethical issues like confidentiality. The questionnaires were pretested at drug retail outlets (DROLs) other than the ones selected and modifications were made. The data collected were submitted on a daily basis and any error, omission, or issue that needed further clarification was communicated to the data collectors immediately. The data entry format was checked before data entry and the data were checked...
for completeness, consistency, outliers and other errors. Information obtained from each study subject was kept confidential and maintained in a secured place. Data were interpreted as soon as each interview was completed for the qualitative portion of the study. Both tape recorded transcripts and notes taken during data collection were used.

Data Analysis Procedures: Data were entered into Epi-Info Version 3.5.1. Percentages, frequency distributions, measures of central tendency, and measures of dispersion were used to describe socio-demographic characteristics and SM practices. Conversations during the in-depth interviews were transcribed verbatim and translated into English. Conversations were coded and categorized into different themes. Finally, the compilation and summarization of different concepts was conducted. Data were analyzed using Open Code software.

Ethical Considerations: The ethical approval was obtained from the Addis Continental Institute of Public Health. An official letter was delivered to the appropriate government agency and the private pharmacies selected for the study. Their permission for conducting the study was secured. The necessary explanation about the purpose of the study and its procedures was given and oral consent
was obtained from all of the respondents. Study participants were advised that they had the choice not to participate in the study. They also knew that they could terminate their participation in the study at any time. To ensure confidentiality, participant names were not used during data collection and this anonymity was clearly explained to all participants.

Results

Seventy-two percent of the respondent drug purchasers were between the ages of fifteen and forty-four years. The median age was 31.5 years with a standard deviation of ±13.5. The most frequently reported illnesses or symptoms that prompted respondents to seek self-medication were respiratory symptoms 92 (22.8%), gastro-intestinal symptoms 72 (18%), and abdominal pain 68 (17%). These findings accounted for 232 of the customers or 57.8% of the reported illnesses prompting SM. The most frequently requested category of drugs was antibiotics 142 (35.5%). Gastro-intestinal medicines 77 (19.3%), and respiratory drugs 61 (15.3%) were requested.
Among the four hundred drug purchasing customers, 239 (59.8%) stated that they got the information “by themselves” while the remaining customers purchased the prescription drugs based on the advisement of the pharmacist or other non-medical person. When the respondents were asked how they knew that their drug request was the right drug for their illness, 247 (61.8%) stated that a physician had prescribed the same drug for a similar problem earlier, while 99 (24.8%) were advised by the pharmacist. A total of 73 (18.3%) said they had seen other people taking their selected medicine for similar medical problems. A total of 49 (12.3%) of the respondents mentioned other reasons like being a health worker or that their disease was chronic and they knew, over time, the correct medicines to purchase and take.

When drug purchasers were asked whether there was an advantage to the self-medication practice, 117 (29.35%) responded affirmatively. A total of 108 (27%) said “no” to any advantages. A total of 152 (38%) said SM had both advantages and disadvantages while 23 (5.8%) did not have any information on the advantages or disadvantages. The advantages of SM included that it was less tedious and time consuming 176 (44%), less costly 147 (36.8%), need-based 89 (22.3%) and other 17 (4.3%).
Among the four hundred drug purchasers, when asked about the disadvantages of SM, 123 (30.8%) said it might expose them to the wrong treatment, 101 (25.3%) were concerned about adverse drug reactions, 85 (21.3%) had drug resistance concerns, 71 (17.8%) with under or over dose of medication, 58 (14.5) with an allergic reaction, and others 22 (5.8%) mentioned different reasons like the disease could be aggravated by SM. A few mentioned the possibility of death occurring as a result of SM.

The perception of pharmacists was assessed by conducting in-depth interviews in the selected fourteen pharmacies. Eighteen were interviewed. There were eight male and ten female participants in an age range of 25 to 45 years. They had experience as dispensing pharmacists from two to ten years. The discussions were tape recorded and interpreted. Three main issues include the following:

1. Understanding the customers and their SM practices and what measures were taken by the pharmacists.
2. The perception of pharmacists regarding the factors influencing SM by customers.
Critical Issues Raised

1. The pharmacists stated that there were many customers with SM coming to their pharmacies. The pharmacists believed that the customers tended to have trust in them. Some stated that going to a pharmacy was their first choice of treatment rather than going to a health facility to be seen by a physician. The reasons given were convenience and reduced costs.

2. Some of the pharmacists said that rather than selling customers drugs from their stores, they preferred to advise the customer to go to a health facility to be seen by a physician. If this advice was declined, they suggested and sold the prescription drugs to them.

3. When the pharmacists were asked to differentiate between OTC and prescription medicines, they did so by giving examples. Most of them mentioned references like published materials produced by DACA, MOH, and international books.

4. Respondents stated that customers often complained about poor service in addition to unfair and unnecessary medical
expenses asked by health facilities. Long waiting times was another compliant made by the customers.

5. The pharmacists mentioned that the customers spoke of the shortage of time and money for a medical consultation, a lack of awareness about the consequences of SM, peer group influences, treating their illness as minor, and relying on previous experiences about illness and drug selection.

6. The pharmacists said that easy accessibility of prescription drugs from pharmacies has paved the way to the dangerous practice of self medication. At the same time, some customers believe that pharmacists are more welcoming than medically-trained clinicians and pharmacists give more advice while dispensing and selling their medicines in the store. Finally, some pharmacists said that owners of pharmacies are in business and that a pharmacy is a business-oriented service.

7. The pharmacists suggested solutions to minimize SM practices. These suggestions included: giving continuous training on the current rules and regulations for pharmacists and owners of pharmacy shops and allowing licenses only for pharmacists. Also, all official documents dealing with
SM rules and regulations should be available in simple language for pharmacy owners.

Discussion

In this study, the greatest proportion of SM customers were between the ages of fifteen and forty-four years. In a similar study conducted in Portugal, the majority of the SM customers were between the ages of ten and forty-nine years. (7)

The most frequently reported illnesses or symptoms that prompted respondents to seek self-medication were 91 (22.8%) respiratory symptoms and 72 (18.0%) gastrointestinal symptoms. This is comparable to the findings in another study in Addis Ababa where 27.3% were for respiratory symptoms and 23.5% for gastrointestinal symptoms. (2) The most common drugs purchased for self medication in this study were antibiotics and GIT drugs. These findings were also reported in studies conducted in Addis Ababa, northwest Ethiopia, and with Gondar University students. (2) The use of antibiotics for a simple cough, a fever, or minor symptoms contributes to the development of antibiotic resistant pathogens. This resistance has become a major problem and great
efforts should be made to avoid the inappropriate dispensing and use of antibiotics. (9, 10) Although one cannot conclude that self-medication resulting from the advice of friends, relatives, or neighbors is wrong, it can be foolish. It is advisable to rely on medically trained professionals- ideally physicians- as sources of information and advice with their appropriate patient examination, laboratory testing, diagnosis, and prescription writing. (11)

Conclusions

Most “by prescription only” drugs in Ethiopia are widely sold to customers for self medication without a prescription. This is risky behavior. Customers need to be advised of the dangers of this practice. It can also be concluded that the pharmacists can play a more active role in strongly encouraging customers to see physicians for medical treatment and state to their customers that they are not medically-trained diagnostic professionals. Pharmacists are there to dispense medicines and provide information about those medicines. They can also play a role in suggesting OTC medicines for minor ailments. The major type of self medication drug was found to be antibiotics which is a serious
concern because of the increasing drug resistance in the country. The health care delivery system in Ethiopia can be greatly improved in the area of self medication by the federal government better regulating and overseeing drug retail outlets to control SM, teaching Ethiopians throughout the nation of the importance of seeking proper medical treatment, and emphasizing the more limited role and responsibilities of the pharmacist in selling medicines.

**Recommendations**

1. The public needs to be educated on the scope and dangers of self-medication.
2. The government should seek ways to make medical services more affordable to all Ethiopians.
3. Public health laws and regulations regarding SM and pharmacies should be in place at the grass roots level.
4. Increasing both easier access to modern health facilities and public education regarding the safe application of self-medication is needed.
5. Pharmacists throughout the country should be officially reminded by the government of their professional ethics and what is appropriate and inappropriate behavior as it relates to SM.

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Assessment of the Acute Flaccid Paralysis Surveillance System in Gurage Zone, SNNPR, Ethiopia

Sisay Gashu

Abstract

Background: Ethiopia established an Acute Flaccid Paralysis (AFP) surveillance system in 1998. The system has operated throughout Ethiopia for over twelve years. The system was established as one strategy for the eradication of polio. There are currently thirty AFP surveillance officers working throughout the country. These surveillance officers visit regional health bureaus, zonal health desks, woreda health offices, and health facilities in the country on a regular basis.

Objective: To explore the effects of AFP surveillance system on various health programs in Gurage Zone, Ethiopia.

Methods: A cross-sectional quantitative and qualitative study was conducted in the Gurage zone of the Southern Nations and Nationality Peoples’ Regional State. Qualitative data were
collected using in-depth interviews with six woreda focal persons and quantitative data were collected with a structured questionnaire with fifty-two health workers in selected health centers. In addition, a records review of data collected by the AFP surveillance officers over the past three years was conducted.

Results: According to the results of the in-depth interviews, most claimed that the surveillance system supported IDSR, RI activities, and capacity building of health workers. A few mentioned that the system took staff time away from other health activities; this was a drawback. Among the fifty-two focal persons interviewed, 26 (50%) reported that the system supported the detection of epidemics, and 24(46.2%) reported that it helped with epidemic confirmation. These effects had no significant association with the p value of 0.17.

Conclusions and Recommendations: Immunization monitoring, the sustainable activities such as cold chain monitoring and data quality self-assessment procedures were positive influences on the health system in general and on immunization programs in particular. It is recommended that there be integration of the AFP surveillance system to benefit the overall health system with proper planning, organization, and administration.
Introduction

Background: In 1988, the World Health Assembly (WHA) adopted a resolution calling for the global eradication of poliomyelitis within twelve years. The humanitarian, scientific and economic rationale for the resolution was sound; polio was endemic in more than 125 countries and paralyzed at least 350,000 children annually. As a facet of the eradication strategy, a global surveillance system was established. In line with this global strategy, Ethiopia initiated an AFP surveillance system a decade later in 1998. Currently, there are thirty surveillance officers working throughout the country. The main focus of the surveillance officers is to establish and conduct AFP surveillance in the country. The implications of this approach for the broader national health system must continue to be studied if such a system is to be replicated for the delivery and monitoring of other interventions.

Taylor, Cutts, and Taylor asserted in 1998 that there were ethical dilemmas in the implementation of a worldwide polio eradication program. The arguments were that countries were pressured to defer action on country-based priorities. In addition, financial benefits were greatest in rich countries while significant costs were
borne by resource poor countries. This may or may not be true today.

*Statement of the Problem:* The AFP surveillance system is operating in Ethiopia; the influence of the system on health programs has not been studied. Many health interventionists are keen to learn how the surveillance system works and they want to integrate their activity with the existing AFP surveillance system. With this in mind, this study sought to explore the ways that the AFP surveillance system worked and identify ways that other health programs could be integrated into this system.

**Objectives**

*General Objectives:*  
To explore the effects of the AFP surveillance system on various health programs in Gurage Zone of SNNPR.

*Specific Objectives:*  
1. To explore the effect of the AFP surveillance system on the detection, confirmation, and investigation of epidemic diseases other than polio.
2. To explore the effect of the AFP surveillance system on routine EPI.
3. To explore drawbacks of the AFP surveillance system on the delivery of other health programs.

Methods

Study Area and Period: The study was conducted in the Gurage zone of Southern Nations and Nationalities Peoples’ Regional State in February, 2011.

Study Design: A cross-sectional qualitative and quantitative study was conducted.

Source Population: All woredas and health centers in SNNPR, Ethiopia were the source population.

Study Population: All woreda surveillance focal persons in the Gurage zone and health center focal persons in the zone who implement the integrated disease surveillance response (IDSR) activity were the study population.

Sampling Technique: The zone was purposely sampled and all woreda offices and all health centers that implemented the IDSR were included in the sample. The AFP surveillance system has been designed and functions similarly throughout Ethiopia. It is assumed that the information learned on the way the AFP
surveillance system functioned in one zone might perhaps be generalized to other zones in the country.

**Variables**

*Dependent Variables:* The dependent variables were the percentage of routine immunization monitoring activity supported by the AFP surveillance system, the proportion of cold chain monitoring supported by the AFP surveillance system, and the number of training programs on routine EPI supported by the AFP surveillance system. Also included were the proportion of review meetings conducted through the AFP surveillance system on RI activities and the proportion of epidemics detected through the AFP surveillance system.

*Independent Variables:* Trainings conducted by the AFP surveillance system and a review of meetings conducted by the AFP surveillance system were the independent variable.

*Data Collection Methods and Instruments:* Data were collected using in-depth interviews for qualitative data. Primary data was collected from the woredas and health facilities using a structured questionnaire. Additionally, secondary data were collected through system analysis for the last three years.
Data Quality Control: The guidelines for conducting the in-depth interviews and the structured questions for quantitative data collection were developed and pre-tested. The guidelines and the questionnaire were revised based on feedback.

Data Analysis: For the qualitative data, tape-recorded information was transcribed manually. The notes taken during the interviews were analyzed. The interview was sorted into eight content areas and then analyzed thematically. The data for the quantitative part using the questionnaire were analyzed using SPSS Version 17 and EPI-Info software.

Ethical Considerations: The study was approved by an ethics committee in the Addis Continental Institute of Public Health. Data collection took place after obtaining written consent from each of the study subjects.

Results

The AFP surveillance system was found to strengthen routine EPI activities in most woredas. The benefit of providing training for health workers on EPI, assisting in the provision of the monitoring tool, and assessing the cold chain were uniformly mentioned by all
of the woreda focal persons. As mentioned by a focal person from one woreda:

*The implementation of data quality self-assessment (DQS) by the presence of the AFP surveillance system is very beneficial not only for the EPI program, but also to look into the quality of data in other programs as well.*

Many focal persons in the woredas shared this idea when interviews were conducted. Yet, some woreda focal persons mentioned a drawback. Due to staff engaging in a supplementary immunization activity, there were instances when routine EPI activities were interrupted.

According to primary data analysis in the fifty-two areas, provision of the EPI monitoring chart was identified in forty-nine (94%). However, technical support for tool utilization was identified in only forty-nine (57%) during the area visits. EPI prioritization was conducted with the support of the AFP surveillance system in twenty-five (48%) of the cases. The AFP surveillance system supported cold chain monitoring in 75% of the cases examined.
The other areas of support identified in the study concerning routine EPI activities were the provision of training programs and the development of micro-plans. EPI training was at 89%, cold chain monitoring at 75%, regular supportive supervision at 73%, safe injection practices at 44%, and RED micro planning at 29%.

This study disclosed that the surveillance system provided thresholds for epidemic-prone diseases that allowed health workers to detect epidemic situations early enough for appropriate action with reporting. The training programs provided by the AFP surveillance system included a focus on IDSR reportable diseases and epidemic diseases were given emphasis. The review meetings arranged by the AFP surveillance system personnel were usually integrated. They included epidemic disease identification and early warning issues. Yet, some mentioned that the time given by the AFP surveillance supervision to epidemic diseases was not sufficient. Even though the woreda rapid response team was initiated in most areas, most focal persons claimed that the team was not actually functional. This issue has not been given due emphasis.

According to the qualitative data analysis, of the 13 epidemics detected in the last twelve months, eleven (84.6%) were reported in the areas that received training programs on epidemic surveillance.
Only two (15%) of these epidemics were detected in less than two days after passing the epidemic threshold. Seven were detected in a week’s time but two days after passing the epidemic threshold. Three were detected one week after the epidemic threshold had surpassed.

The AFP surveillance system has played a role in information delivery in the health system. In addition, it has provided sensitivity to monitoring the reporting of health programs in the woreda in timely manner. It has also led to checking the completeness of the regular supervision that the health system does. One focal person stated:

*The AFP surveillance system has played a role in information delivery in the health system as a whole. The community also benefits from this system. In addition to giving training to health workers, the ongoing sensitization has equipped the health workers with the basics of the vaccine preventable diseases.*
Discussion

The in-depth interviews revealed the close association of the AFP surveillance system with routine immunization activities. It contributes by training health workers, following the immunization monitoring activities, and supporting the defaulter tracing activity of immunization. However, limited support to micro-planning of the EPI activities is a major defect in that all EPI activities are based on micro-plan development.

The integration identified in this study is similar to other studies in African where 87% of the countries have an integrated AFP surveillance system with other programs. (7) In a study conducted in the Philippines (7), it was disclosed that the NID strategy, which is part of the AFP surveillance system, was used for several other priority prevention programs. This is true in this study in relationship to establishing systems for other programs. The DQS routinely conducted for EP that is supported by the AFP surveillance system has helped facilities and woredas to analyze other health-related data quality with the same techniques as reported in the in-depth interviews. Contrary to other studies (20), this particular study showed that the AFP surveillance system did not significantly disrupt the routine system. In the in-depth
interviews, most did not complain about the diversion in the attention of health workers during activities related to the polio eradication program. The new strategic plan by the global polio eradication initiative is designed to align polio eradication with other global health priorities. This study revealed that priority health programs like epidemic disease detection, investigation, management, and the delivery of sustainable routine EPI have all benefited from the AFP surveillance system. This has occurred without compromising the primary objective of the polio eradication initiative. This is contrary to what was sited as a concern in Nepal on the joint review of AFP surveillance. (9)

Conclusions

Many benefits of the AFP surveillance system were identified as a result of this study. This system contributes to the health care system of Ethiopia. Immunization coverage can be attributed to multiple synergetic factors and efforts. It can be concluded that the provision of immunization monitoring, the sustainable activities like cold chain monitoring, and the data quality self-assessment procedures directly given and supervised by the AFP surveillance
system are positive influences on the health system in general and on immunization programs in particular.

Recommendations

It is recommended that the AFP surveillance system be better integrated with the overall health system of the country. This can be achieved through proper planning and selecting indicators from the major health system indicators. Also, the AFP surveillance system should extend to the health extension program in Ethiopia. Priority health programs for HIV/AIDS and TB are not currently addressed by this system. Therefore, incorporating critical indicator follow-ups by the AFP surveillance system of these programs are recommended.

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Editor’s Disclaimer

The editor made a concerted effort to present each extract manuscript as clearly and accurately as possible. Significant language editing was required in all of the extracts to improve clarity. Reformatting was required. Some tables and figures were not included where there was duplication of data in the narrative. The editor attempted to keep the message and the data results reported in tact. The views and opinions expressed in the enclosed extracts do not necessarily reflect those of the editor, the Harar Campus, or Haramaya University.