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EDITORIAL

ORIGINAL ARTICLES

Damen Hailemariam, Sileshi Lulseged, Miliard Derbew. *Ethiop Med J, 2020, Vol. 58, Supp. 2*

EDITORIAL

GENERATING EVIDENCE FOR PRACTICE: JUNIOR SCHOLARS IN THE LIMELIGHT

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It is now widely recognized that clinical decisions should be based on conscientious, explicit, judicious and reasonable use of current, best scientific evidences in the treatment of individual patients. Indeed, confidence in the research outputs has important implications for developing guidelines and clinical recommendations. The quality of evidence depends the research methods which varies in terms of the rigor of evidence they generate. When seeking answers to specific questions, some research methods provide better evidence than that provided by other methods. The challenge that clinicians and other health decision makers oftentimes encounter is to objectively identify and evaluate what is or should be considered "the best available evidence". In order to fully understand this one needs to have a clear knowledge of the level of evidence (also called hierarchy of evidence) and how the integration of this evidence can be used to formulate a grade of recommendation (1,2).

The hierarchy of evidence is a core principal of Evidence-Based Practice (EBP), which allows one to take a top-down approach to locating the best evidence whereby one first searches for a recent well-conducted systematic review and if that is not available, then move down to the next level of evidence in the hierarchy to answer a question of interest (3). It is necessary to place the available literature into a hierarchy as this allows for a clearer communication when discussing studies, both in day-to-day activities such as teaching rounds or discussions with colleagues, but especially when conducting a systematic review so as to establish a recommendation for practice. A number of hierarchies of evidence have been developed to enable different research methods to be ranked according to the validity of their findings (2).

The theme of the studies that generated the manuscripts in this Special Issue of the Ethiopian Medical Journal (EMJ) is “junior scholars generating evidence for practice”. The hierarchy of evidence proposed by Ball et al. (1) can be used as a tool, among others, to assess the quality of the studies. This tool ranks studies addressing the many dimensions of an intervention at various levels depending on the importance of the evidence generated for policy and practice. The popular version of the tool for evidence hierarchies classified types of studies according to the strength of evidence they provide from strongest to weakest as: systematic reviews and meta-analyses of randomized controlled trials as well as evidence based clinical guidelines based on these trials; randomized controlled trials; controlled trials without randomization; case-control or cohort studies; systematic reviews of descriptive or qualitative studies; descriptive or qualitative studies; and opinions of authorities, and reports of experts (4).

In this approach, systematic reviews and meta-analyses of randomized controlled trials as well as evidence based clinical practice guidelines based on randomized controlled trial rank at the top (or as level I). On the other hand, opinions of authorities and reports of experts are ranked at the lower (level VII) in the hierarchy (5). Based on this approach, the epilepsy education material developed and standardized by Gugsa (6) can be considered to be at level II, as it is a practice guideline, but not based on randomized controlled trial. Shikur et al.’s study (7) that determined the effect of common mental disorders on food security using longitudinal data from a demographic surveillance site data qualifies to be level IV as it has employed a cohort design. On the other hand, all the remaining five studies fall within the category of level VI as all of them used descriptive quantitative or qualitative designs.

The other criterion for assessing the effect of research on practice is the potential extent of a study for changing or modifying the existing practice. Based on this criterion, two of the studies can be considered to have potential for modifying the prevailing practice. Yifter et al. (8) conducted a study to look into the achievement of diabetes care goals at a tertiary hospital in Addis Ababa for improved diabetes risk factor control along with preventive screening for complications so that diabetes related morbidity and mortality can be significantly reduced. The epilepsy education manual developed by Gugsa (6) has also the potential for improving the practice of public education and awareness creation about the disease by engaging all stakeholders.

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EMJ considers this series of studies and the manuscripts arising thereof as a good example of junior scholars systemic and productive engagement in evidence generation. Besides the immediate-term contributions, their involvement in supervised and supported research activities and development of quality manuscripts will enhance capacity in the field as it adds to the pool of researchers and educators who will lead future initiatives. As indicated in a previous editorial (9), there is an utter need to improving generation and access to research outputs by creating mechanisms that encourage contributors to publishing good quality research and publishing them in local journal. The studies in reported in this Special Issue of the journal sets one more example to that effect.

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Bilal Shikur Endris, Seifu Hagos Gebreyesus, Girmay Medhin, Martin Prince, AtalayAlem, Larry Wissow, Charlotte Hanlon. *Ethiop Med J, 2020, Vol. 58, Supp. 2*

ORIGINAL ARTICLE

IMPACT OF COMMON MENTAL DISORDERS ON FOOD INSECURITY AMONG WOMEN IN BUTAJIRA, ETHIOPIA: A COHORT STUDY

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ABSTRACT

Introduction:*There is a growing body of evidence for an association between common mental disorders and food insecurity. However, since most studies have been cross-sectional, it has not been possible to differentiate the direction of the association. The aim of this study was to determine the effect of common mental disorders on food insecurity using a prospective cohort study design.*

Methods: *The study was carried out in Butajira, south-central Ethiopia among mothers who were enrolled in the CMaMiE cohort. A total of 1815 enrolled women were evaluated for symptoms of CMD using the Self-Reporting Questionnaire-20 (SRQ-20) at two time points; August 2012 (time 1, T1) and in August 2014 (time 2, T2). Probable CMD was defined when mothers reported six or more affirmative (yes) responses to the SRQ-20. Household food insecurity was measured using the Household Food Insecurity Access Scale (HFIAS) in December 2017 (time 3, T3). Zero inflated negative binomial regression was used to determine the independent effects of CMDs at T1 and T2 on food insecurity score at T3. A Poisson working model was also used to determine the risk of being severely food insecure associated with having CMD.*

Results*: About two thirds of women (67.0%) were living in food insecure households.The prevalence of CMD was 4.8% at T1 and 10.0% at T2 and only 1.2 % (n=22) women had CMD at both time points. After controlling for potential confounders, women with CMD at T2 only (RR=1.14; 95%CI: 1.02, 1,29) had higher HFIAS scores at T3; Women with CMD at T1 only were not significantly associated with HFIAS score at T3.Women with CMD at T1 only had 4 times higher risk of severe food insecurity (RR=3.96, 95% CI: 2.15-7.27) and women with CMD at T2 only had 2.2 times higher risk of severe food insecurity (RR=2.24, 95% CI: 1.27-3.95) at follow-up.*

Conclusion*: Common mental disorders among mothers were prospectively associated with increased risk of household food insecurity in this rural Ethiopian population. Possible mechanisms such as increased cost for health care, lost productivity and decreased self-efficacy warrant further investigation for their potential to prevent future food insecurity.*

Key words*: Food insecurity, Common mental disorders, Cohort*

INTRODUCTION

Common mental disorders (CMDs) are characterized by a combination of somatic, anxiety and depressive symptoms (1).In asystematic review and meta-analysis of perinatal CMDs in low- and middle-income countries (LMICs), 15.6% and 19.8% of women had antenatal and postnatal CMDs, respectively (2). Furthermore, in a Multi-country study carried out in India, Vietnam, Peru and Ethiopia the prevalence of maternal CMD was high, ranging from 21% in Vietnam to 33% in Ethiopia(3). In a study carried out amongst women in a rural Ethiopian community, the prevalence of CMDs during pregnancy and postnatally were 12% and 5%, respectively (4).

Maternal CMD has important public health implications, for both the mother and child(5). In a systematic review, maternal depression was associated with being underweight and stunted in early childhood(6) Individual studies have found that maternal CMD negatively affects child health and development(7, 8).In Ethiopia, there is mixed evidence regarding the association between maternal CMD and child health and development outcomes. In some Ethiopian studies,maternal CMD is associated with increased risk of infant under-nutrition (9,10), diarrhea and acute respiratory infections (11), and child mortality (12). In one study in rural Ethiopia, poorer child development was associated with maternal depression(13). However, in other studies from Ethiopia, there was no association between perinatal CMD and child survival and development (14,15).

The Eastern African sub region is home to one of the world's largest populations of undernourished people; an estimated 124 million people(16). Individual studies in Ethiopia reported as high as 80% prevalence of household food insecurity (17, 18).

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Although Ethiopia has made significant progress in reducing undernutrition, a considerable proportion of children (38%) remains stunted(19).

Achieving food security and promoting mental health are targets of the United Nations Sustainable Development Goals(20).. There is accumulating evidence for a positive association between CMD and food insecurity(21). In a systematic review of 16 studies linking food insecurity and mental health in LMICs, there was a significant association between food insecurity and common mental disorders(22). Similarly, in individual cross sectional studies conducted in Ethiopia, a significant association between mental distress and household food insecurity has been reported(16, 18, 23). In reviews of studies of poverty and depression in LMICs, it is predicted that poverty will be a risk factor for CMD, with less likelihood of CMD leading to poverty (24).However, as most of these studies are cross-sectional surveys, it has not been possible to differentiate the direction of the association i.e. whether food insecurity resulted in mental illness or vice versa.

Indications of the nature of the specific association between CMD and food insecurity are available from studies conducted in high-income countries. In a longitudinal study conducted in the US, maternal depression during the postpartum year was strongly associated with child and family food insecurity 3-15 months later (25).Furthermore, another study conducted in US indicated a bidirectional causal relationship between household food insecurity and depression(26).

In the present study, we hypothesized that maternal CMDs would increase the subsequent risk of household food insecurity in a low resource setting.

PARTICIPANTS AND METHODS

Study settings

The study was conducted in and around Butajira town, which is located 135km south of Addis Ababa, the capital city of Ethiopia. The Butajira Health and Demographic Surveillance Site (HDSS) is one of the oldest surveillance sites in Africa, established in 1986. It consists of nine rural and one urban kebeles (lowest administrative area) from different ecological zones. The livelihood of the residents is based on subsistence farming. Khat (Catha edulis Orsk) and chili-peppers are the main cash crops, while maize and “false banana” or ensete (Ensete ventricosun) are the main staples(27).

The current study was conducted among mothers who were enrolled in the CMaMiE cohort in the Butajira HDSS(28). The CMaMiE project is a population-based prospective cohort of women (n=1065), established in 2005/2006 with the aim of estimating the public health impact of perinatal CMDs. When the birth cohort reached 6.5 years, children born 12 months before (n=572) and 12 months after (n=773) the original CMaMiE recruitment period were identified through the HDSS birth records. Surviving children, together with their mothers, were recruited into an expanded cohort. Data of 1815 mothers who were under expanded cohort follow up at 6.5 years (considered as time 1 (T1) for the current study) and 7.5 years (considered as time 2; T2) were included in the current analysis. The last time point data (time 3; T3) were collected at 10.8 years (November 2017-January 2018) to assess household food insecurity as an outcome.

Study design and power

A prospective cohort study design was employed using the C-MaMiE cohort. CMDs measured in August 2013 (T1) and in August 2014 (T2 were used to predict household food insecurity at T3(3 years and 4 months after T2 and 4 years and 4 months after T1). Power of the study to evaluate the adequacy of the sample to answer the present research questions was calculated using OpenEpi software and it was found to be adequate (>80%). (https://www.openepi.com)

Measurements

Household food insecurity was measured using the9-item (0=No, 1=Yes) Household Food Insecurity Access Scale (HFIAS), which was validated previously in Butajira, Ethiopia(29). Affirmative answers to each question are followed by the frequency of occurrence (1=rarely, 2=sometimes and 3=often). The minimum and the maximum expected score is 0 and 27, respectively. The HFIAS items assess an experience of food insecurity (access) occurring within the previous four weeks. A household is considered as severely food insecure if the household “often” reduces meal size or the number of meals, and/or experiences any of the three most severe conditions (running out of food, going to bed hungry, or going a whole day and night without eating), even only “rarely”(30). We modeled HFIAS in two different ways (a) as count using Zero inflated negative binomial and (b) as binary outcome using Poisson working model. We dichotomized food insecurity as severely food insecure and not severely food insecure (food secure, mild and moderate food insecure combined).

At T1 and T2, women were asked whether they had experienced hunger in the past month due to lack of food (single item), while the full food insecurity measure was collected at T3.

CMD was measured using the self-reporting questionnaire (SRQ-20), which was also validated in Ethiopia(31). The 20 items ask about depression, anxiety and somatic symptoms in the preceding four weeks. Women with six or more affirmative (yes) responses were considered to have CMDs. CMD is the primary exposure variable in the current study.
A living standard score was constructed with the following six variables: ownership of a business, bed and radio, availability of a latrine and sanitary means for disposal of rubbish and having a window within the home. One point was given for each item with the total minimum score of zero and maximum score of six. A hierarchical living standard scale of these six items was confirmed in the same cohort using Mokken analysis (Loevinger H coefficient 0.45)(32).

Data analysis

Data were collected using tablets installed with Open Data Kit (ODK). We analyzed the data using STATA software version 14. Descriptive analyses such as frequency, mean and median, were used to describe the profile of study participants in terms of socio-demographic, economic, food insecurity and CMDs status.

Univariate and multivariable analyses were carried out to assess the effects of CMDs at T1 and T2 on HFIAS score at T3.

As the mean HFIAS score was significantly ($p<0.001$) different from the variance, violating the assumption of Poisson probability distribution (i.e. over-dispersion), we preferred a negative binomial regression model that has an additional parameter to take account of extra variability. Finally, because zeros appeared to be inflated, we used zero inflated negative binomial regression model (zinb command in STATA). We also did test for trend across exposure time points. As a secondary analysis, we estimated the risk ratio for association between CMDs at T1 only and at T2 and severe food insecurity using a Poisson working model with model-robust sandwich estimators(33).

RESULTS

Selected characteristics of the cohort at T1 are presented in Table 1.The mean age of women and their husbands were 34 years (Standard Deviation (SD) 6.4) and 43 years (SD9.0) years, respectively. Most women (82%), but less than half of husbands (42%),had no formal education. About 15 % of women were in polygamous marriages. Hunger in the last month was reported by 7% of the women.

Table 1: Socio demographic and economic characteristics of the study participants at baseline, August 2012.

Characteristics	Number	Percentage or mean (SD)
Age of mother (years)	1754	34 (6.4)
Age of husband (years)	1,683	43 (9.0)
Educational status of mother		
No formal school	1447	82.5
Primary	268	15.3
Secondary	39	2.2
Educational status of husband		
No formal school	709	42.1
Primary	856	50.9
Secondary	94	5.6
Further education	24	1.4
Marriage type		
Monogamous	1,417	80.8
Polygamous	268	15.3
Divorced or widowed	69	3.9
Relative wealth		
Less	548	31.2
More	64	3.7
Same	1,142	65.1
Emergency resources		
Has emergency resources	1,051	59.9
No emergency resource	703	40.1
Hungry in the last month		
No	1,634	93.2
Yes	120	6.8
Adequate family support		
No	291	16.6
Yes	1,463	83.4

Prevalence of CMD and Food insecurity

The prevalence of CMDs was 4.8% at T1 and 10.0% at T2. Only 1.2 % (n=22) mothers had CMD at both T1 and T2.

At T3, 33.0% of households were food secure, 32.8% mildly food insecure, 29.0% moderately food insecure, and 4.6% severely food insecure

Table 2: The effect of CMD at different time point on HFIAS score at T3 among mothers in Butajira, Ethiopia.

Model	CMD status at different time	IRR	Trend (P value)	[95% Conf. Interval]
Model 1: Unadjusted	No CMD at both T1 and T2	1		1
(n= 1,804)	CMD at time one (T1) only	1.14	0.001	(0.96, 1.37)
	CMD at time 2 only (T2)	1.19		(1.06,1.34)
Model 2:Adjusted for hunger at T1	No CMD at both time (T1 and T2)	1		1
(n= 1,745)	CMD at time one (T1) only	1.11	0.001	(0.93,1.33)
	CMD at time 2 only (T2)	1.19		(1.06,1.34)
Model 3: Adjusted for socio -demographic variable and	No CMD at both time (T1 and T2)	1		1
	CMD at time one (T1) only	1.13		(0.94,1.35)
hunger at T1	CMD at time 2 only (T2)	1.19	0.002	(1.06 1.34)
Model 4:Adjusted for economic variable and hunger at T1	No CMDat both time (T1 and T2)	1		1
	CMD at time one (T1) only	1.06		(0.89,1.26)
	CMD at time 2 only (T2)	1.14	0.007	(1.02,1.28)
(n= 1,745)				
Model 5:Adjusted for social support and hunger at T1	No CMDat both time (T1 and T2)	1		1
	CMD at time one (T1) only	1.11		(0.93,1.33)
(n=1,745)	CMD at time 2 only (T2)	1.19	0.001	(1.06, 1.35)
Model 6: fully adjusted	No CMDat both time (T1 and T2)	1		1
(n= 1,675)	CMD at time one (T1) only	1.07		(0.90, 1.29)
	CMD at time 2 only (T2)	1.14	0.014	(1.02,1.29)

** Model 3 is adjusted for age of mother, age of husband, educational status of the mother, educational status of husband, marital status of mother, and hunger at T1

** Model 4 is adjusted for living standard, emergency saving, relative wealth, and hunger at T1

** Model 5 is adjusted for frequency of family visits, friend visits, family help, and hunger at T1.

** Model 6is the final model adjusted for all the variables mentioned from model 2 to 5.

Association between CMD and food insecurity

The effects of CMD at T1 and T2 on HFIAS scoreat T3 among mothers is shown in Table 2. In the final adjusted model, those mothers who met criteria for a CMD at T1 onlydid not have a significantly greater HFIAS score compared to those who did not (RR= 1.07, 95% CI:0.90, 1.29). However, mothers who met criteria for CMD at T2 had significantly higher HFIAS scores at T3(RR =1.14, 95%CI 1.02,1.29).

Considering food insecurity as a categorical measure, after adjusting for possible confounders, those mothers who met criteria for a CMD at T1 had 4 times higher risk of being severely food insecure at T3 (IRR=3.96, 95% CI: 2.15-7.27). Moreover, mothers with CMDs at T2 only had 2.2 times higher risk of being severely food insecure at T3 (IRR=2.24, 95% CI: 1.27-3.9

DISCUSSION

The present study employed a large prospective cohort study to evaluate the effect of maternal CMDs on household food insecurity in southern Ethiopia.

We used locally validated measures for measuring both CMDs and food insecurity. After adjustment for a rangeof important potential confounders, women with CMDs had a significantly higher risk of scoring higher on a household food insecurity index and reporting severe food insecurity, independent of other poverty indicators such as experience of hunger at baseline, relative wealth, living standard and emergency savings.

In a number of studies in LMICs, a positive association between food insecurity and CMDs has been observed(16,21,23,34-36). The major limitation of the existing evidence base is that all studies were cross sectional in design and was not, therefore, possible to examine whether CMDs longitudinally predict household food insecurity or vice versa.

Consistent with our finding, in a few studies from the USA, CMDs predicted household food insecurity using longitudinal data.

A study showed maternal depression during the postpartum year was strongly associated with child and family food insecurity 3-15 months later (25). Another study from rural families in the USA showed a bidirectional relationship(26).We found that the social selection hypothesis (increased risk of poverty among people with mental health problems) is also relevant to CMDs.

Social causation and social selection (social drift) are the main causal theories that elucidate the association between poverty and mental ill health(37).The social causation theory states that poor socioeconomic conditions cause poor mental health. On the other hand, the social selection theory claims that poor mental health causes individuals to experience poorer socioeconomic conditions. In a systematic review, poverty (particularly low education, food insecurity and financial stress) predispose to CMDs, which supports the notion that the social causation hypothesis is more relevant to CMDs (24). However, we found that the social selection hypothesis may also be relevant to CMDs. A longitudinal study found that both social selection and social causation may operate simultaneously by trapping people in a vicious cycle of poverty and poor mental health(38).

Various mechanisms may explain why CMDs are prospectively associated with food insecurity. Decreased productivity due to absenteeism from work, reduced productivity at work, lack of motivation or poor relationships at work, as well as increased health care costs may explain the association(39-41). A strong link between poor mental health and absenteeism from work and reduced on-the-job productivity (presenteeism) was found in a prior study (42).Most of the women in our study were unemployed housewives, but even so play a pivotal role in agricultural production such as crop production activities of weeding, harvesting, post harvesting, and storing crops (43). In addition, women are primarily responsible for livestock management such as milk processing and caring for newborn animals. Furthermore, their role in marketing agricultural products and purchasing foods and other commodities is substantial.

The vicious cycle of poverty and mental health implies that multisectoral responses are needed. In a systematic review, interventions to address CMDs had favorable effects on economic status(24).There is emerging evidence from LMICs that interventions that target the social selection pathway are promising, and supports the call for scale-up of mental health services in LMICs (44). Therefore, Interventions that target both social selection and causation pathways have potential to achieve a dual benefit of better mental health outcomes and poverty reduction.

The present study should be understood within the context of the following limitations. We did not exclude or account for food insecurity at baseline (T1). Controlling for maternal self-reported experience of hunger at T1 might not address this limitation, as food insecurity is a broader concept that measure access to food. In addition, although we accounted for multiple potential confounders, residual confounding, for example by socio-economic status, might affect our finding.

Using a longitudinal study design is the major strength of this study. The present study design helped us to potentially minimize the problems of reverse causality that would have been the case in cross sectional studies. In addition, using locally validated tools to measure CMDs and food insecurity (HFIAS) are further important strengths of the present study.

Conclusions

In a predominantly rural setting of Ethiopia, we found that common mental disorders (CMDs) were prospectively associated with increased risk of household food insecurity. Possible mechanisms such as increased health expenditure, reduced productivity, lost employment, reduced social support, decreased self-efficacy, and stigma warrant further investigation for their potential to prevent future food insecurity in resource limited settings of both rural and urban context.

Ethical approval and consent to participate

Ethical clearance was obtained from the Institutional Review Board of Addis Ababa University, College of Health Sciences and the Research Ethics Committee at King's College London. Written informed consent was obtained from study participants. Women with high CMD scores were referred to local mental health care and supported to attend with payment of transport costs.

Consent for publication: Not applicable

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interest

The Authors declare that they have no competing interests.

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Authorship

The first author developed the research idea and led the data collection process at time three. All authors contributed in designing of the study, participated in the data analysis and critically reviewed the draft manuscript. All authors read and approved the final manuscript.

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Competing interest

The authors declare that this manuscript was approved by all authors in its current form and that no competing interest exists.

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Hanna Getachew, Milliard Derebew. *Ethiop Med J, 2020, Vol. 58, Supp. 2*

ORIGINAL ARTICLE

FACTORS ASSOCIATED WITH CONGENITAL ANOMALIES AMONG YOUNG INFANTS AT TIKUR ANBESSA HOSPITAL, ADDIS ABABA, ETHIOPIA

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ABSTRACT

Introduction*: Congenital anomalies require multitude of surgical procedures at a very early life and impose a large impact on the lives of patients and parents and yet causes are still largely unknown, but assumed to be multifactorial. A few studies focused on environmental risk factors, but evidence is still scarce.*

Methods: *This is a case control study of infants less than three months of age with congenital anomalies evaluated or admitted to the hospital between December 1, 2017 and May 31, 2018. Face-to-face interviews with parents of young infants were carried out to collect socio-demographic and clinical information.*

Results: *Analysis of the data showed that among 200 young infants with congenital anomalies enrolled in the study, gastrointestinal system is most commonly affected organ system. Maternal factors that were significantly associated with congenital anomalies included the lack of peri-conceptional use of folic acid (OR = 3.6; 95% CI = 1.6-7.7; p = 0.005), an inadequate attendance to antenatal clinic (OR = 2.3; 95% CI = 1.5-3.6; p < 0.001), family history of congenital anomalies in 3 %of cases (OR 2.4:95% CI =1.5-3.6; P< 0.001). Infant factors that were significantly associated with congenital anomalies were male sex, and birth weight of 2.5 kg or less.*

Conclusions*: In this study, the proportion of women taking folic acid supplements during pregnancy was very low and mothers of infants with congenital anomalies have less antenatal follow up. Efforts should be made to ensure that more women use folic acid during the peri-conceptional period, as the use of folic acid supplement could reduce the occurrence of some congenital anomalies.*

Key words: *congenital anomalies , risk factors , young infants*

INTRODUCTION

Congenital anomalies (CAs) are structural or functional anomalies which are present at the time of birth. A congenital anomaly is defined as a defect in the structure of an organ which resulted from a specific primary abnormality of organogenesis. Over the years, the proportion of infant mortality due to CAs has increased significantly from 15.1% in the 1970s to 22.1% in the late 1990s. An estimated 6% of global infant deaths are attributable to CAs, which makes it the leading cause of infant mortality, and more than 70% die in the first month of life and the majority of whom survived are mentally and physically disabled for life (2).

Every year an estimated eight million children, 6% of the total births worldwide are born with a serious birth defect of genetic or partially origin. Additionally, hundred thousands are born with serious birth defects of post conception origin due to maternal exposure to environmental agents. CAs could lead to long term disability, which may have significant impacts on individuals, families, societies and health care systems (4).

CAs require a multitude of surgical procedures at a very early age and have large impact on the lives of patients and their parents. The impact of CAs is severe in middle and low-income countries. As a matter of fact, it is estimated that approximately 95% of the children who die from birth defects are from those countries. An indirect determinant of this higher risk relates to a possible lack of access to sufficient nutritious food by pregnant mothers, an increased exposure to agents or factors such as infection or alcohol, poorer access to health care facilities (3). In Africa, results from different studies vary on the frequency of CAs . The rate of CAs was found to be 20/1000 among children aged 0-18 years by a study done in Egypt (9). Studies from East Africa reported incidences of above 20/1000 live births, while the incidence of major anomalies was found to be 15/1000 births (4,8). In Asia, the magnitudes of CAs vary also with reported incidence of 2.5% of infants at birth in India (8). The frequency of these anomalies in Pakistan have been described as either related to total birth or to still birth, with the former accounting for 11.4/1000 and 16% for the latter.

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In the United States (U.S) and Canada where CAs are diagnosed intra uterine and aborted, the incidence was 2-5% of all live births (6). Although 50% of all CAs cannot be linked to a specific cause there are some known genetic and environmental risk factors. There is multifactorial cause for 20-25% of anomalies whereby there is a complex interaction of genetic with environmental risk factors. Another 10-13% of anomalies have a purely environmental cause (e.g. infections, illness, or illicit drug in the mother (8). Only 12-25% of anomalies have a purely genetic cause. Of those caused by genetic factors, the majority are chromosomal anomalies.

Various environmental factors have been identified to be risk factors for CAs . Among the risk factors are advanced maternal and paternal ages, parental consanguinity, maternal *toxoplasma*, rubella, cytomegalovirus, and herpes simplex virus (TORCH) infectious and nutritional deficiencies (10). The association between maternal smoking and the risk of malformation is especially important for mothers who do not take folic acid periconceptional (14). Maternal health conditions that contribute to increased risks for CAs include obesity, chronic hypertension and insulin-dependent diabetes mellitus. Periconceptional alcohol exposure has long been known to confer an increased risk for neurodevelopmental deficits in offspring, but its impact on the development of structural anomalies is less clear (26). Many CAs occur more frequently in one sex than the other, the cause of deviated sex ratio remains unclear (11).

PATIENTS AND METHODS

Study design

A case–control study design was employed at Tikur Anbessa Specialized hospital in Addis Ababa.

Patients and controls

A sample of 692 infants (200 cases, 472 controls) was used for this study; cases were infants less than three months of age with external major anomalies. Daily admission records of infants less than three months of age at pediatric surgical wards, causality, pediatric intensive care unit (ICU) and pediatric surgical referral clinics between December 1 2017 to May 30 2018 were identified, evaluated and included in the study regardless of whether they underwent a surgical procedure or died in hospital. Infants with isolated central nervous system, cardiac, or facial and limb abnormalities were not included in the study since almost all such cases were handled in other centers.

Controls were randomly chosen in a 2:1 ratio relative to cases from among all infants without a diagnosis of CAs born during the same time frame and visited the hospital vaccination clinics and those admitted to wards for reasons other than CAs.

Covariates

Exposures of interest were maternal characteristics including maternal smoking during pregnancy (yes/no), maternal alcohol use during pregnancy (yes/no), maternal drug use and maternal diagnoses of chronic hypertension (diagnosed prior to pregnancy, not pregnancy-induced) and pregestational diabetes mellitus (yes/no).

Potential confounders that were identified before data collection included clinical factors previously known to be associated with CAs or presumed to be potential confounders of the association of interest. These factors were gender of the infant, maternal age (<20 years, 20–34 years, and 35+years), preterm delivery (<37 weeks); birth weight (< or >2500 grams); use of folic acid, maternal parity, and maternal body mass index (BMI) in kg/m2 (<19, 19–25, 25–30, >30), family history of birth defects, defined as two or more first- or second-degree relatives with a birth defect.

Statistical analysis

Chi-square test was used to assess for statistical significance between the frequencies of the background variables among cases and controls. Crude odds ratios (CORs) with 95% confidence intervals (CIs) were calculated to assess the strength of association between the potential maternal and paternal risk factors using logistic regression analyses. The variables considered as potential confounders included all potential determinants that are known or suspected risk factors from the literature. To prevent having too many covariates in the initial multivariable models, we first checked whether a factor changed the risk of CAs by at least 10% in bivariable analyses.

However, those that shared the causal pathway between the risk factor of interest and the outcome were excluded. All relevant variables were included in multivariable logistic regression models for each potential maternal and paternal risk factor to calculate adjusted ORs with 95% CIs. Only risk factors with two or more exposed cases were used in the analyses. Factors with a P value of less than 0.1 on univariate analysis were subjected to multivariate logistic regression analysis.

RESULTS

We identified 200 infants with CAs during the study period and 492 controls. About 55.4% of case infants presented in the first week of life with the age range at presentation of 1-80 days. About four (2%) and 46 (9.4 %) of mothers whose children had and did not have CAs, respectively, were in the15-19 years of age group. Besides, 99 (91.5%) and 368 (74.8%) of mothers whose children were exposed and not exposed to CAs, respectively, were 20-34 years of age 30–34 years of age group. Likewise, 17 (8.5 %) and 78 (15.9%) of the mothers who had affected and non-affected children, respectively, were 35years and above.

As far as the birth order of children was concerned, 37, 31.7, and 31.3 were first, second, third and above (3+) children to their families, respectively. Among the controls, about 32.9, 19.8, and 47.3% were first, second, third and above (3+) children, respectively, to their parents. In on our study, 62.5% of the cases and 29% of controls are from outside Addis Ababa. Compared to controls, a greater proportion of cases were male.

Most of the cases were gastrointestinal anomalies 135 (67.5%) followed by genitourinary anomalies 37 (18.5%) and abdominal wall 20 (10%). Chest, lung, and vascular malformations constitute the rest 8 (4%). The most common gastrointestinal anomaly identified was Hirshsprung disease comprising (29.6% cases), followed by anorectal malformations (27.4% of cases), tracheoesophageal atresia (23.7%), the rest are intestinal atresia (8.8 %), malrotation and duplication cysts (3.3%). Most common genitourinary anomaly was hypospadias (29.7%) followed by Posterior urethral valve (24.9%), bladder extrophy (18.9%), pelviurethral junction obstruction (10. 8%), disorders of sexual differentiation (2.7%) and others (13.5 %). The most common abdominal wall defect was omphalocele (65%) followed by gastroshsis (25%) and others (10%).

About 66.5% of mothers whose children had CAs and 10% of the mothers who had children without CAs, had no antenatal care (ANC) visits) or three or less antenatal clinic (ANC) visits (OR = 2.3; 95% CI = 1.5-3.6; $p < 0.001$). (Table 1)

Table 1: Parental characteristics and risk factors in cases and controls, Tikur Anbessa Specialized hospital, Addis Ababa, December 1, 2017 and May 31, 2018.

	Cases n=200	**Controls n=492**	**P value**
Maternal age (years)			
<20	4 (2)	46 (9.4)	
20-34	99 (91.5)	368 (74.8	0.23
34+	17 (8.5)	78 (15.9)	
Maternal parity			
Primiparous	75 (34.9)	144 (27)	0.12
Multiparous	125 (65.1	348 (73	
Maternal BMI			
<19	6 (3)	11 (4)	
19-25	109 (54.5)	128 (46.9)	0.08
25-30	20 (20)	65 (23.8)	
>30	15(15)	69 (25.3)	
Unknown	50	219	
Antenatal visit			
Yes	133(66.5)	440(89.4)	0.02
No	67(33.5)	52(10)	
Number of ANC Visit			
<4	79 (39.7)	117(23.8)	0.001
>4	121(56.3)	375(76.2)	
History of birth defect			
Yes	3(1.5)	3(.6)	
No	197(98.5)	489(99.4)	0.001
Passive smoking			
Yes	6(3)	16(3)	0.820
No	194(97)	476(97)	
Drug intake			
Yes	8(4)	28(5.6)	0.92
No	192(96)	464 (94.3)	
Folic acid			
Yes	50(25)	400(81.3)	0.005
No	150(75)	92(18.7)	

About 75% of mothers whose children had CAs and 18.7% of the mothers who had children without CAs, had no use of folic acid preconception or during pregnancy. Non-use of folic acid during pregnancy (OR = 3.6; 95% CI = 1.6 - 7.7; p = 0.005).

Maternal and paternal age at childbirth was not different between the groups but fathers of infants with CAs were lower educated than controls and family income for cases were low than controls. More infants with CAs were first-borns, were born preterm, or had a low birth weight compared to control children (Table 2).

Table 2: Univariate and multivariate analysis of congenital anomalies and explanatory factors, Tikur Anbessa Specialized hospital, December 1, 2017 and May 31, 2018.

	Cass n=200	Controls n=492	Unadjusted OR [95%CI]	P-value	Adjusted OR [95%CI]	P-value
Sex						
Female	87(43.2)	142(28.9)	1		1	
Male	112(56.3)	350(71.1)	1.3[0.9-2.0]	0.156	1.8[1.1-2.8]	0.013
Birth order						
≤4	183 (23.7)	280(57)	1	0.47		
			1.5			
>4	17(57.3)	212(43)	1.5[0.5-4.7			
GA at birth						
>37	153(76.5)	400(81.3)	1		1	
<37	47(23.5)	92(18)	5.3[1.9-15.1]	0.002	3.5[1.2-10.9]	0.027
Birth weight						
>2.5	141(70.5)	400(81.3)	1		1	
<2.5	59(29.5)	92(18.6)	3.0[1.9-4.9]	<0.001	2.3[1.4-3.9]	0.002

Obesity is seen in 15 % of case mothers and 20 % of control mothers. Pregestational hypertension was diagnosed in 1.5 % of cases and 3% of controls .More case parents reported a family history of congenital malformations in 1.5% of cases but only in 0.6% of controls. Infant factors that were significantly associated with CAs were: male sex (OR = 1.3; 95% CI = 0.9-2.8; p = 0.013), a birth weight of 2.5 kg or less (OR = 3; 95% CI = 1.9-4.9; p =0.000).

About 3% of cases have history of passive smoking in mothers even if it not significantly associated. 3% of cases and 5.8% of controls have history of drug use, aspirin and unspecified medications though the timing of exposure could not be recalled by parents. There is no significant association between maternal pregestational diabetes and hypertension and CAs .

DISCUSSION

The incidence of CAs in our study was higher in male than in female. A study by Molla et al. from Ethiopia reported the incidence of anomalies to be 58.5% male, 41.5% female.

Another study by Mashuda et al., from Tanzania reported that 54.6% of the male and 44.9% of the female children were observed with CAs. A study by Bakare et al., in Nigeria and Zhang et al., in China pointed out that the proportions of CAs were 51.3% and 48.7%, and 54,9% and 38.7% for male and female, in that order. Although, some rare studies have shown a difference with a higher prevalence of congenital malformations among female than male.

In our study statistically significant association was found between CAs and low birth weight. Similar results also found in other study done in northern Ethiopia. Low birth weight was associated with increased risk of CAs. This highlights the fact that the presence of congenital anomaly itself hampers the growth of a developing fetus. In our study statistically significant association was found between congenital malformation and prematurity. This is particularly a cause of concern as prematurity and stillbirths are a major cause of perinatal mortality.

In our study advanced maternal age was not associated with an increased risk of CAs. In Turkey, studies show that 5.2% of the mothers are older mothers (35 years of age or older) (26) and 8.7% of anomalous births were from older mothers, although this was not statistically significant. In a large prospective cohort study, Hollier et al demonstrated an additional 1% age-related risk of non-chromosomal abnormalities in women age 35 or older. Conversely, Baird et al found no association between the incidence of congenital malformations and advancing maternal age. More recent studies suggest that young maternal age actually may be a stronger risk factor for certain CAs compared with advanced age.

Our study also showed a significantly higher risk of overall CAs in infants of preterm births. This could be explained by the fact that preterm newborns spend more time in the intensive care unit and are subjected to more diagnostic tests, compared to term newborns. This increases the odds of diagnosing subtle CAs in preterm newborns than in term newborns. Another possible explanation for our finding may be that CAs and prematurity may share some underlying maternal risk factors such as smoking, obesity, hypertension, and diabetes mellitus.

In this study there is a significant association between lack and irregular ANC follow up with CAs . Folic acid is known to be necessary for the growth and smooth function of human cells, as it is crucial for the biosynthesis and methylation of deoxyribonucleic acid (DNA) and ribonucleic acid. This is important for cell division, differentiation and regulation of gene expression, especially at a time of rapid cell division.

Multiple vitamin supplements containing folic acid are also distributed during the clinic sessions [29]. The antenatal visits therefore aim at ensuring a normal pregnancy with the delivery of a healthy baby from a healthy mother. Few (≤4) or no prenatal clinic visits have previously been associated with the occurrence of CAs (26).

The Chinese cohort study demonstrated that the risk of anal atresia was reduced by half after the periconceptional supplementation of 0.4 mg of folic acid daily. The Hungarian case-control study showed a similar impact on the occurrence of rectal/anal atresia or stenosis if women used high dose of folic acid (3 to 9 mg daily, mainly 6 mg) in the second month of gestationIn this study, passive smoking was not significantly associated with CAs although several researchers reported that smoking/passive smoking was associated with a specific type of CA.

Our results show that only 25% of the mothers of young infants had used folic acid during the first trimester of pregnancy and that nonuse of folic acid was significantly associated with CAs .

In our study, the highest proportion of anomaly was gastrointestinal (34.2%) followed by genitourinary (30.8%) while the least frequent anomalies were vascular and respiratory (6%). Among the gastrointestinal anomalies, Hirsh sprung disease was the most frequently observed defect. A study by Muga et al, Kenya, found 33.9% prevalence rate of the musculoskeletal system defects, followed by 28.1% of the central al nervous system defects which is different from our findings. The differences in incidence may be due to genetic factors or the existence of multifactorial effects in the countries the studies were carried out and exclusion criteria of our study.

In contrast to our findings, other studies conducted in Romania found higher prevalence of congenital heart defects (33.06%), followed by respiratory tract defects (31). A recent study in Arctic Russia found a higher prevalence (8.7%), of congenital malformations and deformations of the musculoskeletal system, followed by (4.3%) congenital malformations of the urinary system [6]. Similar studies elsewhere have reported that the musculoskeletal and gastrointestinal systems are the body systems most commonly affected (9,18).

There is a significant association between family histories of CAs with cases. This study has several important limitations. First, these are observational data and thus associations cannot be assumed to be causal. Similarly, the administrative source of the data is subject to coding errors and misclassification and not all relevant potential confounders are included in the data. All risk factors studied were self-reported, so random misclassification of exposure and recall bias cannot be excluded, especially since parents were asked to recall events that had occurred some time ago. With regard to disease exposures (pre-gestational diabetes, pre-gestational hypertension), we are not able to extract information on disease severity. The relatively small sample size of cases made it difficult to provide reliable findings for less frequently occurring risk factors.

Conclusion

In this study, the proportion of women taking folic acid supplements during early pregnancy was very low. Even though, due to its design, our study could not establish a causal relationship between non-use of folic acid and the occurrence of CAs, efforts should be made to ensure that more women use folic acid during the periconceptional period since there is ample documentation about its association with CAs.

Family history of CAs was found to be associated with the risk of recurrent CAs in their second pregnancies. We recommend that:

- Iron folate supplementation is required to reproductive age groups, particularly around conception and during early pregnancy;
- Although the causes of CAs are unknown and not studied in Ethiopia, screening nutritional deficiencies, chronic diseases, such as anemia, diabetics, infections/diseases and establishing preventive measures, for example, health education to the public, specifically to reproductive age women are very important pre-conceptional care including genetic testing and counseling should be available for families at risk; and
- Large scale multi-center and register based studies are needed to clarify the role of key risk factors for the development of CAs.

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Competing Interest

The authors declare that this manuscript was approved by all authors in its current form and that no competing interest exists.

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ORIGINAL ARTICLE

STANDARDIZATION OF EPILEPSY EDUCATIONAL MANUALS FOR ETHIOPIAN STUDENTS, MOTHERS AND TEACHERS

Seid Ali Gugssa

ABSTRACT

Introduction: *Epilepsy stigma and treatment gap is enormous in Ethiopia. Epilepsy resolution of the world health assembly calls for coordinated country wide action on the health, social and public knowledge. Effective epilepsy education should target to empower people with epilepsy, create school-based awareness and cascade public education campaign. These emphases the need to develop innovative, collaboratively, linguistically and culturally appropriate community epilepsy education manuals tailored to the needs of the target population.*
Objective: *To develop and standardize epilepsy education manuals for use by mothers and primary students, and to teachers and health extension workers in Ethiopia.*
Methods: *Collaborative framework design and processes, using the principles of Experience- based co-design, was implemented to improve the quality of the draft epilepsy education manuals.*
Results: *The overall feedback from experts and stakeholders was very positive. Students, teachers and parents who had participated in the focused group discussion reported a positive view of the epilepsy education manuals. The feedback from the study participants were used to develop optimized epilepsy educational manuals for "students and mothers" and "teachers and health extension workers".*
Conclusions: *The applied experience-based framework design identified the strengths and weaknesses of the draft epilepsy education manuals. This design allowed experts and stakeholders to identify improvement priorities and to formulate and employ changes on the draft epilepsy education manuals. Follow-up pilot and large-scale implementation trails will clarify the potential of the educational manuals to alleviate epilepsy stigma and treatment gap in Ethiopia.*
Key words*: Standardization, Epilepsy Toolkit. Ethiopia*

INTRODUCTION

Epilepsy is common and considered low priority in many low- and middle-income countries. Epilepsy care in these countries is hindered by limited access to health care facilities, severe shortage of appropriately trained staff, lack of essential antiepileptic drugs, and societal ignorance and misconception.(1,2)

The World Health Organization (WHO) in its WHA68.20 epilepsy resolution emphasized the need to strengthen health system, train non-specialist health care providers, ensure availability of essential antiepileptic drugs and launch public epilepsy awareness campaign to reduced epilepsy treatment gap and societal misconceptions (3).

Community epilepsy education should be appropriate to health literacy of patients, linguistically and culturally appropriate, locally focused, easily accessible, closely linked with epilepsy points of care, innovative and collaborative (4).

Epilepsy in Ethiopia is blanketed by societal misconceptions, as a result majority of people with epilepsy (PWE) never receive medical treatment. Over 90% of the untreated are unaware of the existence of pharmacological epilepsy treatment.(5–11). Instead, spiritual and traditional treatments are the dominant treatment modalities (8).

Sporadic and fragmented epilepsy awareness campaigns are ineffective strategies to avert epilepsy misconception and epilepsy treatment gap in Ethiopia.(12) These emphases the need to develop innovative, collaborative, linguistically and culturally appropriate community epilepsy education material to address the needs of the target population. (4,13-15).

Children and adolescents are most affected by epilepsy in Ethiopia, (16) and considering the need for accelerated public epilepsy awareness creation (14); the investigator identified mothers and children, and teachers and health extension workers (HEW) as target audiences for community epilepsy education.

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The objective of this study is to develop and standardize epilepsy educational manual (EEM) for use by children and mothers, and to teachers and HEW.

PATIENTS ANS METHODS

Design

Intervention

The author drafted the EEM and collaborated with indigenous artist to develop the drawings for children and mothers EEM, and with international artist hired by Wisconsin University to develop EEM for teachers and HEW.

Adapting the intervention

Collaborative framework design and processes, using the principles of Experience- based co-design (EBCD), was implemented to improve the quality of the draft EEM (17).

The processes comprised two repetitive stages of an in-depth interview with expert health care providers and stakeholders; and focused group discussions (FDGs) with upper primary students, teachers, and parents.

The data collected from in depth interview and FGDs was accessible to panel of assessors to assist the author to identify improvement priorities and to formulate and employ changes. The panel of assessors comprised of senior neurologists and psychiatrist from Addis Ababa University; and neuropsychologist from Wisconsin University and child psychiatrist from Johns Hopkins University (Figure 1).

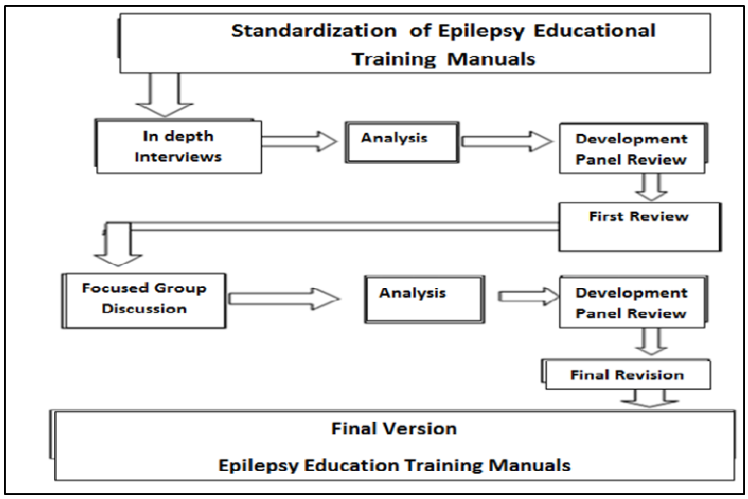

Figure 1: The standardization process of the draft epilepsy training manuals
Addis Ababa, Ethiopia 2018.

Procedure

Sage 1

Qualitative interview with health professionals and stakeholders

Purpose.

To verify the information in the draft EEM were correct and complete; to guarantee the draft EEM were appropriate to train children and mothers, and teachers and HEW.

Recruitment

Study participants were purposively selected from relevant departments of College of Health Sciences (CHS) & faculty of law of Addis Ababa University (AAU), Ministry of Health (MoH), Ministry of Education (MoE), CareEpilepsy Ethiopia (epilepsy patients' society), former president of Ethiopian Medical Association (EMA) and the media.

Process

Process Justification: Study participants reviewed the draft EEM to determine whether: the information was accurate, simple and understandable; culturally and linguistically appropriate; and EEM meet the standards of epilepsy training manuals.

Process Task: After study participants had reviewed the draft EEM for two weeks, data was collected via semi-structured audio recorded face to face interview.

Process Outcome: The interviewees gave feedback on i) accuracy and adequacy of information ii) potential to bring change in knowledge, iii) ways of maximizing benefit, v) the best implementation strategies and vi) weakness and strengths of the draft EEM.

Analysis
The audio-recorded interviews were transcribed word for word and imported to qualitative data analysis software (ATLAS Ti.7). The data was organized into different data types and sources to code and cross-reference the data within and across individuals. The codes were then grouped into themes.

Sage 2
FGDs with parents, teachers and upper primary students
A total of eight FGDs were held: three with parents, two with teachers and three with upper primary students. Each FGD lasted for 60 to 90 minutes.

Purpose
To verify the amended EEM addressed what users had been calling for, and to ensure the amended EEM were acceptable to the norms and values of the target population.

Recruitment
The FGDs were clustered in three purposively selected primary schools: two governmental primary schools (Bethel and March 8 located in Kolfe-Keranio and Bole sub-cities of Addis Ababa respectively); and one private primary school (Daliyah Youth Academy located in Kolfe-Keranio sub-city of Addis Ababa.) The school principals in each school identified and invited FGD participant students, teachers and parents.

Process
Process Task: FDGs were held after the views and comments of experts and stakeholders were incorporated and the EEM amended. A comparative and international education doctoral fellow delivered the course using case vignettes, illustrative diagrams, and PowerPoint slides. The course was categorized into different lessons, and the principal investigator monitored FDG participants' engagement with the course materials, group members and facilitator. Finally, the participants gave feedback on the course content and implantation strategies.

***Process outcome*:** FDG participants gave feedback on i) relevance and cultural appropriateness of stories and arts ii) clarity, flow and content of the story iii) best means of implementations, and iv) weakness and strengths of the amended EEM.

***Analysis*:** The audio-recorded interviews were transcribed word for word and imported to ATLAS Ti.7. The data was organized into different data types and sources to code and cross-reference the data within and across individuals. The codes were then grouped into themes.

Ethical consideration and data safety: The Institutional Review Board of the CHS of AAU approved the study (study protocol #049/17/Neuro). Data was collected from the study participants who consented to participate in the study from May to June 2018. The data was assigned a code, kept in a secured file, and entered in a password protected electronic database.

RESULTS

Participants
Expert Health Professionals and Epilepsy Stakeholders
A total of 12 expert health care providers and stakeholders were recruited for in depth interview. Seven were expert health care providers: 4 neurologists, 1 psychiatrist, 1 public health specialist in anthropology and epidemiology, and 1 former president of Ethiopian Medical Association. Five were stakeholder participants: 1 mental health officer at MoH, 1 curriculum adviser to MoE, founder of CareEpilepsy Ethiopia, 1 Journalist & Activist who works for Duestch-Welle Radio Amharic Services and Weyet Magazine, and 1 human right doctoral fellow at AAU.

Service users
A total of 50 FGD participants were recruited from 3 purposively selected primary schools in Addis Ababa: 22 upper primary students in grades 5-6 and 7-8 (9 M/ 13 F), 17 parents (5 M/12 F), and 11 teachers (6 M/ 5 F.)

Feedback
Expert Health Professionals and Epilepsy Stakeholders
Experts and stakeholders' comments were categorized into three areas: initial impression, identified major areas of change, and course delivery and implementation.

Initial Impression
Overall, the interview participants rated the children and mothers EEM very useful and important initial step. They appreciated the novelty of approach, simplistic story presentation and illustrative diagrams (Tables 1).

Table 1: Initial impression themes and illustrative quotes: views from expert health professionals and stakeholders, Addis Ababa, Ethiopia 2018.

Area	Theme	Illustrative quotes
Initial impression	Misconception	"QU 9:12 Actually the material has addressed the most important issues. Especially the traditional healer story has addressed the major misconception."
	Innovative	"QU: 3:41 What makes this intervention special is that it is a school-based intervention. The material is prepared for school children. This is what I like most. It is very creative..."
	Impact	"QU: 22:1 I absolutely agree that it is problem-solving. I appreciate the initiative. Epilepsy prevails in every school. Addressing school children is brilliant." "QU: 19:12 When I read this material, I was shocked that I let him ride a bike. This training material can change a lot of attitudes like this…"
	Adequacy of the information	"QU: 6:9 I like the material. It includes lots of facts: epilepsy definition, misconceptions, wrong practices, symptoms, treatment issues, first aid measures… It gives the full picture. The way it is presented is suspense and attractive. I finished reading it in few minutes (smiles…)"

Identified major areas of change

***Sexism*:** Reviewers reprimanded the case vignettes and illustrative drawings as portraits of female prejudice and promoters of male chauvinism. *"Qu: 19:9 … I want to comment about sexism. When we create awareness, we should not introduce a problem."*

***Isolationism and protectionism*:** The society encourages passive health communication. Parents follow similar suite and entertain absolute power over their sick child that favours religious and traditional treatment over medical treatment.

***Bullying*:** The reviewers depict peer victimization, harassment, and mistreatment as common practice. They urged including peer discrimination and stigma in the EEM.

Level of the materials: The reviewers commented to lower the level and omit some contents. *"QU: 9:27 the discussion under non-epileptic spells is confusing even for health professionals. I would remove that section to avoid misguiding the learners."*

***Format and structure*:** Many were confused about the purpose of teachers and health extension workers EEM. *"QU: 4:25 what is this material for? Is it job aid, supportive document or is it a training manual? I don't understand the intention of this material* (Table 2)*."*

Course delivery and implementation

R*eviewers u*niversally agreed to implement the EEM at primary school and to translate it into local languages. *"QU: 22:3 ….translation of the training material to a local language is mandatory. I am a true believer of mother tongue education..."*

Almost all reviewers suggested that the EEM should be owned by governmental institutions to ensure accessibility. The best middle ground suggestion was, "*QU: 22:3 the education and health sector intersect in this intervention ….both Ministries should cooperatively lead the intervention…"*

Role-play dramas, cartoon film, group discussion and storytelling were the suggested implementation strategies. *"QU: 22:5 … but for Ethiopia, it is important to know how much the curriculum is loaded and the required resources to incorporate the EEM into the curriculum. It is wise to start as a co-curricular activity …"*

Service users

Comment accommodation

Experts and stakeholders' comments were accommodated in the EEM scripts, case vignettes and illustrative drawings.

Table 2: Needed change themes and illustrative quotes: views from expert health professionals and stakeholders, Addis Ababa, Ethiopia 2018.

Theme	Illustrative Quotations
Sexism	"QU: 16:10 Hmm, Ha-Ha-Ha.., I don't know if it is me or if it is consensus… The examples and stories are a bit sexist. You know it is up to us to teach the society. Instead of saying the boy likes to play football and the girl likes to help her mom, I would rather say, 'They like to play and help their parents. Hmm… I don't know if it is me… Hmm"
Omission of cast lists	"QU: 19:15 The public education must include the issue of peer discrimination and stigma. For example the classmates of my nephew will call him by name and then jerk and shake mimicking his fits … Bullying is a big deal among school children. So this has to be addressed. They have to be supportive." "QU: 23:1 …… Ethiopian patients are not involved in health communication, especially when she/he is a child. No one asks them about their illness instead parents respond for them. This same thing has happened in this story. It revolves around parents than the epileptic children. I guess, 'I know this because I am an epileptic.' "
Omission of major malpractices	"QU: 19:12 the problem related to traditional healers or religious institutions doesn't necessarily have to be about physical injuries. Most parents keep their epileptic child at home 'to protect him/her from harm.' They don't take them to clinics instead they take them to church or holly water treatment."
Level of the material	"QU: 3:19 I have concern on the level of the material for teachers/HEW. Even after translated to a local language, I believe the facts mentioned thereof are very difficult to understand. There is a saying, 'When you plan a community awareness creation, plan to meet the level of a grade 6 student.' "
Format and Structure	"Q: 22:2 I read two materials… I am not sure about the purpose of each material. I mean, what are the competencies at the end of the training? This is not clear. If these are training manuals, the purposes and expected outcomes should be clearly stated." "QU: 6:21 the training manual preparation protocol has to be followed…. Content outline, objective and justification… timetable, trainee selection criteria, teaching methods, stakeholders responsibilities, and expectations and outcomes are not clearly stated… That's my observation."

Parents

Before training

Parents identified tonsillitis, epistaxis, flue, stomachaches and fainting illnesses as school health problems. *"QU: 15:8 … She faints frequently and awakens after sometime. Students with heart cases have tiredness, fast heartbeat, sweating, and unconsciousness."* Parents associated fainting with evil spirit, diabetes, hunger and heart disease. Commonly cited interventions were prayer, Holy water, soft drinks and smelling match smoke. *"QU: 15:17 … It is evil spirit because prayer and holy water makes them better…"*

After Training

Parents had extremely positive impression about the EEM. The training had brought change in their knowledge, attitude and practice. *"QU: 12: 33 Earlier I said, 'Epilepsy is evil spirit.' Now, I know it is a medical condition…"* They ranked the EEM excellent and suggested making it available to rural community, teachers, health professionals, traditional healers and mothers. *"QU: 15:32 … The pictorial presentation is attention-grabbing…translate it into different languages..."*

Teachers

Before training

Teachers identified fainting disease as the most difficult to handle. *"QU: 18:20 fainting is common at schools. "Arefa" or bubbles of saliva come out of their mouth."* Teachers think fainting to be caused by evil spirit, diabetes, hunger and heart disease. Commonly cited intervention were prayer, Holy water, soft drinks and smelling match smoke. *"QU: 18 23 …when she collapses, she always talks to someone invisible... to evil spirit. That is why we let them go to holy water."*

After Training

Teachers had extremely positive impression about the EEM. The training brought change to their knowledge, attitude and practice. *"QU17: 24 epileptic children can cope up with normal school environment. I used to believe it was necessary to send them to special school…"*

They ranked the training as good and suggested making it available to rural community, teachers, health professionals and mothers. *"QU: 18:40 it should be prepared in local languages and distributed to different schools ..."*

Students

Before training

Students were aware of 'fainting disease' before training. *"QU: 14:35 I saw a man fainting… shaking and saliva coming out of his mouth … They said, 'this is diabetes.' … He was then taken to a hospital and the doctor said, 'He is epileptic.' "* The students associated fainting to evil spirit, Diabetes, and hunger. Commonly cited interventions were prayer, Holy water, soft drinks and smelling match smoke. *"QU: 14:40 … When we recite the Quran on them, they get better… so it is spirit."*

After Training

Students had extremely positive impression about the EEM. *"QU14: 50 … one person can make a difference. … We can change our families and classmates... Earlier I said, 'Smelling match smoke could be the solution for epilepsy.' … But now, I have changed my mind ..."*

Students suggested the EEM to reach to teachers, rural community dwellers and traditional healers. *"QU: 13:52 … teachers mostly use water, sugar or soft drinks as first aid. …that is because they don't know about epilepsy."*

DISCUSSION

The applied experience-based framework design identified the strengths and weaknesses of the draft EEM. This design allowed experts and stakeholders to identify improvement priorities and to formulate and employ changes on the EEM. The FGDs reaffirmed the potentials of the EEM to bring the intended behavioural change among target audiences. The EEM were applauded for their cultural appropriateness, simplicity, novelty and problem-solving potential.

The objectives of EEM align with Article 4 of the United Nations Committee on the Rights of Persons with Disabilities (CRPD) that states people with disability are entitled to the full realization of human rights and fundamental freedoms without any kind of discrimination; and with Article 8 that urges governments to take speedy, real and suitable measures to educate the public in order to alleviate stigma and related practices to persons with disability(18)

Successful public epilepsy education awareness program should engage all stakeholders. (19) The Experience- based co-design processes engaged stakeholders from AAU, MoH, *CareEpilepsy Ethiopia* (epilepsy patients' society of Ethiopia),MoE, human rights expert and EMA and the media. *"RQU:22:18 study conducted by the African Child Policy Forum in Ethiopia revealed ….where there was disabled people's organizations support, community leaders reported positive attitudinal changes throughout their communities."* (20).

The principles of experience- based co-design identified strengths and weaknesses of the EEM and allowed experts and stakeholders to identify improvement priorities and to formulate and employ changes. The experts correctly identified major areas of needed changes to the EEM: sexism, omissions of cast lists and omission of major malpractices that are commonplace in Ethiopia. *"RQU: 22:9: … Surveys conducted in Cameroon, Ethiopia, Senegal, Uganda and Zambia disclosed that 38% of respondent caregivers of children with disabilities reported hiding them away, or forbidding them to take part in social activities owing to stigma or in order to protect them from perceptions of stigmas. ... For example, fear and ignorance about the causes of epilepsy can result in exclusion from school for children with seizure disorders."* (20).

The EEM shares the values recommended in the fight against epilepsy stigma: empowering PWE, sensitizing and educating the public, designing school based interventions, undertaking law and policy reforms, active reporting of human rights violation against PWE, and making integrated epilepsy treatment affordable and accessible(3,12-15,21).

Challenges for scaling-up neuropsychiatric care in Ethiopia include lack of proper documentation, lack of properly trained health professionals, shortages of essential drugs and low level public literacy (22). The optimized EEM is hoped to cascade public epilepsy education program in two arms: to health extension workers, community health practitioners, and mothers; and to teachers and primary school students (Figure 2). Follow-up pilot and large-scale implementation trails as proposed will help clarify the potential of the EEM to alleviate epilepsy misconception and treatment gap in Ethiopia.

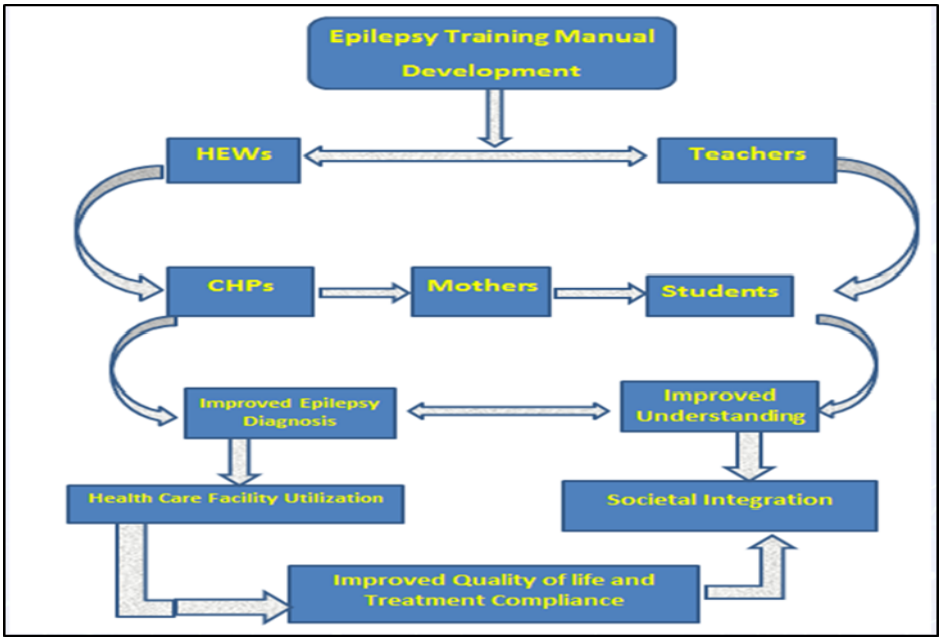

Figure 2: Conceptual model depicting how health education will cascade in the community and impact epilepsy treatment gap and stigma, 2018.

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Competing Interest

The author declare that this manuscript was approved in its current form and that no competing interest exists.

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Yitbarek Fantahun, Shemse Sebre, Aminu Seman, Solomon Kumbi. *Ethiop Med J, 2020, Vol. 58, Supp. 2*

ORIGINAL ARTICLE

MATERNAL VAGINAL COLONIZATION OF GROUP B STREPTOCOCCUS AND NEONATAL TRANSMISSION DURING DELIVERY IN A REFERAL HOSPITAL IN ADDIS ABABA

Yitbarek Fantahun, MD[1*], Shemse Sebre, MSc[2], Aminu Seman, MSc[2], Solomon Kumbi, MD[1]

ABSTRACT

Introduction: *Streptococcus agalactiae or Group B Streptococci frequently colonizes the human genital and gastrointestinal tract and a risk factor for subsequent infection in pregnant women and newborns. The study was conducted to determine the prevalence of maternal vaginal colonization of Group B Streptococci during delivery, transmission rate to the newborns, to identify the possible risk factors and determine the antimicrobial susceptibility pattern of Group B Streptococci isolates.*

Methods: *A cross-sectional study design was used to enroll 250 pregnant women coming for delivery at Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia. Both maternal vaginal and neonatal oropharyngeal swabs were collected and inoculated onto CHROMagarTM StrepB and 5% sheep blood agar plates. Isolates were identified based on the mauve color on GBS CHROMagar, colony morphology, gram reaction and hemolysis on 5% sheep blood agar. Antimicrobial susceptibility testing was performed by using Kirby–Bauer disk diffusion method according to the Clinical Laboratory Standard Institute guidelines.*

Results: *The overall prevalence of GBS colonization among the participants was 23.6% with a transmission rate to the newborns of 47.4%. Group B Streptococci colonization was significantly associated with occupation and parity ($p< 0.05$) GBS isolates had significantly high resistance level to cefepime (59.4%) and penicillin (57.7%). Highest susceptibility to vancomycin (93.3%), clindamycin (86.4%) and chloramphenicol (79.6%) were observed.*

Conclusions: *There was high rate of maternal colonization and maternal to child transmission of Group B Streptococci with resistance to commonly used antibiotics.*

Keywords*: Antimicrobial susceptibility, Group B streptococcus, Intra-partum antibiotic prophylaxis, maternal colonization*

INTTRODUCTION

Maternal mortality is unacceptably high worldwide. Every day, approximately 830 women die from preventable causes related to pregnancy and child birth. Ninety nine percent of all maternal death occurs in developing countries and it is significantly higher in women living in rural and poorer countries. Majority of deaths occur because of bleeding, infections, high blood pressure, obstructed labor and unsafe abortion (1).

Streptococcus agalactiae (Group B streptococcus; GBS) is one of the leading causes of neonatal sepsis and meningitis. GBS is also associated with preterm labor or membrane rupture, as well as urinary tract infections, postpartum endometritis, postpartum wound infection, septic pelvic thrombophlebitis and endocarditis in females (2).

The vagina and the perianal regions are the major reservoirs for GBS, and the colonization of these regions is a risk factor for subsequent infection in pregnant women and newborns (3). About 50-60% of infants born to colonized mothers have positive GBS cultures from skin and mucous membranes, and 1-2% of these colonized newborns develop invasive GBS infection (4). Colonization of pregnant women by GBS is major risk factors for maternal as well as neonatal infections which contribute significantly to maternal as well neonatal death. It has a significant risk for adverse obstetric outcomes (5-7).

GBS causes two types of infections in neonates, early onset disease which occur during the first week of life, within the first 24 - 48 hours after birth and late onset disease which occurs after the first six days of life. In addition, colonized females may get infections including urinary tract infections, endometritis or chorioamnionitis (8-9).

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Studies from different part of Ethiopia showed high carriage rate of GBS among pregnant women. However, further epidemiological investigations is required in different parts of the country in order to know the actual GBS colonization rate of pregnant women and to consider the possibility of implementing prophylactic treatment to prevent potential adverse maternal and neonatal outcomes 10-12).

There are many potential opportunities for reducing the burden of early onset neonatal bacterial and maternal sepsis. However, the benefit of package of interventions can only be maximized if devised using high quality, reliable data on the burden and causes of morbidity having local data. Moreover, Intrapartum antibiotic prophylaxis (IAP) also raises concerns about emerging antimicrobial resistance and neonatal microbiome development (13). So there is a need to conduct this study. The objectives of the study were to determine the prevalence of maternal vaginal colonization of GBS, transmission rate to the newborns, associated risk factors and determine the antimicrobial susceptibility pattern of GBS isolates.

PATIENTS AND METHODS

A cross-sectional study was used to determine the prevalence of maternal GBS colonization and neonatal transmission rate during delivery and postpartum at Tikur Anbessa Specialized Hospital (TASH), in Addis Ababa, Ethiopia. The sample size was calculated by using the single population proportion estimation formula by taking 20.6% prevalence (p) of maternal colonization with GBS (14). Considering 5% non-response rate the final sample size become 257 pregnant women coming for delivery were included. After written informed consent was obtained from study participants and assents from parents or guardians for newborn infants was obtained, vaginal swabs were collected from the mucosa of the lower third of the vagina without using a speculum as per CDC recommendations and oropharyngeal swabs were collected from the newborn immediately after delivery by the attending midwife (15). The swabs were placed in Stuart transport media (DIFCO) and transported immediately to the post graduate Bacteriology laboratory of the Department of Microbiology, Immunology and Parasitology, Addis Ababa, University.

Inclusion criteria: All consenting pregnant women during labor. Pregnant women with history of antibiotic(s) use within two weeks prior to recruitment, premature rupture of membranes (PROM), active vaginal bleeding, and women with emergency obstetric conditions which need immediate interventions were excluded.

The study protocols were ethically approved by Institutional Review Boards (IRBs) of the College of Health Sciences, Addis Ababa University. Written informed consent was obtained from study participants while assents from parents or guardians for newborn infants were obtained. Identified GBS isolates and their antimicrobial susceptibility pattern results were reported to the attending physician for subsequent treatment and follow up.

Socio-demographic data collection

Demographic data was recorded, including age, marital status, occupation, monthly family income, level of education using a well-designed questionnaire.

Obstetrics factors data collection

Gravidity and parity, history of abortion, gestational age of current pregnancy, number of ANC visit, use of hormonal contraceptives, sex of the baby, weight of the baby, first minute APGAR and fifth minute APGAR also taken from study subjects.

Specimen processing and identifications of GBS

The swab(s) were removed from transport medium and inoculated into CHROMagar TM StrepB base (CHROMagar microbiology, France) and 5% sheep blood agar plates (Oxoid, UK). The inoculated CHROMagar TM StrepB was incubated in aerobic conditions at 37°C for 18-24 hours. On the other hand, the inoculated sheep blood agar medium was incubated aerobically at 35–37 ^{o}C for 18–24 h in 5% CO_2. After incubation period, plates were examined. The suspected GBS colonies on CHROMagar TM StrepB were mauve appearance and on blood agar β-haemolytic and non-haemolytic were picked and sub-cultured onto sheep blood agar and incubated aerobically at 35–37 ^{o} C for 18–24 h in 5% CO_2. A known GBS (ATCC 27956) as a positive control and *Enterococcus faecalis* (ATCC 29212) as a negative control was also streaked along with the samples. GBS isolates were further identified by using conventional methods such as Gram staining (Gram-positive cocci arranged in chains), Catalase test (negative), CAMP test on blood agar (positive), hippurate hydrolysis (purple color), Bacitracin disk (resistant) and latex agglutination test with specific antisera (Strepto B latex kit, Liofilchem, Italy) (2,11,16).

Antimicrobial susceptibility testing

Antimicrobial susceptibility testing of GBS isolates were performed with seven antibiotics (Oxoid, UK) based on the Kirby-Bauer disk diffusion method on 5% sheep blood containing Mueller-Hinton agar (Oxoid, UK).

The following antibiotic discs and concentrations were selected according to Clinical Laboratory Standards Institute (CLSI) guidelines: penicillin G (PEN, 10IU), ampicillin (AMP, 10 µg), clindamycin (Da, 2 µg), erythromycin (ERT, 15 µg), chloramphenicol (CAP, 30 µg), cefepime (FEP, 5 µg) and vancomycin (VAN, 30 µg). *Streptococcus pneumoniae* ATCC 49619 was used as quality control strain. Plates were incubated at 35 ◦C for 24 h in 5% CO_2, and the diameters of zone of inhibition were measured and results interpreted as sensitive, intermediate and resistant according to CLSI guideline (17).

Statistical Analyses

Data were entered, cleaned and analyzed using SPSS Statistical Software version 25 (IBM company, Comp.soft-sys.stat.spss.). Qualitative data were described using number and percent. Quantitative data were described using mean, standard deviation. Associations between independent and dependent variables were computed using bi-variate analysis. Differences were considered statistically significant for P-value ≤ 0.05, used to evaluate the association of GBS colonization and socio-demographics or clinical obstetric variables

RESULTS

Socio-demographic Characteristics

A total of 250 pregnant women were included in the study. The age were between 18 to 40 years with a mean of 26.42 (4.99) years. Most (53.6%), of the participants were between the age of 25 – 35 years, while 35.6 % and 27 (10.8%) where in age range of less than 25 and above 35 respectively. The majority of the participants was housewives with 194(77.6%) participants and followed by civil servant 23(9.2%) business women 20(8%) and students 13 (5.2%) (Table 1).

Obstetric characteristics and outcome of pregnant women at term

Fifty two percent of the participants were nulliparous, followed by women who are para 2 - 4 which was 108 (43.2%) and grand multiparous was 12 (4.8%). Fifty participants (20%) had history of abortion and 1.9% of parous women had history of stillbirth. Sixty percent of the participants were with gestational age (GA) 40 and above and the rest 37.6% were below 40 weeks GA. Around 96% had ANC follow up four and above. Three fourth of the participants had a history of hormonal contraceptives usage. From all 250 delivery 52% were male and 48% were female with birth weight ranging 2.3 to 4.5kg with a mean birth weight of 3.23kg, there were 12(4.8%) babies weighing <2.5 kg, 221(88.4%) babies weighing 2.5 to 4kg and 17 (6.8%) were babies weighing >4 kg. Majority of babies had APGAR score of ≥ 7 in first and fifth minute with 246(96.8%) and 248(99.2%) respectively and only 4 (3.2%) and 2 (0.8%) had APGAR of < 7 at first and fifth minute (Table 2).

Table 1: Socio-demographic characteristics of pregnant women (n=250) at TASH, Addis Ababa, Ethiopia, 2018.

Characteristics	Frequency	Percent
Age group		
< 25	89	35.6
25-35	134	53.6
> 35	27	10.8
Marital status		
Single	10	4
Married	240	96
Occupation		
House wife	194	77.6
Civil servant	23	9.2
Student	13	5.2
Business women	20	8
Educational status		
No formal education	83	33.2
Elementary school	99	39.6
High school	41	16.4
Collage	27	10.8

Table 2: Obstetric characteristics of pregnant women at term at TASH Addis Ababa, Ethiopia, 2018.

Obstetric factors	Frequency	Percent
Gravidity and parity		
Nulliparous	130	52
Para 2 – 4	108	43.2
Grand multiparous	12	4.8
History of Abortion		
Yes	50	20
No	200	80
History of still birth		
Yes	3	1.9
No	151	98.1
Gestational age of current pregnancy		
37 – 39+6 weeks	94	37.6
40 – 42 weeks	156	62.4
Number of ANC b visit		
< 4	11	4.4
Four and above	239	95.6
Use of hormonal contraceptives		
Yes	193	77.2
No	156	22.8
Sex of the baby		
Female	120	48
Male	130	52
Weight of the baby		
<2.5kg	12	4.8
2.5 -3.99 kg	221	88.4
4 kg and above	17	6.8
First minute and fifth minute APGAR a		
<7	2/4	1.6 / 0.8
Seven and above	246/248	96.8/ 99.2

APGAR [a]: Appearance, Pulse, Grimace, Activity, Respiration, ANC[b]: Antenatal Care

Prevalence of maternal GBS colonization and neonatal transmission rate

The overall prevalence of GBS colonization as determined by chromogenic culture among 250 pregnant women at term during labor was 59 (23.6%). On the other hand, a total of 250 samples from the babies were taken and over all 44 babies found to have positive culture for GBS and of this 28 babies were born from mothers with positive GBS culture with a transmission rate of 47.4 %. In our study, we have found that 15 babies born from GBS negative women were found to have positive culture for GBS.

Associated risk factors for GBS colonization and transmission

The association of the social-demographic factors with GBS colonization and transmission is demonstrated on (Table 3). There was no significant association between age group, marital status, income and educational status with GBS colonization rate ($p>0.05$). However, being a house wife is significantly associated with lesser risk of positivity for GBS ($p=0.024$).

Table 3: Association of GBS and socio-demographic factors of pregnant women at term at TASH, Addis Ababa, Ethiopia, 2018.

Characteristics	GBS n (%) Present	Absent	Total	P-value a	COR b	AOR c
Age Group						
< 25	24 (40.7)	65 (34)	89	0.623	1.292[0.466 –3.587]	1.132 [0.388 – 3.308]
25-35	29 (49.2)	105 (55)	134	0.947	0.967[0.357 –2.617]	0.899 [0.317 – 2.552]
> 35	6 (10.2)	21 (11)	27		1	1
Marital status						
Non married	2 (3.4)	8 (4.2)	10	0.785	0.803[0.166 –3.888]	0.728 [0.129 – 4.117]
Married	57 (96.6)	183 (95.8)	240		1	1
Occupation						
House wife	44 (74.6)	150 (78.5)	194	0.024	0.545[0.205 –1.449]	0.219 [0.064 – 0.754]
Civil servant	6 (10.2)	17 (8.9)	23	0.527	0.655[0.177 –2.424]	0.885 [0.135 – 5.811]
Student	2 (3.4)	11 (5.8)	13	0.228	0.338[0.058 –1.972]	0.202 [0.030 – 1.351]
Business women	7 (11.9)	13 (6.8)	20		1	1
Educational status						
No formal education	22 (37.3)	61 (31.9)	83	0.658	1.262 [0.451 -3.536]	2.602 [0.316 – 21.432]
Elementary school	25 (42.4)	74 (38.7)	99	0.746	1.182[0.429 –3.260]	2.031[0.271– 15 232]
High school	6 (10.2)	35 (18.3)	41	0.425	0.600[0.171 –2.103]	0.985 [0.121 – 8.040]
Collage and above	6 (10.2)	21 (11)	27		1	1

calculated by using binary logistic regression [a]; Crude odds ratio [b], adjusted odds ratio [c,] 1- Reference Group

3.4. Association of obstetrics factors and colonization and transmission of GBS isolates

The results of our study showed that primigravid women had 27.6 % risk of being colonized by GBS as compared to multiparous (para 2 -4) and grand multipara women's which showed 16.6% and 41.6% rate of colonization respectively and it showed that being para 2 -4 has lesser risk for colonization by GBS. It was also seen that women with history of abortion had 22% rate of colonization as compared to those women with no recent history of abortion which was 24.4% but there was not a statistically significant difference between the two groups (p>0.05).

Women who's GA were between 37 – 40 weeks had a colonization rate of 25.5% as compared to women with GA above 40 which was 22.4% of transmission (p>0.05). Moreover, there was no significant association between GBS colonization rate with Obstetrics factors **(**ANC follow up, history of use of hormonal contraceptives, sex of the baby, weight of the baby and babies having APGAR) (p>0.05) (Table 4).

Table 4: Association of GBS and obstetric factors and neonatal transmission of pregnant women at term at TASH, Addis Ababa, Ethiopia, 2018.

	GBS n (%)		Total	P-value b	COR c	AOR d
Obstetric factors	**Present**	**Absent**				
Gravidity and parity						
Nulliparous	36 (61)	94 (49.2)	130	0.313	0.536[0.160– 1.798]	0.507[0.123-2.092]
Para 2 -4	18 (30.5)	90 (47.1)	108	0.047	0.280[0.080– 0.981]	0.284[0.079-1.013]
Grand multiparous	5 (8.5)	7 (3.7)	12		1	1
History of Abortion						
Yes	11 (18.6)	39 (20.6)	50	0.333	0.470[0.102– 2.167]	1.004[0.275-3.662]
No	48 (81.4)	152 (79.4)	200		1	1
Gestational age of current pregnancy						
37 – 39+6 weeks	24 (40.7)	70 (36.6)	94	0.577	1.185 [0.652 -2.153]	1.261[0.6692.379]
40 – 42 weeks	35 (59.3)	121 (63.4)	156		1	1
Number of ANC visit						
Less than four	1 (1.7)	10 (5.4)	11	0.272	0.312[0.039– 2.490]	0.268[0.033-2.209]
Four and above	58 (99.3)	176 (94.6)	234		1	1
Use of hormonal contraceptives						
Yes	44 (74.6)	149 (78)	193	0.583	0.827[0.419– 1.630]	
No	15 (25.4)	42 (22)	59		1	1
Sex of the baby						
Male	27 (45.8)	103 (53.9)	130	0.288	0.728[0.405– 1.308]	0.660[0.357-1.219]
Female	32 (54.2)	88 (46.1)	120		1	1
Weight of the baby						
Less than 2.5kg	2 (3.4)	10 (5.2)	12	0.655	0.650 [0.098 -4.290]	0.502[0.067-3.772]
2.5 -3.99 kg	53 (89.8)	168 (88)	221	0.966	1.025 [0.321 -3.279]	1.207 0.352-4.143]
4 kg and above	4 (6.8)	13 (6.8)	17		1	1
First minute APGAR a						
≤7	2 (3.4)	2 (1)	4	0.236	3.316[0.457– 24.069]	8.042[0.391-165.456]
Seven and above	57 (99.6)	189 (99)	246		1	1
Fifth minute APGAR						
< 7	1 (1.7)	1 (0.5)	2	0.404	3.276 [0.202 -53.194]	0.429[0.006–29.488]
Seven and above	58 (98.3)	190 (99.5)	148		1	1

*APGAR [a]: Appearance, Pulse, Grimace, Activity, Respiration, [b] calculated by using binary logistic regression; Crude odds ratio [c], adjusted odds ratio [d,] 1-Reference Group

3.5. Antimicrobial susceptibility patterns of GBS isolates

Of the 59 identified GBS isolates, the highest resistance level was recorded to cefepime (59.4%) followed by penicillin (57.7%) and ampicillin (54.3%). The most active drugs for GBS isolates were vancomycin, clindamycin and chloramphenicol with susceptibility results of 93.3, 86.4, and 79.6%, respectively. Moreover, 3(5%) isolates of GBS isolates showed intermediate sensitive to erythromycins and chloramphenicol for each (Table 5).

Table 5: Antimicrobial susceptibility patterns of 59 GBS isolates at TASH, Addis Ababa, Ethiopia, 2018.

	No. (%) of isolates (CLSI, 2018)		
Antibiotics	**Susceptible**	**Intermediate**	**Resistant**
Penicillin G	42.3% (25/59)	-	57.7% (34/59)
Ampicillin	45.7% (27/59)	-	54.3% (32/59)
Cefepime	40.6% (24/59)	-	59.4% (35/59)
Erythromycins	64.4% (38/59)	5% (3/59)	30.6% (18/59)
Chloramphenicol	79.6% (47/59)	5% (3/59)	15.4% (9/59)
Vancomycin	93.3% (55/59)	-	6.7% (4/59)
Clindamycin	86.4% (51/59)	-	13.6% (8/59)

DISCUSSIONS

The overall prevalence of GBS colonization in this study was (23.6%). Our results were comparable with other reports in different parts of the world where GBS colonization was found to be (21%) in studies conducted from Netherland (18) and Portugal (24.4%) (19). It is also relatively comparable result were reported in African countries such as Zimbabwe (21%) (21) and South Africa (30.9%) (22). However, the finding of this study is lower when compared to colonization rate from US (41%) (20). Moreover, different regions of Ethiopia showed different figures of antepartum colonization such as in Jimma (19%) (10), Tigray (11.3%) (23), and two studies in Addis Ababa (7.2%) (12) and (14.4%) (24). All the observed difference in colonization rate of GBS could be due to geographical differences, study design, year of study, sample size difference and laboratory methods used.

Assessment of antepartum vaginal GBS colonization is used as an indirect measure of intrapartum colonization rate and intrapartum assessment will give us a clear picture of rate of colonization as well as the neonatal transmission (4,22), thus this study was performed to assess the intrapartum colonization rate and it is showed that, intrapartum colonization rate was found to be (23.6%). Even though, there were no data on intrapartum colonization of GBS in Ethiopia. Comparable results were reported in elsewhere in Zimbabwe (21%) (21), Iran (20.6%) (14) and Portugal (24.4%) (25).

Identifying risk factors and reducing risk is one of the most important steps in prevention of maternal and neonatal GBS colonization (13). In the present study, risk factors associated with maternal and newborn GBS colonization rate was determined; however, most of the variables were not significant association between maternal and neonatal GBS colonization rate and measured risk factors was found ($P>0.05$).

In the current study, we have found that 15 babies born from GBS negative women were found to have positive culture for GBS. This could be explained by that the hospital environments including medical equipment such as monitors and other high touch surfaces have been implicated as the source, indirect transfer of GBS from infant-to-infant transmission via contaminated hands of health care workers especially from newborn units also involved (26,27). However, hand hygiene and environmental cleaning can render healthcare associated late onset GBS disease preventable as well (27,28).

In our study, only occupation and parity were significantly associated with GBS colonization and being house wife has decreased risk of GBS colonization. Moreover, para 2-4 has decreased risk of colonization.

In contrast to our results studies conducted in USA showed that socio-demographic factors such as occupation, race, higher BMI, higher income, and higher education of pregnant women showed significant association with GBS colonization where as women who smokes has less risk of GBS colonization (29). Comparable with our results, studies conducted in different countries such as Brazil [30], Thailand [31], and Netherland (32) there was no association between studied socio-demographic factors and GBS colonization among pregnant women.

In our study, highest resistance level was recorded to cefepime (59.4%) followed by penicillin (57.7%) and ampicillin (54.3%). It could be explained by that the ease of access of this antibiotics in the study setting, the frequent use of antibiotics for therapy and prophylaxis. Such findings coincides with studies conducted in Addis Ababa (penicillin 55% to 81.5%), ampicillin (86% to 91%) (12).

The most active drugs for GBS isolates were vancomycin, clindamycin and chloramphenicol with susceptibility results of 93.3, 86.4, and 79.6%, respectively. Our results were comparable with studies conducted in elsewhere such as from India (33), Zimbabwe (21), Jimma (10) and Addis Ababa (24). These antibiotics are not recommended for routine intrapartum antibiotic prophylaxis in Ethiopia. Therefore, the sensitivity pattern of commonly used antimicrobials like penicillin, ampicillin, showed less sensitive; it account less than 50% which calls for routine culture and sensitivity test and revision of the antibiotics recommendation for GBS colonized mothers in an area with no facility for culture and sensitivity test.

Conclusion

Our results showed high prevalence of GBS colonization among pregnant women in Addis Ababa, Ethiopia. The study also showed 47.4% transmission of GBS from mothers with positive vaginal colonization for GBS. GBS colonization by the mothers and transmission to their offspring showed statistical significant association with occupation and parity. High level of resistance was observed to commonly prescribe antimicrobial agents.

Recommendation

The high rate of maternal GBS colonization and high rate of maternal to child transmission of GBS calls for universal screening of pregnant women during gestational age of 35 -37 weeks. The low sensitivity and high resistance to the commonly used antibiotics calls for routine test for antibiotics susceptibility before administration of antibiotics.

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Competing Interest

The authors declare that this manuscript was approved by all authors in its current form and that no competing interest exists.

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ORIGINAL ARTICLE

THE PATTERN OF PEDIATRIC TRAUMA IN AABET HOSPITAL:A CROSS-SECTIONAL STUDY USING TRAUMA REGISTRY

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ABSTRACT

Introduction: *Child injuries are a growing public health problem yet it remains overlooked in resource-limited countries.*
Objective: *We aim to assess the patterns, clinical presentation, and outcome of childhood injuries among children visiting the emergency department of AaBET Hospital, Addis Ababa, Ethiopia using a trauma registry form.*
Methods: *A cross-sectional study was conducted on pediatric injuries at the AaBET Hospital Emergency department between December 2017 to May 2018. Data were collected prospectively with a trauma registry form which priory prepared and tested 6 months before this study in the same hospital. The data were entered and analyzed using SPSS version 20 software using analytic and descriptive parameters. Pediatric trauma score and disposition from the emergency room was taken as the assessment of severity.*
Results: *In this study, 407 children aged less than or equal to 18 were included and 280(68.8%) were males. The majority of injuries were road traffic injuries 162 (39.8%) followed by falls 105 (25.5%). 78.6 % of the Road traffic injury occurred on pedestrians. Only 109(26.8%) of injured children arrived at AaBET Hospital via ambulance, only 25 (6.1%) received emergency care before arrival. 136 (33.4%) arrived after 24 hours of the injury with a mean arrival time of 1.7 days post-injury. Pediatric severity trauma score (PST) was only assessed in 211 patients there are only 5 patients who have PST score of < 8. Age between 5 to 12 [AOR = 1.91, 95% CI (1.12-3.24)] and Head injury [AOR= 1.82, 95%CI (1.06, 3.12)] are more likely to be admitted than those who are not.*
Conclusion: *Road traffic accidents are the most frequent injury and most injuries occurred in pedestrians. Use of Ambulance service and pre-hospital care, timely presentations are low. Adequate and comprehensive public education and significant improvement in advanced trauma services with improved prehospital services is imperative.*
Keywords*: Injuries, Childhood, Ethiopia, Trauma*

INTRODUCTION

Childhood injuries are a major public health problem (1). Worldwide about one million children under the age of 18 years are estimated to die annually; more than 2000 children per day (2). The majority of these childhood trauma-related injuries and deaths are the result of road traffic collisions and the cause of death is mostly due to severe head injury (1,3). Over 80% of the injury, deaths in children occur in low and middle-income countries (LMIC) (4,5). Globally the road traffic death rate among children is 10.7 per 100,000, while in the African region it is almost double at 19.9 per 100,000 (6).

Although road traffic collisions are the primary cause of trauma-related deaths in children, falls are also an important cause of morbidity and mortality (7). Children are vulnerable populations, suffering from a particularly high number of fall injuries and subsequent disabilities.

Yearly 2.8 million children < 5 years old visit an emergency room due to fall-related injuries (7). As with road traffic collisions, LMIC, especially in Africa are disproportionately affected (1,8).The epidemiology and pattern of injuries in children vary from one country to another based on socio-economic status, geographical and population-related characteristics (9). Considering that many injuries are preventable, understanding the country-specific pattern of injuries is necessary for formulating policy and instituting preventive measures (10).

Little is known in Ethiopia about the epidemiology of injuries in children. Contrary to the idea the road traffic injuries account for a majority of childhood injuries, in South West Ethiopia, injuries other than car collisions accounted for 82.2% of all cases (11). While the Ethiopian health sector program provides great attention to injuries and violence, without comprehensive data on the patterns and magnitude of injuries, it is difficult to set priorities (11,12).

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The purpose of this study is to further characterize the pattern of childhood injuries and factors associated with these injuries among children in Ethiopia using a pre-prepared trauma registry.

PATIENTS AND METHODS

Study Setting: This study was conducted in Addis Ababa Burn, Emergency and Trauma (AaBET) hospital. AaBET Hospital is the first dedicated Emergency and Trauma hospital in Ethiopia located in the capital city. AaBET hospital is an affiliated hospital of St. Paul's hospital millennium medical college. The hospital provides services in emergency and critical care, orthopedics, neurosurgery, general surgery and burn.

Study Design and Population: This was a cross-sectional study. The source population is all emergency patients seen at the Aabet hospital. The study population was all injured children below or equal to 18 years old who were observed or admitted at the hospital of the study setting during the time of December 2017 to May 2018. Children less than one month were excluded from the study, as the cause of injury in this age group is mostly birth-related and those charts with incomplete records.

Sample size determination: The sample size was drawn by using formula

$$n = \frac{[Z_{1-\alpha/2}]^2 p(1-p)}{D^2}$$

Where:

n = the minimum sample size required

P= estimated prevalence rate of the population

D= the margin of tolerance

Z= the standard normal variation at confidence level and α is mostly 5% with 95% confidence level

The minimum sample size required was obtained by taking a prevalence rate of 50% (0.5) Taking the prevalence of child injury 50% (in absence of previous study in the same setting) and confidence interval of 95% and the margin of error is 5% (0.5).

The sample was calculated as

$$n = \frac{[1.96]^2 0.5(1-0.5)}{(0.5)^2} = 384$$

Considering a 10% incomplete data rate finally, the sample size of 423 was calculated but after clearing the data, we used 407 patients. All patients less than or equal to 18 years old presenting to AaBET Hospital with injury were included during the study period until the sample size reached.

Data Collection: Data elements collected were modeled after standardized data elements proposed for pediatric trauma registries by the World Health Organization was modified and tested 6 months before the start of the study in the same hospital, the required adjustment was done, and the final version was the one used on all the patients.

Data included demographics, injury characteristics, and physical exam findings at presentation. These data were maintained in a trauma registry. General practitioners trained in the process of data collection were responsible for obtaining data and maintaining the trauma registry. The emergency department log was examined each day to identify patients presenting with traumatic injuries over the last 24 hours.

Data Management: Data were entered into SPSS version 20. The investigators were strictly following the data collection process and were checking for completeness of data daily.

Data Analysis: Data were entered and analyzed using SPSS version 20. Severity was defined using a pediatric trauma score (13). We classified the severity of the patients using a pediatric trauma score (PTS) and looking disposition of the patient (considering admitted are sever compared to not admitted) to the hospital. The Glasgow coma scale (GCS) used to define severity for Head injury (14).

Descriptive analyses of independent variables (gender, age, categories of injuries, clinical presentation and duration of injuries, and outcomes) reported as number, percentages, and mean ± standard deviation. A bivariate logistic regression analysis was performed to assess the association of various predictors with the outcome of interest; severity of childhood injury.

Multivariate logistic regression analysis was performed to assess the association of combinations of predictors with severity. A P-value <0.05 and 95% confidence intervals were used to test for statistical significance.

Ethical Considerations: the Institutional Review Board of St Pauls Hospital Millennium College approved this study. Data retrieval forms were made anonymous. The data were kept in a secure place and did not transfer to a third person.

RESULTS

During the study period there were 8,520 patients seen in the emergency department of AaBET hospital. Of these, 6,700 were seen for traumatic injuries where 594 of the trauma patients were <18 years of age. Four hundred and seven medical records were completed and utilized who fulfilled the eligablity crateria were taken till the sample size reached (Table 1) and 284 (69.8%) were males.

The mean age was 11.7 ± 5.1 years. While most of the patients arrived at the hospital within 24 hours of injury, 134 (33%) presented more than a day after the injury. Socio-demographic factors of the patients are presented in Table 1.

Table 1: Demographic characteristics of patients AaBET Hospital, Addis Ababa, Ethiopia, December 2017 to May 2018 (n=407).

	Number (407)	Percentage (%)
Age (years)		
< 5	65	16.0
5 – 12	138	33.9
13-18	204	50.1
Region of residence		
Addis Ababa	200	49.1
Oromia	166	40.8
SNNPR	16	3.9
Amhara	7	1.7
Other	18	4.3
Transport		
Scene	164	40.3
Transfer	230	56.7
Unknown	13	3.2
Place of injury		
Home	81	19.9
Street	184	45.2
School	8	2.1
Public building	6	1.6

The major mechanisms of injury were road traffic accidents (RTA) 162 (39.8%), falls 105 (25.8%), physical assaults 71 (17.4%) and burn account 20 (4.9%) (Table 2). The majority of RTA injuries 130 (80.2 %) pedestrians, 27 (16.7%) passengers and 5 (3.1%) on drivers.

Vehicles involved for RTA were by car 139 (85.8%), 10 (6. %) bicycle, Bajaj (tricycle motor), 9 (5.6%) motorbikes, 3 (1.8%) and cart 1 (0.6%). The five drivers who sustained RTA which includes 3 by bicycle and 2 by automobile (with age 17 years and 18 years old). There was a marked age variation in the different injury mechanisms (Figure 1).

Males accounted for the majority of injuries in all categories of injury except burns, where the gender distribution was even seen (Figure 2). Around 108 (26.5%) of injured children used an ambulance for transportation to the hospital but only 27 (6.6%) of the injured children received pre-hospital care from the scene and on the way to the transportation to the hospital.

One-third of 136 (33.4%) of the cases arrived at AaBET Hospital after 24 hours of the injury. For those who had a neck collar that is 152 patients only 4 had at prehospital, 1 scene, 3 in the ambulance.

Table 2: Mechanism, nature and severity of injured AaBET Hospital, Addis Ababa, Ethiopia, December 2017 to May 2018 (n=407).

Variables	Frequency	Percentage (%)
Mechanism of injury		
Road Traffic collision	162	39.8
Fall down	105	25.8
Physical assault	71	17.4
Burn	20	4.9
Hit by object /machine	19	4.7
Animal related kick	10	2.5
Hit by falling stone	9	2.2
Gun shot	6	1.5
Other	5	1.2
Types of Road Traffic Accident		
Pedestrian RTA	121	78.6
Passenger	28	18.2
Driver	5	3.2
Triage category		
Red	5	1.2
Orange	22	5.4
Yellow	307	75.4
Green	28	6.9
Not documented	45	11.1
Injury to Arrival to hospital (hr)		
Within 24 hour	271	66.6
Greater than 24 hour	136	33.4
Head Injury severity by GCS (n=101)		
Mild	78	77.2
Moderate	18	17.8
Sever	5	4.9
Disposition from ED		
Home from the Emergency room	291	71.5
Admitted to the hospital ward	110	27.0
Admitted to ICU	5	1.2
Death	1	0.2

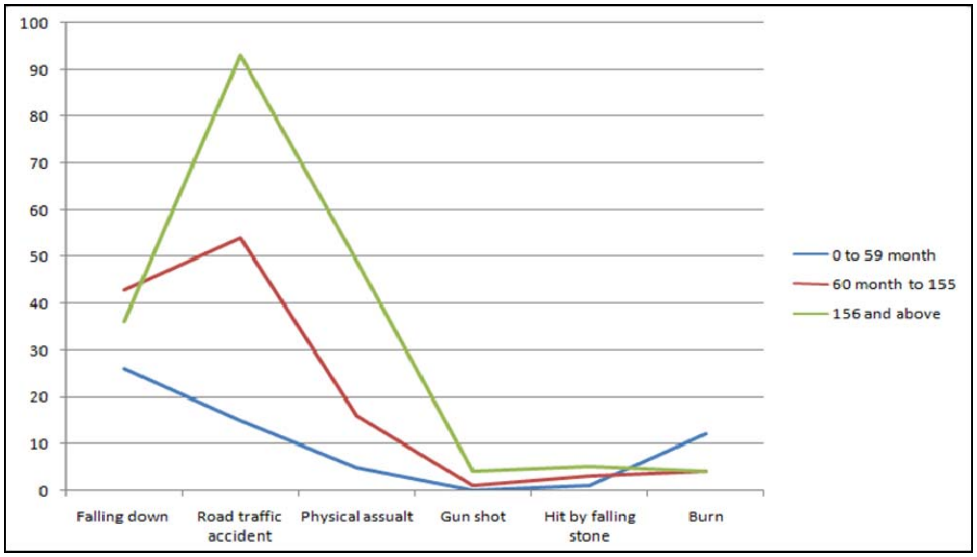

Figure 1 : Injury type by age category at Aabet

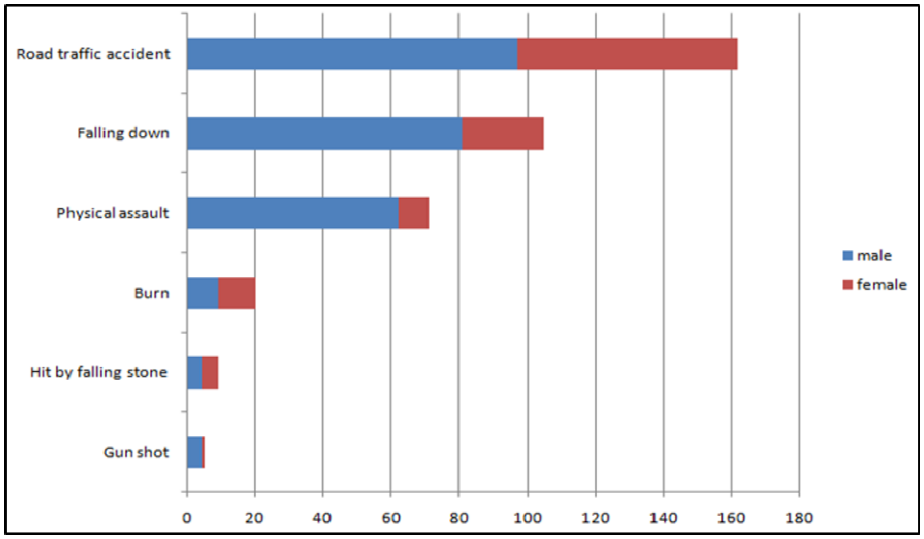

Figure 2: Distribution of mechanism of injury by sex of the pa

Most patients had isolated injuries, only 3% had multiple injuries. The site of Injuries was head injury 101 (25%), extremity 113 (28%), and abdominal134 (33%).

Of the patients with head injuries, the severe head injury with GCs < 8 was five (4.9%) of all injuries that occurred (Table 3).

Table 3: Trauma severity using disposition from the emergency room

Characteristic		Disposed At Home		Disposed not home	Crude OR (95% CI)	Adjusted OR (95% CI)
Age (in years)	< 5	50		14	0.84(0.43,1.65)	0.98(0.45-2.11)
	5-11	87		51	1.76(1.1,2.8)	1.91(1.12-3.24) *
	12-18	153		51	1	
Region	Addis Ababa	165		36	0.53 (0.31,0.89)	0.52(0.31,0.89)*
	Out of Addis	126		80	1	
Prehospital care given	yes	15		10	1.74 (0.75, 3.98)	1.28(0.52-3.17)
	no	276		106	1	
Mode of transport	Ambulance		65	42	1.97(1.24,3.13)*	1.5(0.88,2.55)
	Non Ambulance		226	74	1	
Mechanism of Injury	Road traffic accident		128	34	0.35(0.19,0.643)*	0.31 (0.16,0.61)
	fall		81	26	0.42(0.22,0.81)*	0 .38 (0.19, 0.79)
	Physical assault		44	27	0.80(0.41,1.59)	0 .58 (0.27 ,1.26)
	Other		38	29	1	
Time of arrival from injury to ED in hrs	< 24		208	63	0.47(0.3,0.74)**	0.63(0.36,1.05)
	>24		83	53	1	
Presence of Head injury	yes		55	46	2.82(1.76,4.53)*	1.819(1.06,3.12) *
	No		236	70	1	
Presence of poly-trauma	No		285	109	1	
	yes		6	7	0.33(0.12,0.99)	0.27 (0.08,0.92)

* is less than 0.5 % of significance

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Computed tomography (CT) scan were performed in 47 patients with head injuries. While 17(36.2%) of the scans were negative, the majority showed a variety of injuries epidural hematoma (21%), subdural hematoma (8%), diffuse axonal injury, (11%) depressed skull fracture (19%), and brain contusion (4%).

Overall, 291 (71.5%) of patients were discharged and 115 (28.2 %) were admitted, with 1(0.2%) patients died in the emergency unit (Table 2). The patient's arrival from distances (out of Addis Ababa), ages between 5 to 12 years [AOR = 1.91, 95% CI (1.12-3.24)] and head injury [AOR= 1.82, 95%CI(1.06, 3.12)] are more likely to be admitted than those who are not (Table 3).Only 212 (52.1%) could be scored for Pediatric trauma severity score because of the absence of pediatric blood pressure measurement and only 5 patients identified with PTS score less than 8.

DISCUSSION

In many low-and middle-income countries (LMICs), children face a greater risk of mortality and disability from injuries than in high-income countries. It is important to understand the local epidemiology of injuries to target interventions with the most impact. Despite the high burden of injuries, little data is describing the epidemiology of injuries in Ethiopian children (15). This study further characterizes the pattern of traumatic injuries for children in Ethiopia seen at a tertiary referral hospital.

The most common cause of injury in this study was road traffic accidents accounting for almost 40%. Although RTA is the most common mechanism in other African settings (16), there has been conflicting data in Ethiopia (11,15). RTAs are the most important cause of injury-related deaths in Ethiopian children using survey data with projection estimates (12). Other studies have shown that falls were the most frequent cause of injury (11,15). Wolde, et al examined visits to all health facilities in the Addis health bureau in one year and found that falls accounted for the most injuries in children (17).

While falls may account for a significant number of visits to health facilities, our data, from a tertiary referral hospital, and the data of Li et al suggest that RTA account for more mortality and long term morbidity (18). Mariam, et al found that non RTAs were the most cause of injury in children visiting an emergency department at Jimma University Hospital in southwest Ethiopia (11). Similarly, a study in Amhara National Regional State also found falls to be the leading cause of injury in children in one month.

However, this study excluded children who were transferred to other hospitals because of injury (15). The difference in our results may be due to the higher traffic burden in Addis Ababa compared to these settings and the fact that many patients were transferred from other hospitals to AaBET because of the nature of their injuries and need for more advanced care. In our study, the majority of RTA in children (80%) were pedestrian injuries. This is similar to a previous study from Tikur Anbessa Hospital in Addis, in which 71% of RTA seen in the emergency department were pedestrian injuries (19). It is also similar to the burden of RTA pedestrian injuries reported in other LMIC settings (8,20-21).

Falls were the second most common injury in children in our study, and the most common cause for those between 5-13 . This has been shown globaly [22] and in African countries (8,20) and in Asia (20). The majority of the fall injuries were in males. Most of these falls occurred in home setting .This is similar to previous studies from Mozambique and Malawi (8,23). The age distribution also is in keeping with previous studies on falls (24) .It is the primary reason for an emergency visit and the second leading cause of unintentional injury death globally following road traffic injuries (7).

The predominance of boys in trauma presentation was seen in this study. This remains consistent with reports from Malawi and Mozambique (8,23). Road traffic injury steadily increased across increasing age groups in our study. This is also consistent with WHO and UNICEF joint reports on children and road traffic injury showed a similar increment until the age of 18 years (1). Falls have had a decrement as the age progressed especially in adolescents. This again is not unusual considering childhood years especially in the preschool phase have higher motility but underdeveloped judgment. This is also evidenced by Perez-Suarez *et al* on fall from height in pediatric population reporting preschool children covering 51% of the incidence while adolescents covered 21% (25).

Only 6.1% of patients in our study had some sort of prehospital care and transportation by ambulance was low only 26%. This is quite low even when compared to another study in Ethiopian by Meskere et al, which showed 16.7% of adult patients study in Tikur Anbessa hospital which is the same city of our study (26).

Both studies conducted here show alarmingly low coverage of prehospital services. This is also similar to the Mozambique study (8). A significant number of patients in our study presented to the hospital for more than 24 hours after the injury. These delays are common especially seen in LMIC (8,27). Delays in arrival to the emergency department and initiation in treatment can have impacts on prognosis and outcomes. Similarly, many of our patients were transferred from outside facilities, often without the initiation of treatment.

These transfers with a lack of initiation of treatment at primary sites again may negatively affect the outcome. The timely transport and an efficient system of prehospital care have been shown to have positive impacts on outcome in developed countries (27,28). Many of the patients transported by ambulance had no interventions performed, including simple measures like placing c-collar. These simple measures may have an impact on morbidity in trauma patients. It is important to help educate our prehospital providers in basic trauma care (28,29)

The majority of patients presented to AaBET hospital were sent home with emergency team involvement alone. This is a common trend across LMIC for example a Southern Indian study showing 56.6% emergency discharge rate, the rate presented in our study is significantly higher (30). Pediatric trauma score had been done only in nearly half of the patients due to the lack of the blood pressure cuff and therefore difficult to measure severity for different variables. Patients who have a head injury and arrival from a longer distance, outside of Addis and children from age 5 to 9 years are more likely to have a severe injury and with more propensity to be admitted. This was an expected outcome as higher mortality attributed to traumatic brain injuries both in prehospital and in-hospital care phases (31,32)

This is a study in a tertiary referral hospital. Such hospital-based studies underestimate the burden of mild to moderate injuries which may be treated in other settings or at home. The death reported in this study will not reflect the actual death. This is because it does not take into account those injuries that were treated those who died at the scene. Other limitations of this study include incomplete availability of resources made it not to do pediatric trauma score. The study also doesn't cover all seasons. Despite these limitations, our study highlights the importance of continuing surveillance to understand mechanisms of injury in Ethiopian children and target interventions to address both risk and prevention as well as improving treatment for these injuries.

Conclusions

The most frequent mechanisms of injury presenting to the AaBET Hospital were road traffic injury, falls, and physical assault. RTI is being the comments and occurs mostly in pedestrians. There was a low pre-hospital care service. Overall, these results show that there is a need to continue to improve injury surveillance for injury prevention programs as well as improve immediate emergency care services.

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Authors' contribution

TB brought the idea and wrote the proposal, entered the data and did the analysis, wrote the manuscript. JS: helped in proposal writing, helped in data presentation and in writing the final manuscript. TG: helped in proposal writing and the data collection . SK: helped in data presentation and final manuscript writing. ND proposal writing, data analysis and final manuscript.

Conflict of interest:

All the authors have reviewed these manuscript and do not have a competing interest.

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ORIGINAL ARTICLE

ACHIEVEMENT OF DIABETES CARE GOALS AT TIKUR ANBESSA SPECIALIZED HOSPITAL, ADDIS ABABA, ETHIOPIA

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ABSTRACT

Introduction*: Diabetes mellitus is a major public health problem and responsible for premature death, and chronic disabling complications. Implementation of evidence-based interventions have resulted in improvement in achievement of diabetes care goals in several high-income countries. However, there is limited evidence for this in low-middle-income countries.*

Objective: *To assess achievement of diabetes care goals in people with diabetes at the Tikur Anbessa Hospital diabetes center in Ethiopia.*

Methods*: We conducted a cross-sectional hospital-based study (n=421) at Tikur Anbessa Specialized Hospital, in Addis Ababa. The study was done among ambulatory patients with type 2 diabetes and type 1 diabetes of more than five years duration. We used a structured questionnaire and data abstraction checklist to document demographic characteristics and diabetes-related information. We also conducted physical examination and laboratory tests.*

Results*: Overall, 421 study participants were included. The mean age was 52.7±13 years. Majority were females (55.6%). Sixty-one percent access health care service for free. Majority (81.5%) of the study participants were type 2. The mean duration of diabetes was 12.6± 8.9 years. More than 50% of the study participants had diabetes for more than 10 years. 45% were on Insulin, 30% on metformin and 25% on combined oral agents.*

The three treatment goals namely glycemic control, lipid profile and blood pressure control were achieved in 3.6% of patients. The percentage of patients with controlled Blood pressure is 75.2, and glycemic control was achieved in 39.8% of patients. Only 19.8% of patients had recorded lipid profile.

Conclusion*: The achievement of diabetes care goals is lower as compared to other studies done in Ethiopia. The absence of standardized monitoring tool, inconsistent patient-doctor relationship and follow up by internal medicine residents with little supervision may have contributed for the lower rate of diabetes care goal achievement.*

Key words: *Diabetes, Diabetes care goals, achievement of Diabetes care goals, Tikur Anbessa hospital*

INTRODUCTION

Diabetes is a complex metabolic disorder characterized by chronic hyperglycemia. The number of diabetic population in every country is increasing. According to International Diabetes Federation (IDF), the number of individuals with diabetes has reached 415 million in 2015 and this number will rise to 642 million by the year 2040. Eighty percent of people with diabetes live in low- and middle-income countries. In sub-Saharan Africa the prevalence of diabetes is projected to increase by more than 100% in the coming 20 to 30 years. The International Diabetes Federation estimates 2.68 million people aged 20-79 years have diabetes in Ethiopia (1). This number is an underestimate as prevalence studies done in urban and sub urban Ethiopia report 5.4-6.5% (2,3). Non-communicable diseases and injury commission Ethiopia reported a diabetes prevalence of 3.2% based on the nationally conducted STEPS survey in 2018 (4).

Permanent disability is a common outcome of diabetes, with chronic complications of diabetes being major determinants of disability. About 50 to 80% of diabetic patients die of cardiovascular diseases. Many clinical trials have shown that the occurrence and progression of diabetes complications can be reduced significantly by achieving treatment targets for glycemia, blood pressure, serum cholesterol level and routine screening and treatment of diabetic eye disease, peripheral neuropathy, and diabetic kidney disease (5-8).

The care of patients with diabetes in developing and resource limited settings is challenged by the absence of locally adapted guidelines, implementation of available guidelines, shortage of trained human resource, continuity of health care services (health care services are geared towards delivery of primary health care and episodic illnesses), availability of medications and laboratory tests, and the

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lesser priority given to non-communicable diseases in general and diabetes in particular by policy makers and health care facility administrators. In order to improve quality of diabetes care, baseline data on the treatment and achievement of intermediate outcomes -fasting blood sugar (FBS), BP, lipid, weight, BMI, processes indicators (screening for neuropathy, retinopathy, nephropathy) and diabetes self-management education is important. Improved diabetes and other cardiovascular risk factor control along with preventive screening for chronic complications can significantly reduce diabetes related morbidity and mortality. In USA studies published documenting the progress in the achievement of diabetes care goals over the last more than 20 years have shown that there is significant improvement but still there are residual gaps to address with close to 50% of adults not achieving the recommended care goals (9).

The improvement in achievement of diabetes care goals also resulted in significant decline in the occurrence of chronic complications of diabetes in the last 20 years. There is limited evidence from developing countries on the progress of diabetes care. A meta-analysis of quality of diabetes care in sub Saharan Africa concluded that despite the significant increase in the prevalence of diabetes, there is limited access to diabetes diagnosis and diabetes care (10).

A study from Kenya (11) compared the diabetes care and glycemic control between a regional and tertiary referral hospital, and showed that there was no significant difference in achievement of good glycemic control (15% vs 17%). Gudina, et al. assessed the quality of diabetes care at Jimma University specialized hospital diabetes follow up clinic, and results showed that achievement of glycemic control was poor (73.1%) of patients with mean FBS >130 mg/dl, and other practice indicators were suboptimal (12).

Because of paucity of data on quality and progress of diabetes care in Ethiopia, we conducted the present study to look into the achievement of diabetes care goals at tertiary hospital in Addis Ababa, Ethiopia. The results of this study can also be used to plan quality improvement projects, improve diabetes care management and addressing priorities in diabetes care.

PATIENTS AND METHODS

This is part of a major study looking at 'the achievements of diabetes care goals and prevalence of chronic complications at Tikur Anbessa specialized hospital' which was conducted as a requirement for completion of a Medical Education Partnership Initiative (MEPI) Scholars program in 2018. This paper specifically addresses the objectives related to the achievements of diabetes care goals.

We conducted a cross-sectional hospital-based study at Tikur Anbessa Specialized Hospital, in Addis Ababa. The hospital has a bed capacity of 800 and more than 500,000 patients are treated as outpatient and inpatient every year. The Diabetes center is run by Endocrinologists, Fellows, Internal Medicine residents and Nurses. It provides comprehensive diabetes care to around 800 to 1000 diabetic outpatients a month. Patients are seen mainly seen by Internal Medicine residents who work based on rotation schedule. Consultant Endocrinologists are assigned each day of the week to supervise and mentor residents and Fellows. There are no formally trained diabetes educators, foot care specialists or dieticians. It runs two days per week diabetes clinic, one day pregnancy and diabetes clinic, one-day foot clinic, diabetic retinopathy screening every day and laser treatment twice per week.

The study was carried out among ambulatory clients with Type 2 diabetes and type 1 diabetes of more than five years duration. Patients with type 1 diabetes for more than five years and pregnant mothers were excluded from the study.

Sampling, recruitment and data collection

Clients who met the inclusion criteria and provided written consent were sampled by recruiting consecutive clients. Data collection was done between April and August 2018.

Structured questionnaires and data abstraction check lists were administered by three study investigators assisted by two trained nurses, to capture data on socio-demographic characteristics, duration and type of diabetes, comorbidities and complications, whether they had tests to screen for diabetes complications (dilated eye examination, foot examination, urine analysis, dental exam), glycated hemoglobin (HbA1c), frequency of visit, blood glucose checkups, and whether they have checkups in other health facilities. The study investigators also did physical exam to measure waist circumference, hip circumference, detect loss of protective sensation using a 10g-monofilament and tuning fork, and an ankle brachial index (ABI). Retinal screening for retinopathy was done using a digital camera by trained nurses. Laboratory tests for FBS (day of visit), hemoglobin A1c, lipid profile, urine analysis results in the last one year were recorded from patient charts.

Definition of treatment goals

The treatment goal for diabetes control is defined as HbAlc ≤7.0% or FBS of <130mg/dl, according to the IDF treatment guideline[13]. Following the recommendations of the Eight Joint National Committee (JNC 8) (14), the blood pressure goal for patients with diabetes is defined as <l40/80mmHg. The total Cholesterol treatment goals is <200mg/dL.

Ethical considerations

Ethical approval was received from the Institutional review board of College of Health Sciences, Addis Ababa University. Permission to collect data was obtained from the Outpatient directorate director and head of the Diabetes center.

Statistical analysis

Data was collected by trained data collectors. On spot supervision was done to improve the quality of the data. The collected data was entered using SPSS version 23, exported to STATA version 13 SE (StataCorp, 4905 Lakeway Dr College Station, TX 77845). Data was cleaned, categorized and recoded to meet for the current analysis. Descriptive analysis was done using frequency tables, crosstabs, mean, median, mode, and proportions were done.

Further to identify factors associated with the chronic complication of diabetes and achievement of diabetic care chi square, bivariate logistic regression and multivariate logistic regression were employed. All statistical tests were performed at 95 % confidence level and statistical significance considered at p value of less or equal to 0.05.

RESULTS

Socio-demographic characteristics

Overall, 421 study participants were included for the purpose of this study. The mean (SD) age of the study participants was 52.7 (±13.9) years). Majority were females (55.6%). Among the study participants, 39% of them attended secondary school and 28% tertiary school. Sixty-one percent of the study participants access health service for free. Self-employed were the majority followed by housewife.

Diabetes mellitus characteristics

Majority (81.5%) of the study participants had type 2 DM. The mean duration of diabetes was 12.6 years. More than 50% of the study participants had diabetes for more than 10 years. 61% of them had no family history of diabetes. A larger proportion of the respondents were on Insulin 45%, followed by metformin 30% and combined oral agents. Hypertension was the most common reported co-morbidities with 54.5%.

Achievement of Diabetes care goals

Diabetes care goals achievement was assessed based on three factors (FBS, dyslipidemia and blood pressure). Good glycemic control was achieved in 26.1% of patients. 75.2% of patients had well controlled blood pressure. A recorded Lipid profile in the last one year was found in 19.8% of patients, out of which 39.8% had total cholesterol less than 200 mg/dl. 3.6% of patients achieved the three diabetes care goals.

Table 1: Table 1 Socio-demographic characteristics of study participants (n=421)

Variable	n (%)
Age (years)	
18-34	49 (11.6%)
35-64	307 (72.9%)
>65	65 (15.4%)
Sex	
Male	187 (44.4)
Female	234 (55.6)
Religion	
Orthodox	327 (77.7)
Muslim	41 (9.7)
Catholic	43 (10.2)
Protestant	2 (0.5)
Other	8 (1.9)
Education	
No formal education	44 (10.5)
Primary education	92 (21.9)
Secondary education	167 (39.8)
Tertiary education	117 (27.8)
Access to health care	
Free	257 (61.3)
Paying	162 (38.7)
DM type	
Type 2 DM	343 (81.5)
Type 1 DM	78 (18.5)
Duration of DM (years)	
<10	171 (45.1)
>=10	208 (54.9)
Family History of DM	
No	257 (61.9)
Yes	158 (38.1)
Treatment being taken currently	
Insulin	186 (44.9)
Metformin	127 (30.6)
Glibenclamide	41 (9.88)
Glibenclamide+ Metformin	62 (14.9)
Insulin + Metformin	59 (14.2)
Hypertension	
Yes	228 (54.5)
No	190 (45.5)
Antihypertensive drugs	
ACE inhibitor	123 (43.6)
Calcium channel blocker	56 (19.9)
Diuretics	28 (9.9)
Combination	52 (18.4)
Not taking	71 (25.4)
Statin	223 (54)
ASA	181 (44.7)

Factors associated with diabetes care goals achievement

Glycemic control

Demographic variables such as Sex, Educational status and type of diabetes were found to have statistical association with glycemic control. Accordingly, being male was associated with higher odds of having a good glycemic control compared to females with COR 1.7 (95% CI, 1.12, 2.71). Those patients with primary education were 2.9 times more likely to have a good glycemic control compared to those with no education. Patients with Type I diabetes were 1.8 times more likely to achieve glycemic control COR= 1.8 (1.16,3.39).

Blood pressure control

Those patients with diabetes type 1 were 3.2 times more likely to control their blood pressure well compared to those with type 2 DM COR= 3.2 (1.36,7.59).

Dyslipidemia

The number of patients with recorded lipid profile result was small (19.8% of study participants). There was no significant association between most of the variables including age, gender, duration of diabetes or access to health care and status of lipid control

Table 2: Achievement of diabetes care goals among study participants attending outpatient department in Tikur Anbessa Hospital

Variables	N(%)
Fasting blood glucose	
Poor control	270 (64.1)
Good control	110 (26.1)
No record	41 (9.7)
Lipids	
Poor control	50 (60.2)
Good control	33 (39.8)
No record	338 (80.2%)
Blood pressure	
Well controlled (<140/80)	303 (75.2)
Poorly controlled (>140/80)	100 (24.8)
No record	18 (4.2)
Composite index of diabetic goal achievements	
Partial achieved	237 (93.7)
Fully achieved	9 (3.6)
Not achieved	7 (2.8)

Table 3: Factors associated with glycemic control among study participants attending outpatient department in Tikur Anbessa Hospital

Variable	Good control	Poor control	COR
Age(years)			
18-34	15(3.9)	30(7.9)	Ref
35-64	65(17.1)	196(51.6)	0.66(0.33,1.31)
≥65	30(7.9)	44(11.6)	1.36(0.63,2.96)
Sex			
Male	59(15.5)	108(28.4)	1.74(1.12,2.71)*
Female	51(13.4)	162(42.6)	Ref
Educational status			
No formal education	6(1.6)	33(8.7)	Ref
Primary School	27(7.1)	51(13.5)	2.91(1.1,7.81)*
Secondary school	45(11.8)	111(29.3)	2.23(0.87,5.69)
Tertiary school	31(8.2)	75(19.8)	2.7(0.86,5.97)
Monthly Income (ETB)			
<500	11(3)	32(8.7)	Ref
500-1499	39(10.6)	71(19.4)	1.59(0.73,3.51)
1500-4999	46(12.5)	121(32.9)	1.12(0.51,2.37)
>5000	10(2.7)	37(10.1)	0.79(0.29,2.1)
Access to health care			
Free	71(18.7)	159(41.9)	ref
Playing	39(10.3)	110(29)	0.79(0.5,1.26)
Duration of diabetes (years)			
<=10	44(11.6)	127(33.5)	Ref
>10	65(17.2)	143(37.7)	1.31(0.83,2.06)
Type of DM			
Type 1	29(7.7)	41(10.9)	1.8(1.16,3.39)*
Type 2	81(21.4)	227(60.1)	Ref

DISCUSSION

This is part of a major study looking at 'the achievements of diabetes care goals and prevalence of chronic complications at Tikur Anbessa Specialized Hospital, which was conducted as a requirement for completion of a Medical Education Partnership Initiative (MEPI) Scholars program in 2018. This paper specifically addresses the objectives related to the achievements of diabetes care goals. Accordingly, we have assessed three major diabetes care goal achievement indicators, namely glycemic control, blood pressure control and lipid profile. We have included 421 subjects for this study. There is no peculiar demographic factor identified pertinent to achieving diabetes care goals, and our demographic findings are not different from studies done in similar settings (15).

This discussion focuses on three major findings of the study. Overall, we have found out that 3.6% of patients achieved the three diabetes care goals. Specifically, the percentage of patients with controlled Blood pressure was found to be 75.2%. Glycemic control was good in 39.8% of patients and out of the 19.8% of patients with recorded lipid profile 39.8% had good lipid profile in the year preceding the study. Each finding is discussed in more detail below.

The overall achievement of diabetes care goals (3.6%) is lower than another study done in Ethiopia. We were only able to identify one study done at Ayder Hospital in Northern Ethiopia which reported 8.5% of patients achieving the three treatment goals (15). Even though, there are studies reporting on glycemic control, there is a paucity of data looking at the percentage of combined diabetes care goals in sub Saharan Africa.

We used FBS to classify glycemic control as good (90 -130mg/dl) or poor (>130 mg/dl). We chose to use this measure, since HbA1c is not readily available at public hospitals. Based on these criteria, 39.8% of patients achieved good glycemic control. In line with our finding, similar rate of good glycemic control was reported from Tanzania (30.3%) (16). The lower rate of glycemic control in our study could be a result of multiple factors.

The percentage of patients with good blood pressure control, 75.2%, is higher than studies done elsewhere (15,17,18). What explains the consistently good blood pressure control among diabetic patients in our setup needs further exploration. The finding that 39.8% of patients have good total cholesterol is very difficult to interpret as only 19.8% of patients have a record of lipid profile in the preceding year. This may be as a result of lack of consistent supply of statins, lack of laboratory test for lipid profile in the hospital and reluctance of physicians to order lipid profile test during patient visit. This also needs further exploration.

Despite the evidence that vascular risk factor control reducing complications, attaining concurrent control of glycemia, blood pressure, and LDL-C in patients with T2DM has been challenging with slow progress in the USA (19,20). Data from a multicenter study in Asia which also included Greece revealed that approximately 10% or less of patients achieved triple vascular disease control 921). Similarly, a study in China reported only 5.6% achieved all target goals (22). These studies indicate that achieving diabetes triple goals remains a global challenge.

In light of the global trend described above, our finding of 3.6% conforms to the trend. The still lower rate may be due to the lack of continuity of care provided at our center. Our center is organized to deliver care by rotating Internal Medicine residents or Endocrinology fellows with minimal oversight from Endocrinologists. This not only results in poor follow up but also effective deprive patients from the one to one relationship with the care giver which is essential for good outcome in chronic care. This in general indicates that a lot needs to be done to address this huge gap in achieving the triple treatment goals of diabetes care worldwide. This calls for increased attention and resource to implement a multicomponent quality improvement intervention (23).

In clinics where care is mainly provided by Internal medicine residents, there is an added challenge of continuity of care. There are several factors to explain this, Residents and faculty physicians see patients only for few hours per week. This results in difficulty to understand how to use the clinic resources to optimize care and build interprofessional team (24).

Conclusion

The achievement of diabetes care goals is lower as compared to International standards and other studies done in Ethiopia. The absence of standardized monitoring tool, inconsistent patient-doctor relationship and follow up by internal medicine residents with little supervision may have contributed for the lower rate of diabetes care goal achievement. Further studies looking at the process of diabetes care and quality improvement projects are recommended.

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ORIGINAL ARTICLE

UNDERREPORTING OF IN-HOSPITAL MATERNAL DEATHS IN THREE HOSPITALS, ADDIS ABABA, ETHIOPIA

Mahlet Yigeremu, MD[1], Mitike Molla, PhD[2]

ABSTRACT

Introduction*: Ethiopia as one of the signatories the Sustainable Development Goal three to reduce preventable maternal deaths and launched a maternal death surveillance and response system making maternal deaths a reportable event by the health care system since 2013 in addition to the existing health management information system. With increasing institutional birth, more maternal deaths are being reported from facilities, mainly hospitals. But the mechanism of reporting using the health management information system and maternal and perinatal death surveillance and response system are challenged with hospital maternal deaths as tracking the deaths that occur in units other than the maternity units will have causes indirectly related to the birth process.*

Objective*: This study aimed to assess the reporting of in-hospital maternal deaths in three hospitals of Addis Ababa, Ethiopia.*

Methods*: We extracted data from death certificates and medical records of all females aged 15-49 years who died between January 2015 and December 2017 using practical data capturing tool developed by the Initiative for maternal mortality program assessment called; rapid ascertainment process of institutional death. We also assessed the result with the maternal deaths reported through the health management information system and the maternal and perinatal death surveillance and response system. Results was analyzed using SPSS version 20 and descriptive statistics is presented.*

Result: *During the study period there were 1210 women deaths in the age group of 15-49 years with 1137 well documented death certificates. We reviewed medical charts of 876 (77.04 %) female deaths and found 84 (9.58%) maternal deaths using the Initiative for maternal mortality program assessment rapid ascertainment process of institutional death tool. Using health management information system and /or maternal death surveillance and response systems 47 (56%) of the maternal deaths were reported by the studied hospitals resulting in underreporting of 37 (44%) of female deaths. Most deaths (28.6%) occurred in the adult emergency department and (27.4%) in the intensive care units of the hospitals. Direct maternal deaths contributed to two-third of the deaths and preeclampsia/eclampsia was the leading direct maternal cause contributing to (21.4%) of the deaths while cardiac disease is the leading cause to (15.5%) the indirect causes of maternal deaths.*

Conclusion*: There is a significant gap in reporting maternal deaths using both health management information system and maternal death surveillance and response system when women died on non-maternity wards such as emergency and intensive care units. This study suggested that, the use of Initiative for maternal mortality program assessment, rapid ascertainment process of institutional death tool is a feasible strategic option to identify maternal deaths by assessing all female deaths aged 15-49 occurring in service units other than labor and delivery.*

Keywords*: underreporting, maternal death. rapid ascertainment process of institutional death, Ethiopia.*

INTRODUCTION

Skilled birth is a key intervention to decrease all avoidable maternal deaths and is increasing in Ethiopia.(1). The national estimates indicated that only 48% of pregnant women deliver at health facilities while this is high in urban areas especially at the capital Addis Ababa where 94.8% of all deliveries occur at health facilities (1).With the aim of rectifying problems related preventable maternal deaths, the Ethiopian Government had launched the maternal and perinatal death surveillance and response system (MPDSR) in addition to the existing health management information system (HMIS) since 2013 and has made maternal death as one of reportable events by the health care system (2). Since then, almost all maternal deaths are reported from health facilities especially hospitals. However, despite the efforts made by the health system in capturing material deaths using both the standard health services reporting system HMIS and MDSR, up to 40% of maternal deaths fail to be reported (3).

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Hospital studies have shown that routine methods of identifying maternal deaths underestimate the number by one-half to two-thirds (3-5). The main problem being the misclassification of indirect maternal deaths as non-maternal. In addition, assessment of the cause of in-hospital deaths is generally based on the clinician's diagnosis of the disease(s) that led to the fatal outcome. However, short of autopsy, such estimations entail frequent misclassification errors. Indeed, when clinical diagnoses have been contrasted with post-mortem findings, rates of major clinical—pathological discrepancies have ranged from 10% to above 30%, especially in the diagnosis of infectious diseases (6).

The underreporting of maternal deaths in hospital settings has also been highlighted by findings from Initiative for maternal mortality program assessment-Rapid ascertainment process for institutional deaths (IMMPACT-RAPID) which shows that many additional maternal deaths could be identified from case-note reviews (7).

Failure to differentiate between direct and indirect causes of maternal mortality may lead to unrealistic plans and outcomes and inappropriate use of resources. consequently, to the misallocation of resources. Indirect maternal deaths were particularly likely to be missed because they often occurred in wards other than the maternity wards and were frequently reported as non-maternal deaths (8,9).

This study aims to estimate in-hospital maternal deaths using the IMMPACT RAPID as compared with two systems currently functioning in reporting of maternal deaths; the HMIS and maternal and perinatal death surveillance and response (MPDSR) in Ethiopia. The IMMPACT-RAPID is a practical data capturing tool which is a plausible alternative to the existing systems in picking all maternal deaths irrespective of the place of death within the health facility. RAPID involves a review of institutional records for all deaths of women aged 15–49 years to identify all pregnancy-related deaths, including those that may have been missed from routine reports. RAPID tool is found to provide an estimate of the numbers of pregnancy-related deaths omitted from routine reports and analysis of case in a similar setting (7).

PATIENTS AND METHODS

A retrospective descriptive study involving two regional hospitals Gandhi Memorial Hospital GMH), and Zewditu Memorial Hospital (ZMH) and one tertiary hospital, Tikur Anbessa Specialized Hospital (TASH), in Addis Ababa Ethiopia.

The three hospitals in addition to maternal health services offer multidisciplinary medical care. The hospitals report vital events using both HMIS and MPDSR systems to the relevant institutions. All reproductive aged women deaths occurred between January 2015-December 2017 among women of reproductive age (15-49 years) in every department including the emergency department and intensive care units, whose death certificates were accessed.

Data of all female deaths in the reproductive age with wards where the death happened were collected using the RAPID assessment tool format I (annexed) prepared by IMMPACT by trained medical interns from the log books of the hospitals' morgues. Following this, copies of the death certificate were retrieved from the wards. Medical charts for the well documented medical certificates were retrieved from the respective hospitals archive. The female deaths are classified as maternal, non- maternal or unclassified by Obstetricians and Gynecologists using Format II (Annexed). The maternal deaths were further studied and classify as direct, indirect or unclassified. Deaths reported through the HMIS and MPDSR system was also collected from the HMIS Offices of the respective hospitals.

Data were stored and analyzed using SPSS version 20 statistical software. The findings of the study were presented using descriptive tables and graphs. Ethical clearance was obtained from the institutional review board of the Collage of Health Sciences, Addis Ababa University and the Addis Ababa Regional Health Bureau.

RESULTS

In the study period, there were 1210 female deaths in the reproductive age in the three hospitals of which death certificates were found for 1137 (94%). From those we were identified by the death certificate, only 876 (77.0%) of the medical records were reviewed, mainly due to loss of charts (178) and 83 had incomplete /absent data in the medical charts.. From the 876 charts reviewed from January 2015-December 2017, 84 maternal deaths were identified. During the same time period, there were 53,681 deliveries resulting in 53,744 births, of which 53,351 were livebirths. The youngest mother was 15 years and the oldest was 47 years old with a median age of 27. The mean (SD) parity was 2.2 (±1.4). The mean (SD) time to present to the hospital was 3.9 (±3.1) days with the longest time to seek care being 18 days. Adolescents constituted 13% of maternal deaths and most (67.9%) maternal deaths were from among mothers in the age group 20-35 years.

The nulli and primiparas constituted about one third of the maternal deaths, while the multiparas accounted for 57.1%. A majority (66.9%) of the deaths are from Addis Ababa. Most 69/84 (81.1%) of the mothers died in the postpartum period and 10/84 (11.9%) died from complications of abortion.

The mean time (SD) to admission was 2.07 (±3.7) days for direct causes, while it was 4.1 (±4.02) days for indirect causes ($p < .001$). Mothers stayed for a mean (SD) duration of 4 days (±3.2) before death.

Table 1: Characteristics of women who died in the three hospitals between January 2015-2017, in the three hospitals (GMH, ZMH and TASH) Addis Ababa, Ethiopia

		Reported no			Yes		
		Count	Row Total N %	Table N %	Count	Row Total N %	Table N %
Hospital	GMH	7	38.9%	8.3%	11	61.1%	13.1%
	TASH	25	48.1%	29.8%	27	51.9%	32.1%
	ZMH	5	35.7%	6.0%	9	64.3%	10.7%
Age(yrs)	<20	5	45.5%	6.0%	6	54.5%	7.1%
	20 -24	6	50.0%	7.1%	6	50.0%	7.1%
	25 -29	13	40.6%	15.5%	19	59.4%	22.6%
	30 - 34	8	61.5%	9.5%	5	38.5%	6.0%
	35-39	4	33.3%	4.8%	8	66.7%	9.5%
	> 40	1	25.0%	1.2%	3	75.0%	3.6%
Parity	0	6	85.7%	7.1%	1	14.3%	1.2%
	1	7	29.2%	8.3%	17	70.8%	20.2%
	2	24	50.0%	28.6%	24	50.0%	28.6%
	3	0	0.0%	0.0%	5	100.0%	6.0%
Address	Addis Ababa	27	48.2%	32.1%	29	51.8%	34.5%
	Outside Addis Ababa	9	36.0%	10.7%	16	64.0%	19.0%
	unknown	1	33.3%	1.2%	2	66.7%	2.4%
Pregnancy status	antepartum	0	0.0%	0.0%	3	100.0%	3.6%
	intrapartal	0	0.0%	0.0%	1	100.0%	1.2%
	postabortion	5	71.4%	6.0%	2	28.6%	2.4%
	postlapratomy	1	100.0%	1.2%	0	0.0%	0.0%
	postpartum	29	42.0%	34.5%	40	58.0%	47.6%
	Preevacuation	2	66.7%	2.4%	1	33.3%	1.2%
class	direct	13	22.4%	15.5%	45	77.6%	53.6%
	indirect	14	87.5%	16.7%	2	12.5%	2.4%
	unclassified	10	100.0%	11.9%	0	0.0%	0.0%

During the study period, only 47 were maternal deaths reported. The HMIS (8/84) and MDSR (15/84) separately. Both systems identified 24 of the 84 deaths resulting in reporting of only 56% of in-hospital maternal deaths.

The institutional maternal death reporting rate differs from 66.7% (12/18) at Ghandi Memorial to 40.4% (21/52) at Tikur Anbessa Specialized Hospital. Indirect and unclassified maternal deaths tend to be misreported than direct causes. In addition, none of the indirect maternal deaths were reported as maternal deaths from TASH. (Fig 1). All maternal deaths reported were from Labor and delivery unit, maternity wards and operating room.

Majority of maternal deaths from the Intensive Care Unit (ICU) 15/23 (65.2%) were also reported while only (2/24) 8.3% from the Adult Emergency Department. None of the deaths from Gyn ward, Medical, surgical wards were notified as maternal deaths by the respective hospitals.

Unlike the expectation that most maternal deaths occur in labor and maternity wards, in this study most maternal deaths were from the Adult Emergency Department (28.6%) and intensive care unit (27.4%) which are an entry to the management of most critical patients. The women dedicated wards (labor, maternity and gyn) contributed to 28.6% of the deaths during the study period. (Table 2).

Figure 1: Place of maternal deaths in hospitals at Addis Ababa, Jan 2015-Dec. 2017

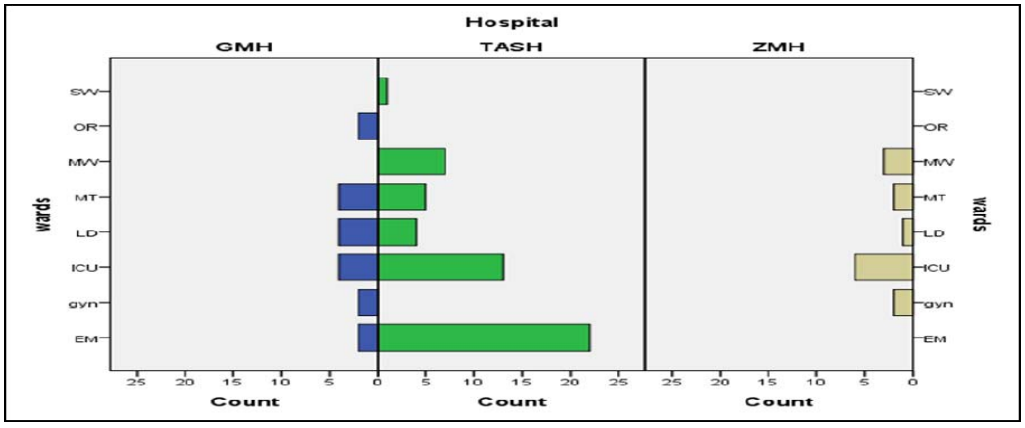

Table 2: Place of death in three hospitals in Addis Ababa, Jan 2015- Dec. 2017, Ethiopia

	No.	Percent
Emergency Department	24	28.6
Gyn wards	4	4.8
Intensive Care Unit	23	27.4
Labor and Delivery	9	10.7
Maternity ward	11	13.1
Medical Ward	10	11.9
Operating Room	2	2.4
Surgical ward	1	1.2
Total	84	100.0

Most Deaths in Tikur Anbessa Specialized Hospital happened at the Adult Emergency Department followed by Intensive care unit and medical wards while in Ghandi Memorial equal proportion of mothers died in the labor ward, maternity and ICU. Most Deaths at Zewditu Memorial took place in ICU followed by medical and maternity wards. Major proportion 58/84 (69%) of the maternal deaths were from direct causes while almost one in five deaths (19%) 16/84were from indirect causes. Maternal deaths couldn't be classified in 11.9% (10/84) of the deaths due to poor documentation. Of the direct causes of maternal death, the top five causes are Preeclampsia/ Eclampsia (21.4%), Postpartum Hemorrhage (15.5%), Puerperal sepsis (13.1%), abortion (11.9%) and Pulmonary Embolism (6% of maternal deaths). The indirect causes were from cardiac disease (15.5%) and HIV (4.8%). (Fig 2).

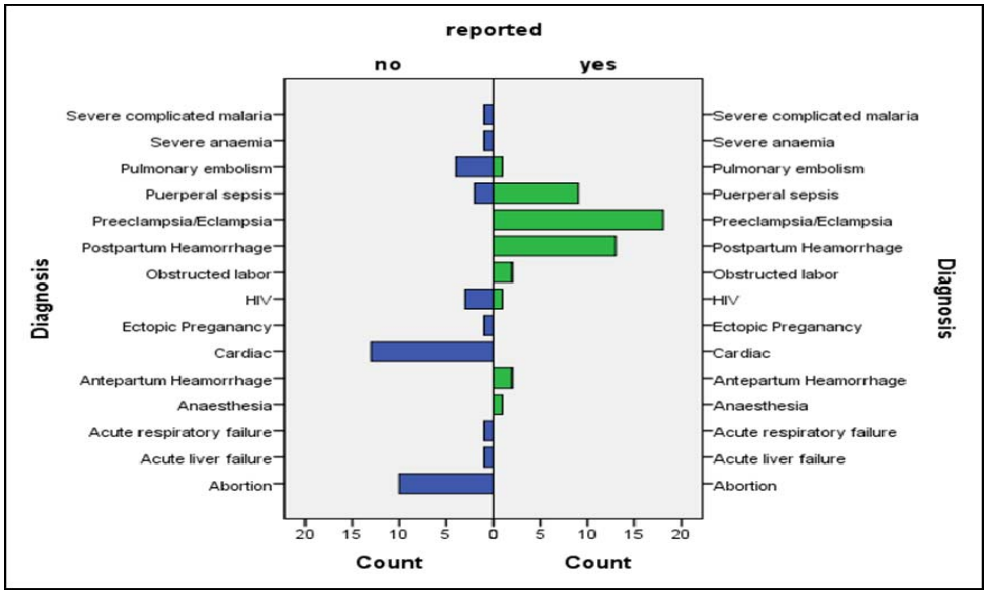

Figure 2: Reported causes of maternal deaths - Jan 2015-Dec. 2017.

A large proportion (52.4%) of the mothers had one or more form of procedure done. Cesarean section, hysterectomy and cesarean hysterectomy was done for 43.2%, 22.7% and 2.4% respectively.

DISCUSSION

In this retrospective descriptive study, we found 84 maternal deaths out of 53,351 live births giving a maternal mortality ratio of 156/100000. Of these, only 9 deaths occurred in the labor ward, 4 in the gyn ward and 11 in maternity wards while the rest occurred in medical, surgical, intensive care and emergency units. The HIMS , MPDSR and RAPID captured 33/84 (39%), 40/84 (47.6%) and 84/84/100%/ of the maternal deaths respectively. Considering that the already existing system has weakness in identifying in-hospital maternal deaths leading to misreporting of maternal death as seen in a study from the Netherlands.(10) . Its clears as a sensitive global and country level indicator, such reporting will give false reassurance at the policy level with distorted allocation of resources for reducing preventable maternal deaths..

Counting maternal deaths, reviewing and taking lessons from the audit process has been one of the recommended methods to reduce maternal mortality at both institutional and community level.(11) In this study, both the HMIS and MDSR system identified a little more than half of the maternal deaths. This is also found in studies done in Morocco, Taiwan and but the rate is quite high compared to these studies (12,13). This might be due to documentation on death certificate that focus more on the clinical diagnosis which lacks definitive diagnosis so as to identify maternal deaths.

Most death certificates documented a malfunction of the organs system as final cause of death which is the usual fatal route all deaths happen at last. The fact that almost a quarter of the female deaths in reproductive age identified in this study couldn't be classified mainly because of poor documentation is concerning as deaths from hemorrhagic shock and acute pulmonary events leave little time for referral and intervention.

The maternal mortality ratio found in this study is lower than what is documented in Ethiopian demographic and health survey (EDHS) 2016(14) but much higher that what we are expected to achieve in sustainable development goal (SDG)-3. This might be because most of the deaths came quite late which might show the time taken to develop the severest form of the disease process and its complication that culminate their life.

In this study, we found a contribution of maternal deaths from indirect causes as witnessed in many studies (15) but much higher that what is reported in The Ethiopian EMONC final report (16). This might be due to the fact that the hospitals in this study are university or university affiliate hospitals with multidisciplinary team resulting in reception of the most critical and complicated cases. Women from non-maternity wards died of indirect causes mostly related to cardiac, pulmonary related causes and HIV. This is alarming in light of the increasing number of deliveries at institutions and the growing burden of chronic non communicable and communicable diseases necessitating focus on the management of these cases as those of direct causes. Interventions that increase detection of underlying diseases and integrating multidisciplinary care will be worth considering if the SGD 3 is to be achieve through reduction of maternal deaths from all causes.

One of the contributing factors for misreporting found in this study is the fact that majority of the maternal deaths happened outside the labor and delivery area. This shows the hospitals with multidisciplinary services will have maternal deaths mostly from indirect causes which is an important shift from the usual expectation. The fact that patients stayed reasonably long from admission to the hospital to death shows the loose linkage among respective departments including the ICU might be due resources limitation like ICU beds; especially from adult emergency.

In this study, most direct causes are due to preeclampsia/Eclampsia rather than postpartum hemorrhage. this might be due to the fact that most cases might have severe hemorrhage where by the chances of women reaching the health facilities alive is less. These deaths are mostly reported as " death on arrival" with poor documentation without mentioning the cause of death.

In this study, most mothers had surgical interventions to deliver or terminate pregnancy and this might imply the gap in hospital care which has failed to identity those cases in a timely fashion for a timely intervention to avoid death. Though the study has a good power as a result of the large sample size, but suffers from the retrospective nature of the study which limits identification of the causes of death. The fact that maternal deaths are classified based on the clinical diagnosis rather that autopsy and our inability to classify about 23% of the female deaths is the main limitation of the study.

Conclusion

The IMMPACT RAPID Tool used in this study, identifies all female deaths in the studied health facilities. Maternal death reporting is underestimated as indirect maternal deaths were not captured either in the HMIS or in the MPDSR at Hospitals in Addis Ababa. In addition, maternal deaths outside the labor and delivery units were misreported. Preeclampsia/ Eclampsia, postpartum hemorrhage, puerperal sepsis and abortions contribute significantly to direct maternal deaths while cardiac diseases and HIV were the commonest causes for indirect causes. The postpartum period still remains the most critical time for both direct and indirect causes of maternal deaths. The findings from this study suggested that identifying all female deaths in reproductive age is a plausible strategy to reduce the significant misreporting of maternal deaths from hospitals. Attention and action to develop strategy for reducing Preventable causes of maternal deaths from cardiac disease and pulmonary embolism is needed.

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Competing Interest

The authors declare that this manuscript was approved by all authors in its current form and that no competing interest exists.

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Damen Haile Mariam, Habtamu Messel, Adiam Nega, Meseret Yohannes, Bruktait Tadele, Miliard Derbew.
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ORIGINAL ARTICLE

THE IMPACT OF MEPI-JUNIOR FACULTY PROGRAM ON SCHOLARS AND TO THE COLLEGE OF HEALTH SCIENCES AT LARGE

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ABSTRACT

Introduction *The Medical Education Partnership Initiative Junior Faculty (MEPI-JF) Program at College of Health Sciences (CHS), Addis Ababa University (AAU) is designed to enable junior faculty physicians to conduct research in collaboration with mentors from AAU and partner universities abroad. The program has been implemented since 2016 to achieve its goal of nurturing the next generation of researchers. The program has enrolled a total of 44 scholars grouped in five cohorts.*

Objective: *The aim of this study was to share experience and describe the output and possible impact of the MEPI-JF program on the scholars and within the CHS, AAU.*

Methods: *Mixed methods (both prospective quantitative and descriptive qualitative study designs) were employed to describe the impact of the MEPI-JF program on the scholars and within the CHS. Four cohorts of 32 MEPI-JF scholars, faculty mentors, and officials at the CHS were involved as key informants in the study.*

Results: *Fifty-three researches have been published by the first three cohorts of MEPI-JF scholars after joining the program. In addition, these three cohorts of scholars have made 63 paper presentations at local and international conferences, and secured eleven grant awards from funders for advancing their research careers. The program has introduced the journal club culture in with weekly journal club presentations by the scholars to the College community.*

Conclusion: *the contribution of MEPI-JF program has created a great opportunity by building the research capacity of physicians to generate evidence for improving their practice and for developing their particular fields of specialty in the College.*

Key words: *Medical Education Partnership Initiative, Junior Faculty, Addis Ababa University*

INTRODUCTION

Sub-Saharan Africa bears more than 24% of the global burden of diseases but lacks the human power or infrastructure to tackle the problem (1). The average physician to population ratio is 2 per 10,000 people in Sub Saharan Africa compared to high income countries with 29 physicians per 10,000 people (2). The small number of physicians as well as the brain drain in the region has resulted in very busy clinical and teaching responsibilities for faculty with neglect of focus on research functions. The health care services cannot survive if the physicians are away from their clinical and teaching duties with the time and commitment required to conduct research.

The number of researchers per million inhabitants in high income countries is 20 times higher than in lower and middle-income countries (3). There were 3,814 researchers per million people in the high-income countries, while there were only 121 researchers per million people in low-income countries with 91 per million people in sub-Saharan Africa (4).

Worldwide scientific publications originating from SSA has low level with 1% of biomedical publications, and only 2.3% of the world's articles cite an African author. A research conducted in 2014 shows that 31 of the world's 193 countries produce 97.5% of the world's most cited papers. South Africa, at number 29, is the only Sub-Saharan African country on this list (5). Additionally, the knowledge generated from the publications form SSA has low potential for innovation, which results in poor social and economic value (6). In Ethiopia, the number of published works from the country in the last three decades is one of the lowest by any standard. There were 4,687 biomedical research articles published between 1980 and 2008 (7).

There are many reasons for the low research productivity and gaps in the physicians' research career in the region: lack of formal research training in research design, data analysis, presentation/ writing skills and preparing manuscripts; lack of funding; insufficient laboratories and computers; and lack of sufficient time for research activities.

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Poor administrative and institutional support for developing, submitting, and administering research grants; and brain drain in the region where physicians have to immigrate to HIC for better job opportunities and career development also contribute for the low research productivity in the region (4).

A comprehensive solution for thriving health research is coordination among researchers, funders and users including policy makers for conducive environment for research. Effective research requires individual skills, research infrastructure, and relevance to national policies. The region needs to focus on strengthening the research capacity by creating a research platform that addresses locally relevant research issues. Programs for research training and mentorship for faculty are among the most important institutional practices recommended for building and strengthening research culture within universities (8). Based on such ideal, the College of Health Sciences at Addis Ababa University has launched a junior faculty research mentorship program to nurture the culture of research within the School of Medicine and create a platform for junior faculty to advance their research careers and become the next generation of leaders in health research.

Research training for career development of African Junior Faculty of the Medical Education Partnership Initiative - Junior Faculty (MEPI-JF) program was launched with the aim of providing research training and mentored research opportunities for junior faculty within the College of Health Sciences who seek careers in research that contribute to improved human health and to become the next generation of leaders in health research. The program has been financially supported by the US National Institute of Health for the period of five years (2016-2020), and Emory and Johns Hopkins Universities from the US are also collaborators (9).

The program provides two-year dedicative mentored research training for those who have joined the program through merit-based competition. Four scientific areas were identified for the College based on the research priority areas set by the University. These included: HIV/AIDS and related infections; maternal and child health; non-communicable diseases with focus on diabetes and cardiovascular conditions; and mental health with focus on community interventions. In addition to inputs to the scholars, the program also aimed to strengthen the research culture within the College by creating a better environment for the faculty to conduct individual and collaborative research. This in turn was supposed to help the institute to maintain the quality of medical education, retain faculty, and improve the overall health services.

The junior scholars are enrolled in the program in a competitive process whereby they submit their research proposals that are anonymously reviewed by a training advisory committee (TAC) organized for this purpose. The selected scholars take didactive courses in biostatistics, data management, responsible conduct of research, fundamental health research, health care leadership, grant writing and mentorship; and then get involved in mentored research project in one of the four scientific areas. Research training and mentorship were provided by senior academic faculty from Addis Ababa University and the collaborating US based institutions (Emory and Johns Hopkins Universities). The duration of enrollment for a scholar in the program is two years.

Scholars are also involved in weekly journal club sessions where each (in rotation) of them present their critical review of a journal article selected based on relevance to their scientific area to audiences that are composed of all cohorts of trainees, program leads, and other members of the College community.

Based on this background, this particular study aims at describing the outputs and possible impacts of program within the College as an experience sharing of the lessons learnt for similar endeavors in the future.

METHODS

Study area/ setting: The College of Health Sciences (CHS), Addis Ababa University, is a professional health sciences College, established in 2010 by the reorganization of previously separate institutions of health under one umbrella. The CHS has the mission, within a scholarly environment, of providing high quality and regionally relevant health sciences training, research and community services at both undergraduate and postgraduate levels. The CHS also envisions to become a prominent African Health Sciences University dedicated to excellence in teaching, research and community health services (9).

Study design: Mixed methods (both prospective quantitative and descriptive qualitative study) design was employed to describe and explore the impact of the MEPI-JF program on the scholars and within the CHS.

Sample Size and study participant: Four cohorts of 32 MEPI-JF scholars, faculty mentors, and officials within the CHS were involved as key informants in the study.

Data collection: For the quantitative study, continuously collected information from the scholars' research performance progress reports (RPPP) and individual development plans (IDP) starting from 2015 were used for information on socio- demographic characteristic, number of publications, grant application and conference participation before and after joining MEPI-JF. For the qualitative study, focus group discussions (FGD) were conducted with four cohorts of MEPI-JF scholars and one with faculty mentors and officials at the CHS.

With the scholars, the point of discussion mainly focused on their professional carriers (publications, grant applications, and conference presentations), trainings and courses delivered by the program, as well as participation in journal club session.

With the mentors, status of their mentees' in research, publication, and conference presentation, how they help their mentees and strength of the process were discussed. In addition, in-depth interviews with officials at the CHS (school deans, department heads, program leads within the MEPI program, and the Director of Research & Technology Transfer at the College) were made regarding their views on the output and possible impacts of the Program.

The interviews were audio-tapped with digital recording after receiving permission from the study participants. Each FGD session took about an hour on average. Data on trends of publications were obtained from the Research and Technology Transfer of the College.

Data quality assurance: For the quantitative data, completeness and consistency of the IDP reports were regularly checked. Whenever there are inconsistencies or if data are out of date, the scholars were requested to revise and resubmit their reports. For qualitative data, the responses from the informants were checked before closing interview sessions.

Data Analysis: All the quantitative data were entered and analyzed using excel spreadsheet. Descriptive analysis was used for socio-demographic characteristic, distribution of MEPI-JF scholars within scientific areas, number of publications, grant applications, and conference presentations before and after joining MEPI-JF. For the qualitative data, the records were first transcribed in English word by word then uploaded to qualitative data management software. Analysis was conducted by writing thematic memos about emerging themes in the data. The data was extracted, assigned codes, and descriptive summaries for each of the codes were made. Thematic analysis of the data was conducted using MaxQDA for reviewing the transcripts and identify deductive and inductive patterns within the codes developed.

Ethical Considerations

Ethical clearance was obtained from the Institutional Review Board (IRB) of the CHS. The purpose of the study was clearly explained to all study participants before each interview was conducted. Assurance was made for the anonymity respondents and the confidentiality of the information they provide. Informants were also at their discretion to withdraw from participating in the study if they wished.

RESULTS

Scholars' Socio-Demographic Characteristics

The mean (SD) age of the scholars was 36 with SD (±4.4). Nineteen of them were females. All the scholars were medical practitioners and faculty members of the Schools of Medicine and Public Health with rank of assistant professor. Nine scholars were from the Department of Internal Medicine followed by Neurology, Obstetrics & Gynecology, Surgery, and Dermato-venereology) four scholars' each.

Program Description and Status

Scholars are enrolled into the program to conduct their mentored research in four scientific areas that are considered of priority for research: HIV/AIDS and related infections; maternal and child health; non-communicable diseases (with focus on diabetes and cardiovascular conditions); and mental health (with focus on community interventions). Table 1 shows the distribution of scholars across the four scientific areas.

Table 1: Distribution of MEPI-JF scholars across scientific areas

Scientific area	Number of Scholars					Total
	Co-hort I	Co-hort II	Co-hort III	Co-hort IV	Co-hort V	
HIV/AIDS	-	5	1	1	5	12
Maternal & child health	2	1	2	2	3	10
Mental health	1	1	2	2	1	7
NCDs	5	1	3	3	3	15
Total	8	8	8	8	12	44*

* Two have dropped out of the program.

Mentored Research

The results of the focus group discussions found that core capacity in research was built through the training and mentored research among the junior faculty members in selected priority scientific disciplines. Majority of the scholars confirmed of having a mentor (both local and international), and they have found the mentor-mentee agreement to have highly significant impact on their research advancements.

> *"Honestly speaking, I got the right idea about mentor-mentee relationship after I became a scholar. I had advisors throughout our educational career, but now I have formally learnt about what is expected from mentees and mentors. Our interaction with our mentors is very good and cultivating".*

The didactive courses were also found to be very useful. The scholars felt that the biostatistics course in particular was explained in so much simple terms, that they got good grasp of the subject.

> *"All the online courses and in-person trainings were very helpful. They were very interesting and have made us knowledgeable"*

> ***"****In particular, the courses in biostatistics and data management were interesting"*

The journal club presentations were also highly appreciated by the scholars, and considered to be very useful in strengthening their research knowledge and in better understanding research methodology.

> *"I am pretty sure that MEPI journal club is different from our department's journal club. I follow attentively. It is just amazing how you follow the research methodology and see part and parcel of the discussion".*

There are also MEPI-JF Scholars' Scientific Conferences that are organized annually where the scholars make scientific presentations as well as progress reports. These annual conferences also provide opportunities where mentorship trainings are conducted, and lectures on contemporary issues and new developments are provided by speakers invited on the basis of their expertise in the relevant subjects.

All scholars have made presentations in MEPI-JF Scholars Scientific Conferences. Furthermore, scholars are also provided with travel related resources for presenting their research work at international forums. In the focus group discussions, the scholars mentioned that the feedback on their presentations at the annual conferences were very useful.

Program Output

At the time of the write-up of this article (in 2020), the program has graduated three cohorts of 32 scholars, and additional two cohorts of scholars are on the process of conducting their research activities. As of this same period, the first three cohorts of junior scholars in the program have made a total of:53 publications and 63 scientific presentations (at local and international meetings) after they joined the program. The three cohorts of scholars have also secured 11 grant awards from funding agencies. Figure 1 below shows the changes in the number of scientific presentations made by the first three cohorts of scholars before and after they got enrolled into the program.

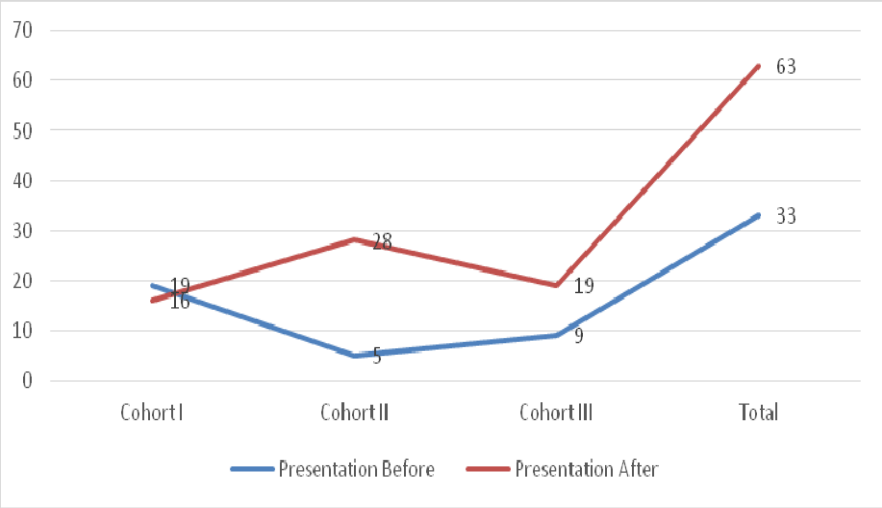


Figure 1: Changes in scientific presentation before and after enrolling in the program (first three cohorts).

Possible Program Impact

The publication record within the College of Health Sciences has been steadily growing over the last five years as shown in figure 2 below, and research outputs by the MEPI-JF scholars is no doubt among the contributing factors to this phenomenon.

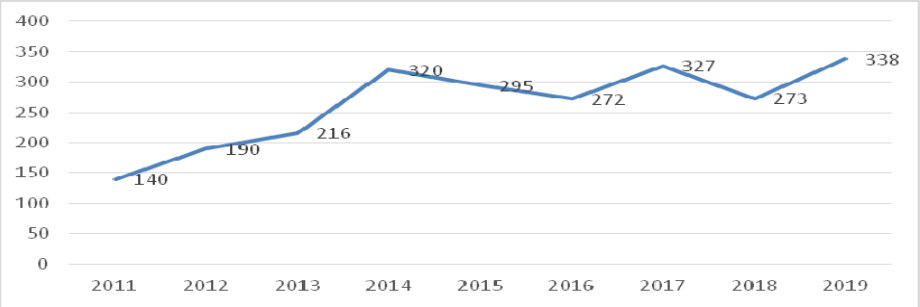
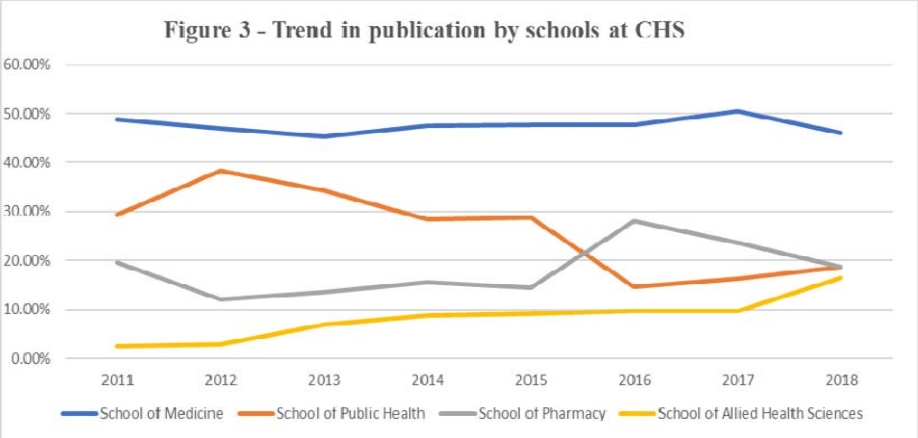


Figure 2: Number of publications within CHS.

Similarly, as shown in figure 3 below, the proportional contribution of the School of Medicine within the CHS's trend in the total publication also seem to be steadily increasing since 2016.



DISCUSSION

The present study was aimed at looking the outputs and possible impacts of the Medical Education Partnership Initiative (MEPI) Junior Faculty (JF) research training and mentorship program within the College of Health Sciences at Addis Ababa University. As shown in the findings, the program seems to have resulted in changes in research outputs among the junior faculty members involved. In addition, the fact that there has been an overall trend of increase in the number of publications within the College during the period of the program implementation, one can suggest a possible impact of the program on the research output in the College in general.

It should also be noted that at the AAU level, faculty members of the CHS have been rated among the top in their publication outputs. AAU's share of world research output increased from 0.017% in 2012 to 0.024% in 2016, and among the total of 2,352 publications by the University that were found in Web of Science during 2012-2016, the CHS produced the highest number (757) or 32% of them (10). Furthermore, based on evaluation of research performance and ratings by members of the academic community around the world and in the region, Addis Ababa University was ranked as the tenth top global university in Africa (with a world rank of 618) in 2019 (the first being University of Cape Town with a world rank of 121) (11).In addition, it is known that enhancing the research capability of academic faculty also would have positive benefits to those involved both in terms of increase in the scope of knowledge as well as in improving ones' status within the global academic community (12).

Another element in the MEPI-JF program is that it is a collaborative program with other universities, and this has been seen to be an important factor in research productivity of faculty across the landscape of universities according to a comparative analysis of research versus non-research institutions (13).

The fact that scholars were given access to travel opportunities at international meetings for presenting their research work will be an impetus for them to work towards publishing their research. Similarly, encouragement for publication by organizing periodic conferences to present their papers, creating opportunity to hear others research presentations, and opportunity to create researcher network are considered as important strategies to increase research productivity in higher educational institutions in India (14).

Of course, resources are required for financing the providing research activities of the scholars as well as for providing protected time to engage them in the program.

The commitment by departments and faculty colleagues to be willing to share the teaching and clinical responsibilities foregone by the scholars during their engagement in the program is also very critical as demonstrated earlier in the findings of a case study in Canada (15).

Junior faculty in the study are enrolled in the program based on individual research proposals they submit in response to calls for competition, and such a process does not have much room for group or team-based activities. Given additional resources in the future for similar efforts, it is recommended that programs be directed towards encouraging interdisciplinary and collaborative "team science" research (16).

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EDITORIAL POLICY

Overview

Ethiopia's oldest medical journal, *The Ethiopian Medical Journal (EMJ)* is the official organ of the Ethiopian Medical Association (EMA). The EMJ is devoted to the advancement and dissemination of knowledge pertaining to the broad field of medicine in Ethiopia and other developing countries. The journal first appeared in July 1962 and has been published quarterly (January, April, July, October) without fail since then. It has been published in both online (www.emjema.org) and hard copy (ISSN0014-1755) versions.

The EMJ continues to play an important role in documenting and disseminating the progress of scientific medicine, and in providing evidence base for health policy and clinical practice in Ethiopia and Africa at large.

Our online journal is open access. The hard copies are distributed to members of the Ethiopian Medical Association. Hard copies of the Journal are distributed to institutions and organizations (internal and external) based on subscription.

Reviewing procedure

Peer reviewers

The Ethiopian Medical Journal uses a double-blind review system for all manuscripts. Each manuscript is reviewed by at least two reviewers. The reviewers act independently, and they are not aware of each other's identities. The reviewers are selected solely based on their relevant expertise for evaluating a manuscript. They must not be from the same institution as the author(s) of the manuscript, nor be their co-authors in the recent past. The purpose of peer review is to assist the author in improving papers and the Editorial Board in making decision on whether to accept or reject a manuscript. Reviewers are requested to decline if they have a conflict of interest or if the work does not fall within their expertise.

Peer review process

Manuscripts are sent for review only if they pass the initial evaluation (pre-review by the Editorial Board) regarding their style, methodological accuracy, ethical review documentation and thematic scope. A special care is taken that the initial (pre-review) evaluation is done in 3-5 days.

The Journal policy is to minimize time from submission to publication without reducing peer review quality. Currently the total period from the submission of a manuscript until its publication takes an average of six months. Peer reviewers are requested to respond within four weeks. During the review process, the Editor-in-Chief may require authors to provide additional information (including raw data) if they are necessary for the evaluation of the manuscript. These materials shall be kept confidential and must not be used for any other purposes.

The entire review process takes place under the supervision of the Editor-in-Chief in an online environment, with the assistance of the Journal Secretariat. The online system also allows authors to track the manuscript review progress.

Resolving inconsistencies

In case that the authors have serious and reasonable objections to the reviews, the Editorial Board assesses whether a review is objective and whether it meets academic standards. If there is a doubt about the objectivity or quality of review, the Editor-in-Chief will assign additional reviewer(s).

Additional reviewers may also be assigned when reviewers' decisions (accept or reject) are contrary to each other or otherwise substantially incompatible. The final decision on the acceptance of the manuscript for publication rests solely with the Editor-in-Chief.

Responsibilities

Authors' responsibilities

This is provided in the '*Guidelines to Authors'* which appear in each issue of the Journal. Authors must guarantee that their manuscripts are their original work, that they have not been published before, and are not under consideration for publication elsewhere. Parallel submission of the same paper to another journal constitutes misconduct and eliminates the manuscript from further consideration. Work that has already been published elsewhere cannot be reprinted in the Ethiopian Medical Journal

Authors are exclusively responsible for the contents of their submissions and must make sure that the authors listed in the manuscript include all and only those authors who have significantly contributed to the submitted manuscript. If persons other than authors were involved in important aspects of the research project and the preparation of the manuscript, their contribution should be acknowledged in the Acknowledgments section.

It is the responsibility of the authors to specify the title and code label of the research project within which the work was created, as well as the full title of the funding institution. In case a submitted manuscript has been presented at a conference in the form of an oral presentation (under the same or similar title), detailed information about what was published in proceedings of the conference shall be provided to the Editor-in-Chief upon submission.

Authors are required to properly cite sources that have significantly influenced their research and their manuscript. Parts of the manuscript, including text, equations, pictures, tables and graphs that are taken verbatim from other works must be clearly marked, e.g. by quotation marks accompanied by their location in the original document (page number), or, if more extensive, given in a separate paragraph.

Full references of each quotation (in-text citation) must be listed in the separate reference section in a uniform manner, according to the citation style used by the journal. References section should list only quoted/cited, and not all sources used for the preparation of a manuscript.

When authors discover a significant error or inaccuracy in their own published work, it is their obligation to promptly notify the Editor-in-Chief and cooperate with him/her to retract or correct the paper.

Authors should disclose in their manuscript any financial or other substantive conflict of interest that might have influenced the presented results or their interpretation.

By submitting a manuscript, the authors agree to abide by the Editorial Policies of the Ethiopian Medical Journal

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Editorial responsibilities

The Editor-in-Chief is responsible for deciding which articles submitted to the journal will be published. The decisions are made based exclusively on the manuscript's merit. They must be free from any racial, gender, sexual, religious, ethnic, or political bias. When making decisions the Editor-in-Chief is also guided by the editorial policy and legal provisions relating to defamation, copyright infringement and plagiarism.

Members of the Editorial Board including the Editor-in-Chief must hold no conflict of interest about the articles they consider for publication. Members who feel they might be perceived as being involved in such a conflict do not participate in the decision process for a manuscript.

The information and ideas presented in submitted manuscripts shall be kept confidential.

Editors and the editorial staff shall take all reasonable measures to ensure that the authors/reviewers remain anonymous during and after the evaluation process in accordance with the type of reviewing in use.

The Editorial Board is obliged to assist reviewers with additional information on the manuscript, including the results of checking manuscript for plagiarism.

Reviewers' responsibilities

Reviewers are required to provide the qualified and timely assessment of the scholarly merits of the manuscript. The reviewer takes special care of the real contribution and originality of the manuscript. The review must be fully objective, and the judgment of the reviewers must be clear and substantiated by arguments.

The reviewers assess manuscript for the compliance with the profile of the journal, the relevance of the investigated topic and applied methods, the scientific relevance of information presented in the manuscript, and the pres-

entation style. The review has a standard format. It is submitted through the online journal management system where it is stored permanently.

The reviewer must not be in a conflict of interest with the authors or funders of research. If such a conflict exists, the reviewer is obliged to promptly notify the Editor-in-Chief. The reviewer shall not accept for reviewing papers beyond the field of his/her full competence.

Reviewers should alert the Editor-in-Chief to any well-founded suspicions or the knowledge of possible violations of ethical standards by the authors. Reviewers should recognize relevant published works that have not been considered in the manuscript. They may recommend specific references for citation but shall not require citing papers published in the Ethiopian Medical Journal, or their own papers, unless it is justified.

The reviewers are expected to improve the quality of the manuscript through their suggestions. If they recommend correction of the manuscript prior to publication, they are obliged to specify the way this can be achieved. Any manuscript received for review must be treated as confidential document.

Ethical Considerations

Dealing with unethical behavior

Anyone may inform the Editor-in-Chief at any time of suspected unethical behavior or any type of misconduct by giving the necessary credible information/evidence to start an investigation.

- Editor-in-Chief makes the decision regarding the initiation of an investigation.
- During an investigation, any evidence should be treated as confidential and only made available to those strictly involved in the process.
- The accused will always be given the chance to respond to any charges made against them.

If it is judged at the end of the investigation that misconduct has occurred, then it will be classified as either minor or serious.

Minor misconduct (with no influence on the integrity of the paper and the journal, for example, when it comes to misunderstanding or wrong application of publishing standards) will be dealt with directly with authors and reviewers without involving any other parties. Outcomes include:

- Sending a warning letter to authors and/or reviewers.
- Publishing correction of a paper, e.g. when sources properly quoted in the text are omitted from the reference list.

Publishing an erratum, e.g. if the error was made by editorial staff.

In the case of major misconduct, the Editor-in-Chief may adopt different measures:

- Publication of a formal announcement or editorial describing the misconduct.
- Informing officially the author's/reviewer's affiliating institution.

The formal, announced retraction of publications from the journal in accordance with the Retraction Policy.

- A ban on submissions from an individual for a defined period.

Referring a case to a professional organization or legal authority for further investigation and action.

The above actions may be taken separately or jointly. If necessary, in the process of resolving the case relevant expert organizations, bodies, or individuals may be consulted.

When dealing with unethical behavior, the Editorial Board will rely on the guidelines and recommendations provided by the Committee on Publication Ethics (COPE).

Plagiarism prevention

The Ethiopian Medical Journal does not publish plagiarized papers. The Editorial Board has adopted the stance that plagiarism, where someone assumes another's ideas, words, or other creative expression as one's own, is a clear violation of scientific ethics. Plagiarism may also involve a violation of copyright law, punishable by legal action.

Plagiarism includes the following:

- Self-plagiarism, which is using one's own previous work in another context without citing that it was used previously
- Verbatim (word for word), or almost verbatim copying, or purposely paraphrasing portions of another author's work without clearly indicating the source or marking the copied fragment (for example, using quotation marks) in a way described under Authors' responsibilities;
- Copying equations, figures or tables from someone else's paper without properly citing the source and/or without permission from the original author or the copyright holder.

Any manuscript which shows obvious signs of plagiarism will be automatically rejected. In case plagiarism is discovered in a paper that has already been published by the journal, it will be retracted in accordance with the procedure described under Retraction policy, including blacklisting the author(s) .

To prevent plagiarism, the manuscripts are submitted to a plagiarism detection process. The results obtained are verified by the Editorial Board in accordance with the guidelines and recommendations of the Committee on Publication Ethics (COPE).

Retraction policy

Legal limitations of the publisher, copyright holder or author(s), infringements of professional ethical codes, such as multiple submissions, bogus claims of authorship, plagiarism, fraudulent use of data or any major misconduct require retraction of an article.

Occasionally, a retraction can be used to correct numerous serious errors, which cannot be covered by publishing corrections. A retraction may be published by the Editor-in-Chief, the author(s), or both parties consensually.

The retraction takes the form of a separate item listed in the contents and labeled as "Retraction".
The original article is retained unchanged, except for a watermark on the PDF indicating on each page that it is "retracted".

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Open access policy

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There are no hidden costs whatsoever.

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The *Ethiopian Medical Journal (EMJ)* is the official Journal of the Ethiopian Medical Association (EMA) devoted to the advancement and dissemination of knowledge pertaining to the broad field of medicine in Ethiopia and other developing countries. Prospective contributors to the Journal should take note of the instructions of Manuscript preparation and submission to EMJ as outlined below.

Article types acceptable by EMJ

Original Articles (*vide infra*) on experimental and observational studies with clinical relevance
Brief Communications
Case Series
Case Reports
Editorials, Review or Teaching Articles: by invitation of the Editorial Board.
Correspondences/Letters to the Editor
Monographs or set of articles on specific themes appearing in a Special Issues of the Journal
Book reviews
Perspectives,
Viewpoints
Hypothesis or discussion of an issue important to medical practice
Letter to the Editor
Commentaries
Advertisements
Obituaries

N.B. Articles are not acceptable if previously published or submitted elsewhere in print or electronic format, except in the form of abstracts in proceedings of conferences.

Content and format of articles:

Title: The title should be on a separate page. It should not have acronyms or abbreviations. The title should be descriptive and should `not exceed 20 words or 120 characters including space. The title page should include the name(s) and qualification of the author(s); the department or Institution to which the study/research is attributed and address of the corresponding Author. If the author has multiple affiliations only use the most preferred one.

1. Original Articles

2,500 words, excluding Abstracts, References, Figures and Tables. The manuscript of the Article, should appear under the following headings:

a) Abstract: The abstract of the Article is prepared on a separate paper, a maximum of 250 words; it should be structured under the titles: a) Background; b) Methods; c) Results; d) Conclusions. Briefly summarize the essential features of the article under above headings, respectively. Mention the problem being addressed in the study; how the study was conducted; the results and what the author(s) concluded from the results. Statistical method used can appear under Methods paragraph of the Abstract, but do not insert abbreviations or references in the Abstract section.

Keywords: Provide three to six key words, or short phrases at the end of abstract page. Use terms from medical subject heading of Index Medicus to assist in cross indexing the Article.

b) Introduction : Should provide a short background and context of the study and provide the rationale for doing the study. It should not be a detailed review of the subject and should not include conclusions from the paper.

c) **Patients or (Materials) and Methods:** should contain details to enable reproducibility of the study by others. This section must include a clear statement specifying that a free and informed consent of the subjects or their legal guardians was obtained. Corresponding author should submit a copy of institution review Board (IRB) clearance or letter of permission from the hospital or department (if IRB exempt) with the manuscript. For manuscripts on clinical trials, a copy of ethical approval letter from the concerned body should be submitted with the Manuscript. If confidential data is being used for publication (such as student grades, medical board data, or federal ethics board data), then appropriate support/ agreement letter should be included. Photos of patients should disguise the identity or must have obtained their written consent. Reference number for ethical approval given by ethics committee should be stated. In general, the section should include only information that was available at the time the plan or protocol for the study was being written; all information obtained during the study belongs in the Results section.

d) **Results:** This section should present the experimental or observational data in text, tables or figures. The data in Tables and Figures should not be described extensively in the text.

e) **Discussion:** The first paragraph should provide a summary of key finding that will then be discussed one by one in the paragraphs to follow. The discussion should focus on the interpretation and significance of the results of the study with comments that compare and describe their relation to the work of others (with references) to the topic. Do not repeat information of Results in this section. Make sure the limitations of the study are clearly stated.

f) **Tables and Figures:** These should not be more than six. Tables should be typed in triplicate on separate sheets and given serial Arabic numbers. Titles should be clearly place underneath Tables and above Figures. Unnecessary and lengthy tables and figures are discouraged. Same results should not be presented in more than one form (choose either figure or table). Units should appear in parentheses in captions but not in the body of the table. Statistical procedures, if not in common use, should be detailed in the METHODS section or supported by references. Legends for figures should be typed on separate sheets, not stapled to the figures. Three dimensional histograms are discouraged. Recognizable photographs of patients should be disguised. Authors should submit editable soft versions of the tables and figures.

g) **Acknowledgement:** Appropriate recognition of contributors to the research, not included under Authors should be mentioned here; also add a note about source of the financial support or research funding, when applicable.

h) **References**:

- The titles of journals should be abbreviated according to the style used for MEDLINE (www.ncbi.nlm.nih.gov/nlmcatalog/journals).
- References should be numbered consecutively in the order in which they are first mentioned in the text and identify references in text, tables, and legends by Arabic numerals in parentheses.
- Type the References on a separate sheet, double spaced and keyed to the text.
- Personal communications should be placed NOT in the list of references but in the text in parentheses, giving name, date and place where the information was gathered or the work carried out (e.g. personal communication, Alasebu Berhanu, MD, 1984, Gondar College of Medical Sciences). Unpublished data should also be referred to in the text.
- References with six or less authors should all be listed. If more than six names, list the first three, followed by et al.
- Listing of a reference to a journal should be according to the guidelines of the International Committee of Medical Journal Editors ("Vancouver Style') and should include authors' name(s) and initial(s) separated by commas, full title of the article, correctly abbreviated name of the journal, year, volume number and first and last page numbers.
- Reference to a book should contain author's or authors' name(s) and initials, title of chapter, names of editors, title or book, city and name of publisher, year, first and last page numbers.

The following examples demonstrate the acceptable reference styles.

Articles:

- Gilbert C, Foster A. Childhood blindness in the context of Vision 2020: the right to sight. *Bull World Health Org 2001;79:227-32*
- Teklu B. Disease patterns amongst civil servants in Addis Ababa: an analysis of outpatient visits to a Bank employee's clinic. *Ethiop Med J 1980;18:1-6*
- Tsega E, Mengesha B, Nordenfelt E, Hansen B-G; Lindberg J. Serological survey of human immuno-deficiency virus infection in Ethiopia. *Ethiop Med J 1988; 26(4): 179-84*
- Laird M, Deen M, Brooks S, et al. Telemedicine diagnosis of diabetic retinopathy and glaucoma by direct ophthalmoscopy (Abstract). *Invest Ophthalmol Vis Sci 1996; 37:104-5*

Books and chapters from books:

- Henderson JW. Orbital Tumors, 3rd ed. Raven Press New York, 1994. Pp 125-136.
- Clipard JP. Dry Eye disorders. In Albert DM, Jakobiec FA (Eds). Principles and Practice of Ophthal-mology. W.B Saunders: Philadelphia, PA 1994 pp257-76.

Website:

- David K Lynch; laser History: Masers and lasers. http://home.achilles.net/jtalbot/history/massers.htmAccessed 19/04/2001

2. **Brief Communication**

Short versions of Research and Applications articles, often describing focused approaches to solve a health problem, or prelnary evaluation of a novel system or methodology

- Word count: up to 2000 words
- Abstract up to 200 words; excluding: Abstract, Title, Tables/Figures and References
- Tables and Figures up to 5
- References (vide supra – Original Article)

3. **Case Series**

Minimum of three and maximum of 20 cases

- Up to 1,000 words; excluding: Abstract, Title, Tables/Figures and References
- Abstract of up to 200 words; structured; (vide supra)
- Statistical statements here are expressed as 5/8 (62.5%)
- Tables and Figures: no more than three
- References: maximum of 20

4. **Case Report**

Report on a rare case or uncommon manifestation of a disease of academic or practical significance

- Up to 750 words; excluding: Abstract, Title, Tables/Figures and References
- Abstract of up to 100 words; unstructured;
- Tables and Figures: no more than three
- References: maximum of 10

5. **Systematic review**

Review of the literature on topics of broad scientific interest and relevant to EMJ readers

- Abstract structured with headings as for an Original Article (*vide supra*)
- Text should follow the same format as what is required of an Original Article
- Word count: up to 8,000 words, excluding abstract, tables/Figures and references
- Structured abstract up to 250 words
- Tables and Figures up to 8

6. **Teaching Article**

A comprehensive treatise of a specific topic/subject, considered as relevant to clinical medicine and public health targeting EMJ readers

- By invitation of the Editorial Board; but an outline of proposal can be submitted
- Word limit of 8,000; excluding abstract, tables/Figures and references
- Unstructured Abstract up to 250 words

7. Editorial

- By invitation of the Editorial Board, but an editorial topic can be proposed and submitted
- Word limit of 1,000 words: excluding references and title; no Abstract
- References up to 15.

8. Perspectives

- By invitation of the Editorial board, but a topic can be proposed and submitted
- Word limit of 1,500
- References up to six

9. Obituaries

- By invitation of the Editorial board, but readers are welcome to suggest individuals (members of the EMA) to be featured.

Preparation of manuscripts

- Manuscripts must be prepared in English, the official language of the Journal.
- On a single separate sheet, there must be the title of the paper, with key words for indexing if required, and each author's full name and professional degrees, department where work was done, present address of any author if different from that where work was done, the name and full mailing address of the corresponding author, including email, and word count of the manuscript (excluding title page, abstract, references, figures and tables). Each table/figures/boxes or other illustrations, complete with title and footnotes, should be on a separate page.
- All pages should be numbered consecutively in the following order: Title page; Abstract and keywords page; main manuscript text pages; References pages; acknowledgment page; Figure-legends and Tables
- The Metric system of weights and measures must be used; temperature is indicated in degrees Centigrade.
- Generic names should be used for drugs, followed by propriety brand name; the manufacturer name in parenthesis, e.g. diazepam (Valium, Roche UK)
- Statistical estimates e.g. mean, median proportions and percentages should be given to one decimal place; standard deviations, odds ratios or relative risks and confidence intervals to two decimal places.
- Acronyms/Abbreviations should be used sparingly and must be given in full, at first mention in the text and at the head of Tables/foot of Figure, if used in tables/figures.eg. Blood Urea Nitrogen (BUN). Interstitial lung disease (ILD).
- Use the binomial nomenclature, reference to a bacterium must be given in full and underlined - underlining in typescript becomes italics in print (e.g. *Hemophilus influenzae)*, and later reference may show a capitalised initial for the genus (e.g. *H. influenzae)*
- In the text of an article, the first reference to any medical phrase must be given in full, with the initials following in parentheses, e.g., blood urea nitrogen (BUN); in later references, the initials may be used.
- Manuscripts for submission should be prepared in Microsoft Word document file format

Submission of manuscripts

- As part of the submission process, authors are required to check off their submission's compliance with journals requirements

- All manuscripts must be submitted to the Editor-in-Chief of the Journal with a statement signed by each author that the paper has not been published elsewhere in whole or in part and is not submitted elsewhere while offered to the *Ethiopian Medical Journal*. This does not refer to abstracts of oral communications at conferences/symposia or other proceedings.
- It is the author's responsibility to proof-read the typescript or off-print before submitting or resubmitting it to the Journal, and to ensure that the spelling and numerals in the text and tables are accurate.
- Authors should submit their work through the Ethiopian Medical Journal website; ema.emj@telecom.net.et.

Conflict of interest

Authors should disclose at the time of submission of manuscripts any conflict of interest, which refers to situations in which financial or other personal considerations may compromise, or have the appearance of compromising their professional judgment in conducting or reporting the research results They should declare that there is no conflict of interest to declare if there is none,

Manuscripts review procedures

The procedures for manuscripts review include:

- Within one week of receipt of a manuscript, the Editorial Board will review it in reference to (i) conformity with the Journal's "guidelines to authors (revised version available in all issues starting January 2020)", (ii) relevance of the article to the objectives of the *EMJ*, (iii) clarity of presentation, and (iv) plagiarism by using appropriate software
- The Editorial Board has three options: accept manuscripts for external review, return it to author for revision, or reject it. A manuscript not accepted by a board member is blindly reviewed by another board member. If not accepted by both, the manuscript is rejected by the Editorial Board. Decision will be made by the suggestion of a third Editorial Board member if the decisions of first two do not concur.
- Once accepted for external review, the Editorial Board identifies one (for brief communication, case reports, and teaching articles) or two (for original articles) reviewers with appropriate expertise. The reviewers will be asked to review and return manuscripts with their comments online within two weeks of their receipt. Reviewers have four options; accept, accept with major revision, accept with minor revision, or reject.
- A Manuscript accepted subject revision as suggested by reviewers will be returned to the corresponding author. Author(s) will be given four weeks to respond to reviewers' comments, make necessary changes, and return the manuscript to the Editorial Board. A Manuscript not returned within the specified time will be considered withdrawn by the author(s).
- Manuscripts with minor revisions will be cleared by the Editorial Board and accepted for publication. Those with major revisions will be returned to external reviewers and follow the procedures as outlined for the initial review.

General information

The Editorial Board reserves the right for final acceptance, rejection or editorial correction of papers submitted. However, authors are encouraged to write an appeal to the Editor-in-Chief for reconsideration of rejected manuscripts or any other complaints they might have.

Accepted papers are subject to Editorial revision as required and become the copy-right of the EMA Twenty-five reprints of published articles are supplied free to the first/corresponding author.

The Editorial Board welcomes comments on the guidelines from Journal readers.

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