Hawassa University

Vice President for Research and Technology Transfer

Research Programs Directorate

Proceedings of the 40th Annual Research Review Workshop: College of Medicine and Health Sciences

April 2021

Hawassa, Ethiopia

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Proceedings of the 40th Annual Research Review Workshop: College of Medicine and Health Sciences

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Foreword

This year, Hawassa University is holding its 40th Annual Research Review Workshop since the University was founded as the Awassa College of Agriculture (ACA) in 1976. It is inspiring to see that the university, which started with a college when it was founded, now has eight colleges (i.e., College of Agriculture, College of Business and Economics; College of Education; College of Law and Governance; College of Social Sciences and Humanities; College of Natural and Computational Sciences; College of Medicine and Health Science; Wondo Genet College of Forestry and Natural Resources), 3 Institutes (i.e., the Institute of Technology; Institute of Policy and Development Research and Institute of Sidama Studies) and a campus (Daye campus).

Since the founding of Hawassa University, several types of research of national and international importance have been carried out by the university's academic staff with funds from the state budget and in collaboration with various international organizations/institutions. While research review workshops have been carried out at the university level for several years, review workshops are now being carried out at all colleges and institutes of the university due to the increased number of research projects associated with the growth and diversification of programs. The publication of Proceedings is one of the platforms that Hawassa University has long used to disseminate the research results of its staff to the scientific community inside and outside the university. I still believe that the current Proceedings consisting of the research findings of the academic staff at the respective college of the university, are public and provide scientific research material. The research papers included in the Proceedings of the 40th Annual Research Review Workshop will be an excellent resource for academic staff, postgraduate students, undergraduate students, and researchers working in government and non-governmental institutions. This year, six colleges have published proceedings, namely the College of Social Sciences and Humanities, Business and Economics, Education, Natural and Computational Sciences, Agriculture, and Medicine and Health Sciences. As I thank these colleges, I want to encourage the remaining colleges and the Institute of Technology to take a lesson from these colleges, work hard, and do the same for the next year.

As the proud Vice President for Research and Technology Transfer, thank all the academic staff at Hawassa University who presented their research results at the annual Research Review Workshop and who contributed to the publication of the proceedings and to the success of the university's research endeavors. I would also like to thank the Research Programs Directorate of Hawassa University for coordinating the Research Review Workshops conducted at six colleges and for editing, compiling, and publishing the proceedings. I would also like to thank everyone who has supported our work to improve the quality of education in Ethiopia.

Once again, I really appreciate the hard work of the Hawassa University staff this year, and I am eternally grateful for your ongoing scientific contribution. Together we are securing our vision of being one of the best research universities in Africa and moving away from teaching towards a stronger research orientation.

Tafesse Matewos (Ph.D.)

Vice President for Research and Technology Transfer

Hawassa University

Table of contents

Lived Experiences of Labor Pain by Women who gave birth at Yirgalem General Hospital, Southern Ethiopia

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ABSTRACT

L*abor pain is the most distressing experience in women's life. Poor control of pain resulted in negative child birth experiences which in turn have poor maternal and fetal outcomes. The experience of labor pain is affected by culture, physical endurance and psychological factors. However, there are no well-established contributing factors for control of labor pain and most of the previous literatures were done decades back. The objective of this study was to explore lived experience of labor pain by women who gave birth at Yirgalem General Hospital, Southern Ethiopia. A qualitative research with phenomenological study design was employed to explore the lived experience of purposively selected ten mothers who admitted to post-portal room of Yirgalem General Hospital. In-depth interview was conducted in local language (both in Amharic and SidamuAffo) using interview guide. Interviews were transcribed and translated into English and entered as document into atlas-ti soft-ware. Thematic categories were identified and transcripts were coded accordingly. After analyzing and coding the interviews four major thematic categories were identified. These includes nature of pain (severity of pain, location of pain), factors increasing or decreasing pain, cultural issues (pain management and reflection) and preferred companion were identified. Participants reported that labor pain was very severe, and uterine contraction and absence of companion increase the pain intensity. The culture of the current study area do not allow mothers to reveal their feeling of labor pain. The companions massage the laboring mother's body by butter to relief pain and fasten the* labor. *Labor pain was reported as very severe pain which the participants compared with death. However, the culture of the current study area influences the laboring mothers not to reveal their pain. Laboring mothers prefer their husband and mother to accompany them during labor. Health care providers following laboring mothers need to give attention for labor pain and provide anti-pain as per the protocol.*

Keyword: Lived experience, labor pain

INTRODUCTION

Pain during labor and childbirth is a unique event in the women's life. The extent to which a woman feels in control of pain during labor is an important indicator of maternal emotional wellbeing in childbirth(Hodnett and Simmons-Tropea, 1987).

Labor pain is thought to have both physiological and psychological origin(Lee Lai Yin, 2017). Physiological origin of labor pain is uterus contractions or cervical dilation(Abushaikha and Oweis, 2005)and psychological factors like stress, anxiety and fear were shown to cause labor pain (Abushaikha and Oweis, 2005, Lang et al., 2006).Pain stimulates the sympathetic nervous system, which causes increase in the heart rate, blood pressure, sweat production, endocrine hyper-function, and delays the patients prognosis(Fortescue and Wee, 2005).Uncontrolled labor pain resulted negative/traumatic childbirth experiences (Hollander et al., 2017).

Childbirth experiences/feeling control of labor pain/ can be affected both by internal and external factors of the women. Internal factors like attitude towards staff (Beigi et al., 2010),attitude toward the experience of pain (perceiving), motivation towards child bearing, and education about childbirth affects the extent of labor pain and feeling of control (Havelka Meštrović et al., 2015). Those women who have learnt how to experience a safe childbirth showed low levels of stress as compared to their counterpart (control group) (p=0.002)(Firouzbakht et al., 2014).

External factors like health personnel, cultures, and companion were affects the women's feeling of labor pain control. Poor communication with the care provider, lack of practical/emotional support, and being primi-parous were indicated as factors for negative child birth experiences(Hollander et al., 2017). Presence of a companion, e.g. their husband or a family member, during childbirth decreases the stress and promote positive child birth experiences (Sapkota et al., 2012, Najafi et al., 2017). Professionals and partner support during child birth were factors for positive child birth experiences(Nilsson et al., 2013).

Belongingness to different cultures can affect child birth experiences differently(Havelka Meštrović et al., 2015, Lee Lai Yin, 2017).

Therefore, feeling of labor pain control is affected by both internal and external factors that can result in either negative or positive childbirth outcomes.

Since labor pain is one of the most severe pains, giving birth is very stressing for the mother. More than 90% of the tension and stress during pregnancy period is related to childbirth (Hosseininasab et al., 2010). Among 100 laboring mothers in Jordians, 81 of them reported intensity of labor pain level as ≥ 8out of 10 (Abushaikha and Oweis, 2005). Loss of labor pain control was reported by 54.6% of women in Netherland(Hollander et al., 2017). On the other hand, fear of labor pain is also a concern for non-delivered females; 25.9% of students reported clinically significant fear of childbirth which could be predicted by postponing pregnancy planning (ŽigićAntić, 2018).

The extent of pain control during labor and child birth affects maternal and fetal outcomes and delays the patients prognosis(Fortescue and Wee, 2005). Poorly controlled labor pain can lead to maternal distress which in turn resulted in reduced oxygen transfer to the fetus and fetal metabolic acidosis, fetal hypoxia and death (Labor and Maguire, 2008). Severe pain during labor is related to negative childbirth experiences which in turn increase the risk for maternal postpartum depression (Pang et al., 2008). Fear of labor pain is one of the most important reasons that make women go for cesarean section (Salehi K. Isfahan, 2001). Anxiety associated with child birth result in a higher uptake of epidural analgesia as well as influence the analgesic effect of the epidural block, whereas continuous intra-partum support were less likely to have intra-partum analgesia (Labor and Maguire, 2008, McGrady and Litchfield, 2004).Women with severe fear of childbirth experienced significantly more labor pain than women without severe fear of childbirth ($P < .01$) (Junge, 2018).

Greater sense of pain control during labor resulted in positive birth experiences (Cheung et al., 2007).Although labor pain is the most stressful event and resulted in various maternal and fetal adverse out comes, few literatures indicated the factors for positive labor pain control.

In addition to the problem of labor self-control, labor analgesia provision is poor in Ethiopia. Studies conducted in Amhara region referral hospitals and Tigray region general hospitals showed that pharmacological analgesia utilization is zero in both region and non-pharmacological method utilization was 40.1% and 43.3% respectively(Sahile E. et al., 2017, Bitew A. et al., 2016). In Amhara region referral hospitals, lower level of qualifications and inadequate knowledge about labor analgesia were associated with analgesia utilization(Bitew A. et al., 2016) while obstetric providers positive attitude and higher qualifications were associated with analgesia utilization(Sahile E. et al., 2017).

Since the perception of childbirth experiences were varied among different cultures, we preferred to conduct this study. Moreover, unpublished quantitative research conducted in Yirgalem Hospital recommended for Qualitative study since the culture affect labor pain experience in different ways. Therefore, this paper is aimed to explore lived experience of labor pain by women who give birth at Yirgalem General Hospital, Southern Ethiopia.

Significance of the study

Positive feeling of pain control during child birth resulted in good maternal and neonatal outcomes. Since labor pain is the severest pains that has always been a concern to pregnant women, relieving labor pain is an important part of modern obstetrics. Therefore, knowing the level of pain control and its associated factors at the specific study area is very crucial as it is mainly affected by psychological and cultural factors.

Thus, identifying major enhancing and inhibiting factors will help the professionals to promote positive women's child birth experiences (greater control of pain) as well as to achieve good maternal and fetal outcomes. In addition, control of pain is part of compassionated and respectful care which is the concern of the government currently.

Objectives

To explore lived experience of labor pain control by women who give birth at Yirgalem General Hospital, Southern Ethiopia, 2019

METHODOLOGY

Study area and period

The study was conducted in Yirgalem General Hospital, southern Ethiopia. Yirgalem General Hospital is one of the well-known hospitals in the southern Ethiopia. The hospital has also Medical College that provide accelerated Medicine. The hospital is providing service for more than 3.5 million peoples and the average annual delivery service for more than 13,000 mothers. The status of labor control among mothers giving birth at this specific hospital is not studied. This study was conducted from November 2019 to December 30/2019.

Study subjects

Participants were purposefully selected from women admitted to postnatal room of Yirgalem hospital. New participants were approached until data saturation was reached.

Inclusion: All Women who presented with singleton pregnancy at full-term (37-42 weeks).

Exclusion criteria: laboring women with known obstetric, medical or psychological problems.

Study design

A descriptive phenomenological qualitative design where researchers employ bracketing to gain perspective on the phenomena was employed. This research showed the experience of labor pain (i.e. the "what") and the control mechanism (i.e. the "how") they control the pain

Sample Size determination: Ten volunteer post-partal mothers were selected purposively.

Study Methodology

Data was collected through in-depth interview using open ended questions (guides). Participant's nonverbal communications and emotions was documented using field note. The time and place of interview were selected by mutual agreement with the participants. The in-depth interview guide was developed by research teams (Hirut, Melese and Shewangizaw) through review of related literatures and incorporating specific factors that are specific to the study area. The interview guide covers socio-demographic variables, reproductive history and need, physical health and severity of labor pain experienced. They were asked about: their expectation of labor pain severity, their confidence on controlling of pain, their expectation of care from family, from health care provider and about awareness of labor analgesia. They were interviewed for their feeling of labor pain (confidence, hopelessness, and failures) and how they controlled them-selves, support they got from family or health care providers. Finally. they were interviewed about the culture regarding labor pain control (the way they express feeling of pain, support given by companions, the role of companion and husband).

The interview guide was pretested at Tula hospital to assess the clarity of the questions and to measure the length of time for the interview which is expected to take 60 to 90 minutes.

Data were collected using audio records and field notes including nonverbal communications.

Ethical approval was obtained from Hawassa University, College of Medicine and Health Science Institutional Review Board (IRB). Labor and delivery ward head was informed about the study and finally voluntary informed consent was obtained from the participants.

Data Management and Analysis

Data collection and analysis were done simultaneously. Audio records and field notes were transcribed and translated to English from the local language used during data collection. All interview transcripts were readied repeatedly by research team and preliminary code guide was used independently. Discrepancies in the application of the code was checked, resolved and the final version of the code guide was developed through consensus by research teams. Coding was done by Atlas-ti version 8 software. Quotations for selected codes were generated by Atlas-ti code manager feature and the codes were sorted into important categories and the main concepts (themes)were identified. Significant quotations were clustered into concepts and used to explain participant experience and the factors (context) that affect level of pain control.

RESULT

Socio-demographic characteristics and reproductive history

Ten participants who gave birth at Yirgalem general hospital were interviewed (Table 1). All of the participants were protestant and married. The age of the participants range from 18 to 30. The current pregnancy was unplanned for two of the participants.

Table 1: Background characteristics of study participants on Lived experience of mothers who gave birth at Yirgalem General Hospital, Southern Ethiopia, 2020.

Id.no	Age	Religion	Level of education	Residence	Parity	Was the pregnancy planned?
	30	Protestant	4	rural	5	No
	25	Protestant	10	rural	2	No
	22	Protestant	College	urban	1	Yes
	23	Protestant	9	urban	1	Yes
	19	Protestant	8	rural	1	Yes
	18	Protestant	College	rural	1	Yes
	30	Protestant	10	rural	1	Yes
	24	Protestant	8	rural	3	Yes
	26	Protestant	8	urban	1	Yes
	25	Protestant	College	Urban	1	Yes

After analyzing and agreed on coding, 15 different codes were categorized in to four main concepts.

Nature of pain: (location of pain, psychological feeling, degree of pain, pain tolerance)

Related factors: (pain increasing, decreasing, place of delivery, expected outcome, recommendations)

Cultural factors: (ways of pain reflection, experience of expression, cultural treatment)

Preferred companion and reasons

Nature of pain: Labour results a physical and psychological encounter for women. The last phases of gestation can be a problematic time expressively. Dread and anxiety are practiced together with excitement. Their feelings both positive and negative will have emotional impact on the woman's birth practice. One of the peculiar nature of labor pain is that this physiologic course is not simple. Based on participants' practices, labor pain is go together with some unusual feelings;

One of the participants expressed the location of the pain as "*I felt severe lower abdominal and back pain*" (Id.No 1). All participants described "*I felt severe lower back pain*". The degree of the labour pain was reported as very severe pain for which clients felt as they are dying. One of the participants described it as "*the pain was very severe, I could not move here and there, I was sweating and guessed that I am on the way to die"* (Id.no 10). Other participants also reported

that the pain was very severe, and they cried to GOD. One participant reported it as "*I could not tolerate the pain; I cried a lot to Almighty God to kill me immediately rather than suffering from such pain"* (Id.no 9). Another participant mentioned "*I couldn't tolerate the pain, I cried to Almighty God to save me*". Another two participants reported that they could not tolerate the pain and preferred to undergo cesarean section. "*My labour was a dry labour and too severe. I never seen such pain previously. I wanted to give birth by operation to deliver it immediately"* (ID.no 2).

Related factors: Correlated factors to labour pain are be made of two ideas of "factors which increase pain" and "factors which decrease pain and make it tolerable". Later stage of labour, uterine contraction, lack of birth companion and loss of hope were described as factors increasing intensity of labour pain.

"The pain would increase… when the fetus is approached to be expelled" (id.no 4).

"The presence of contraction increases the pain" (id.no 8).

"Lack of companion and loss of hope increase the strength of labor pain" (id.no 7).

Institutional delivery, fetal expulsion and thinking about a family life after delivery were some of the factors mentioned to decrease intensity of labour pain. One participant said, "*If the place of delivery is at health institution, even if they can't give anti-pain, they can help me while I'm in stress*" (id.no 1). Other participant said "*labour pain is decreased only after expulsion of the fetus*" (id.no 3). Mothers reported that they tolerate labour pain when they think of the life after delivery. This was expressed in different ways. One participant stated that "*When I think of living with my husband, child, and family; the pain is somewhat decreased. I don't want to lose a baby due to fear of labor pain, I decided to tolerate the pain*" (id.no 4). The other participant expressed "*Labor is very difficult, but the happiness gained after delivery is more than that. Son (baby) is not gained without labor, so it is passing through labor pain to get a son. Having a child is more than everything. So, tolerating the pain is good to get a child" (id.no 7)*. One of the participants said, "*It is called that 'giving birth (laboring) is both living and dying", because child is very important, it is about making the generation to continue (self-replacement). So, even though laboring is suffering, it is a must to give birth"* (id.no 2). On the other hand, there was a client who preferred to ovoid childbearing rather than suffering from labour pain. One participant said, "*it is better to avoid childbearing rather than suffering from labor pain*" (id.no 9).

Cultural issues

Cultural and religious dogmas can affect the insight and understanding of labour pain. In some cultures, the woman is estimated to scream and cry uncontrollable while in others the woman may not outwardly describe much suffering in her labour. Cultural impacts on labour pain can take many diverse forms. Traditional beliefs and ethnicity are known to impact the insight of pain such factors can show a vital role in what way a woman manages pain in labour.

In this study area, laboring mothers are not allowed to express their feeling of labour pain. They are expected to tolerate it. One of the participants said "*I did not reveal may pain any form. In our culture, neither shouting nor body movement is allowed. Freely shouting and making body*

movement "mewarachat" is not allowed because it`s believed that the fetus will be affected or totally die" (Id.no 06).

There are different ways of labour pain management culturally in this study area. Some of the described methods were: massaging the laboring mother with butter, enforcing the mother to lie straight and avoid curving (body flexion), covering the whole body with blanket, covering and tie the laboring mother's head with scarf, the locally called "shash", physical and psychological supports. One participant said "*before coming to this hospital, my body was massaged by butter and my companion covered me by the clothes and supported me*" (Id. no 01). Another participant expressed, "*I take a rest on the prepared bed, covered by a blanket and then massaged the whole body by butter*" (id.no 03). Another participant explained "*they hold my legs straight to avoid curving (flexion), the whole body is covered by a blanket to avoid the entrance of air and my head was covered (tied) by scarf`"shash*" (id.no.09).

Preferred birth companion

Research proposes that birth company, and in specific, non-stop support during labor and delivery, can recover women's childbirth practice and birth consequences. Richer and literate women were extra probable to be go together with their partners and to wish Labor Company from their partners.

Mothers in the current study area prefer different family members for different reasons. One participant said, "*I prefer my mother or mother-in-law because I need them to support (hold) me, and I need them to keep my secret (privacy and confidentiality)*" (id.no. 01). The other participant expressed "*I prefer my mother: I want to show her how she suffered when she delivered me*" (id.no.10).

The groups prefer their husbands for different reason. One participant explained "*I prefer my husband because he is the one who knows my desire and understands my feeling*" (id.no 4). Another participant said, "*I prefer my husband: to show him how much I suffered; and he will feel worried for me in the future"* (Id.no.08).

DISCUSSION

The current study explored the experience of labour pain by mothers who gave birth at Yirgalem general Hospital, southern Ethiopia. The report contains perceived nature of labour pain (like location of pain, psychological feelings, and degree of pain severity), related factors (including pain increasing factors, decreasing factors and factors enabling to tolerate pain), cultural factors (like labor pain management and ways of pain expression) and preferred companion with their reasons.

In this study, women who gave birth described that labor is very severe and associated it with death. This is similar with study from Netherland where 54.6% of participants reported that they failed to control themselves (Hollander et al, 2017). Another study from Jordian also reported that 81% of mothers reported labour pain as very severe pain (Abushka 2015). The participants reported that they felt more pain from lower back and lower abdomen. Study conducted in China showed that mothers complain severe lower back pain (Lee Lai Yin, 2017).

While the mothers feel severe pain from labour process, the culture of the current study area did not allow mothers to express (show) their pain (feeling). This is supported by one study which reported that in Korean culture, it is important to keep quit for women so that the family will not be ashamed. However, European or American women can express their pain feeling in different actions (Olds SB, et al, 2003).

The participants of the current study reported that they prefer their husband or their mothers/mother in law to accompany them during labour. Woman needed the company of her husband or partner to walk through the childbirth process together. In addition, the husband's company provided a sense of safety as facing the challenging childbirth process in a strange environment is distressing. It was also noted that the woman relies on the husband to support her and communicate with the midwife or health care provider. Presence of a companion during childbirth decreases the stress and promote positive child birth experiences (Sapkota et al., 2012, Najafi et al., 2017, Lee Lai Yin, 2017).

Study participants reported that they tolerate labour pain to have a happy life with their family and new baby. Even though labour pain was reported as very severe pain, thinking of the life after delivery enabled them to tolerate the pain. Similar finding was reported from Hong women (Lee Lai Yin, 2017).

CONCLUSION

Labour pain was reported as very severe pain which the participants compared with death. However, the culture of the current study area influence the labouring mothers not to reveal their pain. Labouring mothers prefer their husband and mother to accompany them during labour. Health care providers following labouring mothers need to give attention for labour pain and provide anti-pain as per the protocol.

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Level of chronic disease risk perception and associated factors among high school adolescents in urban communities of Hawassa, Southern Ethiopia

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ABSTRACT

*Disease perceptions when communicating multiple disease risks may facilitate an accurate understanding of risk for diseases and help individuals to effectively identify and engage in relevant behaviors to reduce their risk. However, there is information gap concerning chronic disease risk perception in the current the study area. The aim of this study is to determine chronic disease risk perception and associated factors among High school adolescents in in Hawassa, Ethiopia, 2019. A cross-sectional survey of 403 randomly selected youths/adolescents was interviewed using pretested Questionnaire. Data was analyzed using SPSS V23 after data management. All the independent variables with p<0.25 during bivariate analyses was included in the multivariate model. From a total of 403 questionnaires distributed, about 391 participants returned the filled questionnaire, yielding 97% response rate. Minimum, maximum and mean BMI of the participants was 13 and 35 and 22.38 (Std. 2.96). About 55(14.1) had underweight, 301(77%) had normal weight, 26(6.6%) had overweight, 9(2.3%) had obesity. About 178(45.5%) Have positive Perception, the Remaining 213(54.5%) Have negative Perception towards chronic disease. The perception on chronic disease was significantly associated with age, sex, type of Family's Occupation, Family income, Family size and BMI of the participants (**AOR**=2.12[1.19-3.99], [0.47(0.28-0.80], [3.78(1.80-7.93], 0.25[0.11-0.55] and 4.60(1.58-13.37) respectively. Current study shown that significant amount of the study participants (54.5%) had negative perception on chronic disease. Also, significant portion of participants have abnormal body weight both underweight and overweight (including obesity). The researchers recommend improving the level of awareness on chronic disease by Training of high school adolescents on improving the level of awareness on chronic disease and its prevention strategies will improve the Perception of adolescents on chronic disease. In addition, further research on school community about awareness on chronic disease, weight management strategies and chronic disease risk reduction will be needed.*

Key words: *Chronic, Risk, Perception, obesity, prevalence, Hawassa, Ethiopia*

INTRODUCTION

Background

According to World Health Organization (WHO) has defined obesity as a disease (ICD-10: E66.0–E66.9) (WHO, 2016). The optimal cut-off for obesity using body mass index was 22.2 kg/m for males and 24.5 kg/m for females. Similarly, the optimal waist circumference cut-off for obesity was 83.7 cm for males and 78.0 cm for females. The cut-off values for detecting obesity using waist to hip ratio and waist to height ratio were: WHR (0.88) and WH t R (0.49) for males, while they were 0.82 and 0.50 for females, respectively (Sinaga et al, 2018). Studies showed that

prevalence of obesity and overweight is increasing throughout the world at an alarming rate (Murray CJL et al. 2015) and no country has been successful at reversing the epidemic once it has begun. Particularly, among children and adolescents aged 5-19 has risen dramatically from just 4% in 1975 to just over 18% in 2016 (WHO, 2018).

To date, obesity ranks third in terms of worldwide economic burden after smoking as well as armed violence, war and terrorism (Dobbs R et al, 2017). Moreover, individuals with obesity and overweight were at risk of developing several forms of cancer, chronic conditions such as cardiovascular diseases and type 2 diabetes as well as several musculoskeletal disorders and has an enormous direct impact on quality of life (Visscher TLS, Seidell JC, 2001). It has also a consequence for psychological health (Avila C et al, 2015) and stigmatization against obese people is highly prevalent (Milan Declaration, 2015). About 3.4 million deaths, 3.9% of years of life lost, and 3.8% of disability-adjusted life years are attributable to overweight and obesity globally in 2010 (Lim SS, 2010).

However, many US adults are not aware of this association (Ziebland S et al, 2002) and do not consider obesity to be a serious health concern (Bennett GG et al, 2006). One might expect that a perception among individuals, society, and professionals at different levels (policy, health care and social work, public health and prevention, schools etc.) of obesity being a risk factor and disease contributes to effective obesity prevention and management strategies (Brug Lechner L, 2008). Perception of weight is a key tool in identifying risk for obesity-related chronic disease and may encourage people to lose weight (Bethesda (MD), 1998).

Risk perception is the subjective judgement that people make about the characteristics and severity of a risk. (https://en.wikipedia.org/wiki/Risk_perception). It is an important determinant for behavior or action in the field of health promotion (Brug Lechner L, 2008). Perceived risk was significantly higher for cancers than for other diseases. Evidences showed that, addressing prior disease perceptions when communicating multiple disease risks may facilitate an accurate understanding of risk for diseases, and help individuals to effectively identify and engage in relevant behaviors to reduce their risk (Wang et al, 2009).

Efforts to educate the public on health behaviors to prevent chronic disease necessitate a better understanding of the attitudes and beliefs individuals hold about these conditions. Perceptions of risk, worry, severity and control have been the foundation of health behavior theories for decades and are integral to many theories including the Health Belief Model and Theory of planned model (Ajzen I. et al, 1991). In line with the Healthy People 2020 goals and objectives, the CDC recently recommended community strategies related to improving nutrition and Physical activity, with the goals of childhood obesity prevention (Khan LK et al, 2009)

However, many people are not ready to lose weight. For this group, strategies for behavior change may depend on perceptions of weight and dietitians, educational level and marital status. Obesity prevention initiatives should focus on increasing the awareness of the seriousness of their condition and offering individually appropriate weight management programmes(Tol et al, 2014).

Social and environmental factors include those influences in the home, school, community, and society. For instance, family and friends influence and support one's lifestyle and daily habits;

schools are seemingly providing fewer opportunities for physical activity, due to a greater emphasis on academic achievement; and environmental factors including community resources and even media in society are sending conflicting messages concerning a healthy lifestyle. (Williams SE, 2018). Currently, low-income countries are witnessing epidemiological transition from infectious communicable diseases to chronic non-communicable diseases due to changes in the lifestyles, rapid urbanization and diminishing levels of physical activity (Ellulu M, 2014).

Due to the increasing prevalence of overweight and obesity, the number of people with hypertension, dyslipidemia and an impaired glucose level is also rising. Lifestyle modifications leading to modest weight loss can prevent cardiovascular disease and diabetes [(Orozco LJ. Et al 2008), Dattilo AM et al, 1992)]. However, changing health-related behavior remains a challenge as the effectiveness of interventions in routine clinical care, outside a strictly controlled trial setting, has been disappointing or cannot be maintained in the long term (Linmans JJ, et al 2011), Vermunt PW, et al 2012].

This may be partly due to a sedentary lifestyle and an overabundance of high calorie foods but may also relate to an individual's perception of overweight and obesity. The Health Belief Model postulates that people need to experience a certain health threat before changing their behavior [(Rosenstock I. et al, 1974)].

Thus, people with overweight or obesity need to view their condition as serious and they should be aware of the associated health risks. In addition, overweight and obese people must feel in control in order to manage their weight, and they must believe that a specific behavior will lead to a certain health outcome and that they will be able to adopt and maintain the desired behavior – the so-called self-efficacy belief (Bandura A., 1977)]. Self-efficacy beliefs significantly relate to a person's perceptions of control over their illness (Schuz B, etal, 2012).

Findings showed that majority of overweight and obese individuals do not consider themselves as having excess weight. Study done among middle aged adults in Tanzania showed that appropriate perception of one's own body weight is important for improved weight control behavior. There is a great difference between perceived and actual body weight with men underestimating their body weight more than women (Alfa J. etal, 2012). Obesity guidelines recommend increasing the level of weight-related care for persons with elevated levels of weight-related health risk (WRHR). However, there seems to be a discrepancy between need for and use of weight-related care. There is factors that may influence readiness to lose weight and intention to use weight-related care in an overweight population.

Perceptions of illness are important determinants of health behavior. A better understanding of perceptions of obesity might allow more effective interventions that challenge these perceptions through lifestyle modification programs. However, there is no data that showed the chronic disease risk perception and associated factors in study area

Statement of the Problem

The prevalence of obesity is growing worldwide. Obesity constitutes a major public health problem and increases the risk for cardiovascular diseases and diabetes, which are the main causes of mortality globally [(Bethesda, 1998, 31. I. GyArf, 2006). Evidence is clearly showing the enormous health, social and economic impact of obesity on individuals and societies (Visscher TLS, et al 200, Frühbeck G, 2013)

Perceptions of disease risk play an important role in motivating people to adopt healthy behaviors.

A greater number and variety of factors were associated with risk perceptions yet, associations also existed between multiple psychosocial variables (optimism, health locus of control, social exposure to disease, perceived stigma) and risk perceptions. Results suggested that women may base their risk estimates on factors beyond those considered important by healthcare providers (Hamilton and Lobe, 2015)

Despite efforts and encouragement by physicians and other health professionals, a strong societal focus on weight loss and management, and marketing efforts to accurately assess weight and encourage weight loss, more than 75% of overweight Americans fail to accurately identify themselves as overweight or obese(Truesdale KP, 2008).

There is evidence for a positive correlation between people's risk perception and their recognition of the negative consequences, symptoms and negative emotions associated with diabetes(Calvin D et al, 2011), as well as their willingness to engage in diabetes prevention activities(Pinelli NR et al, 2010)A significant negative relationship between general well-being and perception of risk for diabetes complications has been noted(Calvin D et al, 2011).Obese adults considered their obesity to be of shorter duration with respect to identity and illness concerns(den Engelsen et al, 2015).

Overweight and obesity were highly prevalent with high incorrect body weight perceptions in the general adult population in Beijing. Weight loss practice was poor in overweight and obese individuals (Cai L, et al. (2014). Though studies looked at perceptions of body image in many African settings (Scott A, et al, 2013), Draper CE, et al 2015), information on body image perception, perceived health risk due to obesity and intention to lose weight among men and women in this communities is limited.

Recently, an increase in mortality due to chronic non-communicable diseases related to obesity is also reported in Ethiopia (Misganaw A, etal 2012),Misganaw A, et al, 2014). These findings will be essential inputs for the preparatory programs to tackle such upcoming problems in the country. Despite an increasing prevalence of obesity in Ethiopia, no studies have examined people's perception of body weight and chronic disease risk. Because an appropriate perception of one's own weight is important for improved weight control behavior (Y. Wang, et al 2009) Obesity rates will continue to increase as long as individuals, the society, and professionals at different levels of policy, health care, social work, schools, and prevention have false interpretations of the severity of obesity. Strong action is needed against those who are playing a role in maintaining false perceptions of obesity as a risk factor and disease (Visscher et al, 2017)

Findings showed that the low perceived threat and severity of obesity particularly among obese women a challenge to obesity prevention and possible resistance to recommended weight loss interventions (Okop et al, 2016). Overweight people tend to underestimate their body weight (Wang et al, 2009) which may contribute to the weight increase/maintenance. Understanding people's risk perception of chronic disease will help in designing educational programs to address obesity and other related chronic diseases in Ethiopia. Therefore, this study aims to provide the up-to-date prevalence of overweight and obesity and investigate chronic disease risk perception in Hawassa in Southern Ethiopia

Significance of the study

Understanding people's risk perception of chronic disease will help in designing educational programs to address obesity and other related chronic diseases. Also, the findings might allow more effective interventions that challenge these perceptions through lifestyle modification programs. Obesity prevention efforts that target youths, adolescents have the greatest potential to avert obesity into adulthood and should be rigorously evaluated. Actions at multiple levels are needed to slow or control this overweight and obesity epidemic and to increase awareness on appropriate health behavior among students.

This research will change the paucity of data on youth/adolescent overweight/obesity related issues institutionally. Additionally, more informative description of these data will help to understand the magnitude of obesity/overweight, level of risk perception of the chronic disease among obese individuals and its associated factors particularly in this study area.

As a result of this research communities may get awareness regarding the Perceptions of illness are important determinants of health behavior. More importantly, this study may help the participants know the status of their BMI.

Furthermore, from the information produced by this research, all the stake holders will use it in their respective policy modifications. In addition, the experts, and professional will get awareness on the level of risk perception among obese individuals and make their own precautions or upgrade their services accordingly. Appropriate chronic disease perception was estimated to be an important point of focus for the design and implementation of clinical and public health Initiatives.

Apart from these, it will provide primary information which allow other researchers to adopt, continue or modify their researching areas; contributing to the need for involvement of schools in the fight against obesity/overweight

Conceptual frame work

This conceptual frame work was developed after reviewing different sources of the literature. It has three main parts i.e. Sociodemographic factors/variables, Individual level/personal factors and External/Environmental factors. Labeling of the main category was given by the interest of the researcher.

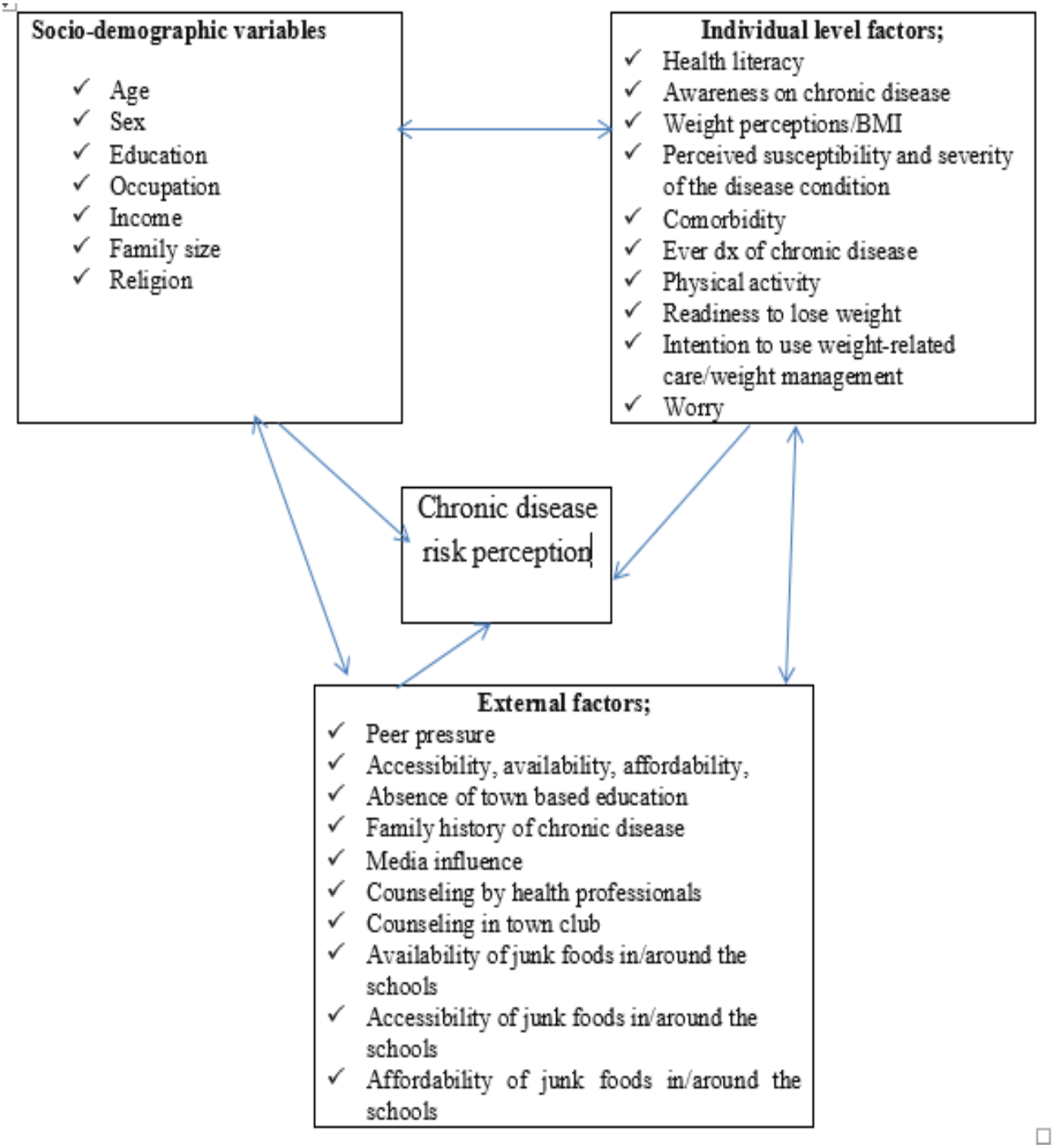
Socio-demographic variables
Age
Sex
Education
Occupation
Income
Family size
Religion
Individual level factors;
Health literacy
Awareness on chronic disease
Weight perceptions/BMI
Perceived susceptibility and severity of the disease condition
Comorbidity
Ever dx of chronic disease
Physical activity
Readiness to lose weight
Intention to use weight-related care/weight management
Worry
Chronic disease risk perception
External factors;
Peer pressure
Accessibility, availability, affordability,
Absence of town based education
Family history of chronic disease
Media influence
Counseling by health professionals
Counseling in town club
Availability of junk foods in/around the schools
Accessibility of junk foods in/around the schools
Affordability of junk foods in/around the schools

Figure 1: *The conceptual framework for Level of Chronic Disease Risk Perception and Associated Factors among High School Adolescents in Urban Communities of Hawassa, Southern Ethiopia, 2019*

Objectives

General objective:

Assessment of Level of Chronic Disease Risk Perception and Associated Factors among High School Adolescents in Urban Communities of Hawassa, Southern Ethiopia, 2019/2020

Specific Objectives:

To assess magnitude of obesity/overweight Among High School Adolescents in Urban Communities of Hawassa, Southern Ethiopia, 2019

To determine level of chronic disease risk perception Among High School Adolescents in Urban Communities of Hawassa, Southern Ethiopia, 2019

To identify associated factors with chronic disease risk perception Among High School Adolescents in Urban Communities of Hawassa, Southern Ethiopia, 2019

Methods and Materials

Study area and period

The study was undertaken in Hawassa city, which is located in Sidama regional state of Ethiopia. It is located 275 km south of Addis Ababa. The city has about 151,652 students [Male: 74648, Female 77004]. The city has about 44 primary and 15 secondary school owned by Government. Also, The City has about 79 primary school, 14 secondary schools and 111 KG schools owned by Private organizations. There are about 7370 students in preparatory schools [Grade 11-12], about 16096 students in high schools [9-10] and about 65869 students' Primary schools [1-8] and also there are about 7347 students in O-class of government schools. There are about 428 students in preparatory schools [Grade 11-12], about 416 students in high schools [9-10] and about 28241 students in Primary schools [1-8] in private schools and 19195 students in Kindergarten KG of private schools.

Study Period

This study was conducted from, November 1, 2019, to June 30, 2020

Study subjects

Source population

All youths and Adolescents who were in all schools of Hawassa city

Study population

Selected adolescent in Tabor high school and Adventist high school in Hawassa city

Students lived at least half a year in the study area and those who gave informed consent were included in the current study.

Those students who refused to participate in the study were excluded.

Study design

Institution based Cross-sectional study was conducted.

Sample size

First, the sample size for prevalence of obesity/overweight was calculated using single population proportion formula using the following assumptions: Proportion (P) = 50%, CI=95%, d=0.05. Accordingly,

n = $(Z_{\alpha/2})^2(p.q)/d^2$ where, q= 1-p

= $(1.96)^2*(0.05)\ (0.05)/\ (0.05)^2$

= 384

= Non-respondent rate was taken 5%

= Total sample size = 403

Sampling method and procedures:

Initially, all schools in the Hawassa city are classified according to government or private schools. Then, each of categories was classified according to level of grade i.e., Secondary level (9-10) and Preparatory level (11-12). One school from government and one school from private school were selected. (Tabor high school and Adventist high school were selected respectively by simple random sampling using lottery method) From each of these schools' grade 10, 11, and 12 selected by simple random sampling techniques. Sample size was allocated proportionally to the size of the included sections.

Government school					**Private school**				
Secondary					secondary				
15 high schools		23466			14 high schools				844
By proportionate allocation					By proportionate allocation				
Tabor high school					Adventist high school				
By SRS					By SRS				
377 participants					14 participants				
G9=93	G10=95	G11=94	G12=94		G9=5	G10=3	G11=3	G12=3	

Total Participants = 391

Study Methodology

Measurement of the variables

Body weight and height measurements

Body mass index (BMI)(kg/m2) was calculated as weight in kilograms divided by height in meters squared. It was classified according the WHO classification category (underweight, normal weight, overweight and obesity as BMI <18.5, 18.5-24.9, 25-30, >30 respectively (Hyattsville MD, 1988).

Standing height and weight were measured by research staffs during the interview. Height was measured without shoes and hat in an upright position with a vertical height gauge to the nearest 0.1 cm.

Weight was measured using an electronic scale to the nearest 0.1 kg after removal of shoes, hat, heavier clothing and pocket contents (ai L, 2014).

Using similar questions to those from the National Health and Nutrition Examination Survey we asked participants to indicate on a 4-point scale the degree to which they believed that being overweight was a health problem for them personally (from 1 = "not a problem" to 4 = a "big" health problem).

For analysis, we dichotomized this variable to respondents who believed being overweight is a "big" health problem for them personally and those who did not. These 2 items (perceiving oneself as overweight and perceiving that being overweight is a personal health problem) assessed weight perceptions

Chronic disease risk perception was measured by using five item question stating the Worry about a condition ("Getting/Having (a) a chronic disease), Responses were on a 5-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. The total score ranged from a minimum 5 to maximum of 20, removing the neutral state. Taking the mean value of the total score, then the respondents overall level of chronic disease risk perception was classified into favorable i.e. positive perception (above the mean score) and unfavorable i.e. negative perception (below the mean score).

Data collection methods and Tools

Data was collected by trained and experienced clinical nurses using Questionnaire on socio-demographic data and anthropometric measurements. Anthropometric measurements (weight and height) were taken using standardized scales by using calibrated equipment. Weight was measured using adult weight scale(an electronic scale)to the nearest 0.1 kg after removal of shoes, hat, heavier clothing and pocket contents. Height was measured by using the Stadia meter. Two reading of height and weight was measured and the mean value was taken as final value.

Data quality assurance

To maintain data quality, training was given for data collectors and supervisors for a total of two days. Pre-testing the questionnaire was done in 20students in St. Compony high school. Supervision was carried out on daily bases to check completeness and consistency by the supervisors and respective principal investigators. Correctly completed questionnaires were collected from data collectors. Cleaning, coding and entering of the data were carried out carefully.

Data processing and analysis

Data was entered, cleaned and coded using Epidata version 3.1 and exported to SPSS version 20 for analysis. All the independent variables with $p<0.25$ during bivariate analyses was included in the multivariate model. A regression coefficient (ß) with 95% CI was reported, while the level of significance was set at $p<0.05$.

Ethical approval and clearance was obtained from institutional review board of Hawassa University and permission to conduct the study was obtained from education bureau of the city. Informed consent was obtained from the respondents before participation. The letter of permission was submitted to concerning bodies. Confidentiality was assured throughout the study by use of code numbers instead of individual names for identification.

All participants was reassured that they can withdraw from the research at any time if they feel uncomfortable with the study.

RESULTS

Distribution of socio-demographic characteristic among High School Adolescents in Urban Communities of Hawassa, Ethiopia 2019/20

From a total of 403 questionnaires distributed, about 391 participants returned the filled questionnaire, yielding 97% response rate. The mean, minimum, and maximum age of participants was 18, 15 and 25 respectively. The mean, Median and Mode of family size of the participants was 6, 6 and 7 respectively.

Table 2: Distribution of socio-demographic characteristic among High School Adolescents in Urban Communities of Hawassa, Ethiopia 2019/20

Characteristic		**Frequency**	
		Number	**Percent[%]**
Sex	Male	165	42.2
	Female	226	57.8
	Total	391	100
Religion	protestant	223	57
	orthodox	119	30.4
	Muslim	5	1.3
	catholic	6	1.5
	others	38	9.7
	Total	391	391
Marital status	married	24	6.1
	single	367	93.9
	Total	391	100
Occupation of head of family	Employed	139	35.5
	Farming	78	19.9
	merchant	104	26.6
	laborer	8	2.0
	others	62	15.9
	Total	391	100
Educational status of the Head of the	Illiterate	26	6.6
	grade1-8	98	25.1
	grade9-12	82	21.0
	college	185	47.3
	Total	391	98.5

Distribution of body weight [BMI] among High School students in Urban Communities of Hawassa, Ethiopia, 2019/20

Concerning the body weight Measurements of the study participants the minimum, maximum and mean BMI of the participants was 13 and 35 and 22.38 (Std. 2.96). See the following Bar chart depicting Distribution of body weightof High School adolescents.

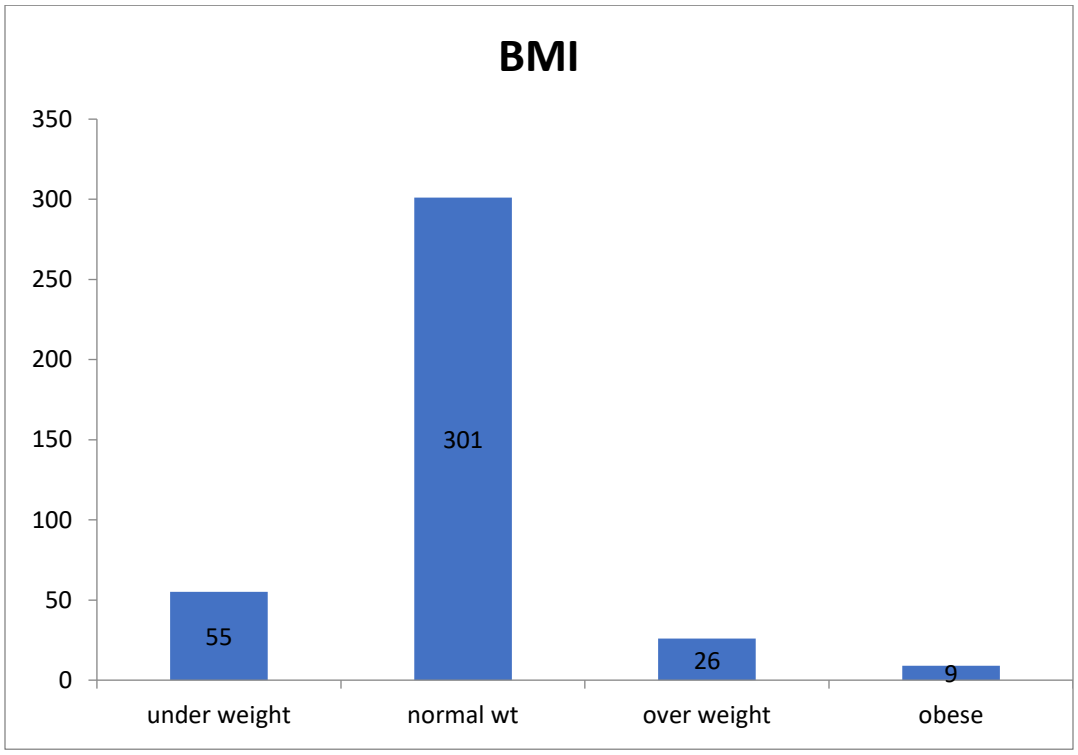

Figure 1: Distribution of body weight [BMI] among High School students in Urban Communities of Hawassa, Ethiopia, 2019/20

Student's Level of chronic disease risk perception at high school adolescents in urban communities of Hawassa, Southern Ethiopia, 2019/20

Out of 391 Students Participated, About 178(45.5%) Have positive Perception, the Remaining 213(54.5%) Have negative Perception.

Table 3: Proportion of positive disease risk perception at high school adolescents in urban communities of Hawassa, Southern Ethiopia, 2019/20

Code	Perception questions	Proportion of positive perception	
		No	%
318	I have worry about having chances of getting chronic disease	179	53.2
319	I feel being overweight as a health problem	257	65.7
320	I feel Getting chronic disease have serious health risk	257	65.7
321	In the last 4 weeks I have been worrying about Getting chronic disease	157	40.2
322	Always I am worrying about the chance of Getting chronic disease	178	45.5

3.3 Proportion of students currently diagnosed with chronic disease at High School Adolescents in Urban Communities of Hawassa, Ethiopia 2019/2020

About 41(10.5%) had reported currently diagnosed with chronic disease, the remaining 350(89.5%) reported that they have not currently diagnosed with chronic disease and about 15(3.8%) not reported about their current status on chronic disease

3.4 Knowledge of students about chronic disease at High School Adolescents in Urban Communities of Hawassa, Ethiopia 2019/2020

As total knowledge of the participant student were classified based the data driven classification methods, about 161(41.2%) have low level of knowledge, 92(23.5%) have moderate level of knowledge and about 125(32%) have high level of knowledge on chronic disease.

Table 4: Knowledge of students about chronic disease at High School Adolescents in Urban Communities of Hawassa, Ethiopia 2019/2020

Item Code	Knowledge of respondents about chronic disease	Proportion of Correct response	
		No	%
211	I have ever Heard about chronic disease from different sources at least once a month	244	62.4
212	Read on health-related information from magazines/internet/books at least once per week	183	46.8
213	Healthy person can have chronic disease	272	69.6
214	Physical inactivity was good for health	177	45.3
215	Our families discusses about importance of good health	267	68.3
216	Do you have an intention to use weight-related care/weight management	342	87.5
217	Have you performed physical exercise in this week	231	59.1

Perceived factors by students at High School Adolescents in Urban Communities of Hawassa, Ethiopia 2019/2020

Table 5:Perceived factors by students at High School Adolescents in Urban Communities of Hawassa, Ethiopia 2019/2020

Code	Items	Yes	No
323	Do you think that your Peer influenced getting the risk of chronic disease?	132(33.8)	257(65.7)
324	Are there Nutritional-based awareness creation activities in your school?	129(33%)	260(66.5%)
325	Do you have any Family history of chronic disease?	95(24.3%)	294(75.2%)
326	Do you think that Media have influenced your nutritional status?	188(48.1%)	199(50.9%)
327	Do you think that junk foods are easily accessible around your schools?	251(64.2%)	140(35.8%)

Factors associated with student's perception at High School Adolescents in Urban Communities of Hawassa, Ethiopia 2019/2020

Table 6: bivariate and multivariate model of dependent and independent variables

Variables	**Category**	**Risk Perception**		**COR (95% CI)**	**AOR (95% CI)**
		Positive	Negative		
Age	young age	69	68	1	1
	Middle age	**67**	**82**	**2.71(1.57-4.68)****	**2.12(1.19-3.99)***
	Older age	**77**	**28**	**3.36(1.96-5.77)**	**2.86(1.55-5.29)****
Sex	Male	53	25	1	1
	Female	**38**	**37**	**1.77(1.17, 2.68)***	**0.47(0.28-0.80)***
Religion	Protestant	123	100	1	
	Orthodox and others	90	78	0.938(0.628-1.402)	
type of Family's Occupation	Employed	80	59	1	1
	Farming	31	47	1.32(0.73-2.40)	1.01(0.52-1.96)
	Merchant	**57**	**47**	**2.73(1.40-5.32)****	**3.78(1.80-7.93)****
	Others	45	25	1.48(0.79-2.76)	1.67(0.85-3.30)
Marital status	Married	11	13	1	
	Single	202	165	1.44(0.63-3.31)	
Income	Low Income	64	32	1	1
	Middle Income	**120**	**116**	**0.48(0.25-0.94)***	**0.25(0.11-0.55)****
	High Income	**29**	**213**	**0.93(0.53-1.65)**	**0.49(0.25-0.96)***
Family size	Small Family size	16	4	1	1
	Medium Family size	109	103	0.31(0.09-0.96)*	0.30(0.09-1.01)
	Large Family size	88	71	1.17(0.77-1.77)	1.45(0.91-2.31)
BMI	Low body wt.	30	25	1	1
	Normal body wt.	**155**	**146**	**3.33(1.24-8.92)***	**4.60(1.58-13.37)****
	Over weight and Obese	**28**	**7**	**3.77(1.59-8.89)****	**4.33(1.74-10.76)****

1

DISCUSSION

This study showed that the perception of participants was significantly associated with age, sex, type of Family's Occupation, Family income, Family size and BMI of the participants (**AOR**=2.12[1.19-3.99], [0.47(0.28-0.80], [3.78(1.80-7.93], 0.25[0.11-0.55] and 4.60(1.58-13.37) respectively. That means, for example, the perception of participants on chronic disease is significantly associated with age class of participant (AOR=2.12[1.19-3.99]), i.e. compared to young age group, middle age group are 2.12 times more likely have negative perception about chronic disease. Concerning sex of participants, compared to male, females are less likely to have negative perception about chronic disease [AOR = 0.47(0.28-0.80]. Regarding to types of Family's Occupation, compared to employed, Merchant are 3.78 times more likely to have negative risk perception about chronic disease(**AOR**= 3.78(1.80-7.93]). Regarding to Family income, compared to Low Income family class, participants from middle income family class are less likely to have negative risk perception about chronic disease (**AOR**= 0.25[0.11-0.55]).

The overall prevalence of underweight, overweight, obesity in this study were55(14.1%), 301(77%), 26(6.6%) and 9(2.3%) respectively. This finding is not similar with the study done in in Gondar Town, Northwest Ethiopia by Gebremedhin B, etal in 2013.This difference may be due time variation between the current and the previous study since there is increasing trends of sedentary life resulting in increased body weight.

The prevalence of Unfavorable Perception (negative perception) on chronic disease in study was 54.5%. This finding is difficult to compare with the previous studies since this variable was not investigated in the previous studies as designed in the current study.

In this study about 10.5%of participants were diagnosed with chronic disease. This finding of this study is similar with the study done in Hawai'i to investigate the Prevalence of Selected Chronic Conditions Among Children, Adolescents, and Young Adults in Acute Care Settings where about 12% of them had at least 1 chronic condition. The further discussion and comparison of our finding is somewhat difficult because chronic disease prevalence among young people is understudied generally and specifically for youth who are at high risk for these conditions in our country Ethiopia.

Conclusion

Current study shown that significant amount of the study participant, i.e. about 54.5% hadUnfavorable Perception (negative perception) on chronic disease. Also in this study significant portion of participants have abnormal body weight both underweight and overweight (including obesity).

Recommendations

[1]NB *= p <0.01, **= p <0.001,

The researcher recommends improving the level of awareness on chronic disease and its prevention strategies. Training of high school adolescents on improving the level of awareness on chronic disease and its prevention strategies will improve the Perception of adolescents on chronic disease. In addition further research with longitudinal studies design to reveal the effect of intervention on school community about awareness on chronic disease, weight management strategies and chronic disease risk reduction will be needed.

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Quality of sleep and associated factors among patients living with HIV/AIDS attending ART clinic at Hawassa university comprehensive specialized hospital, Hawassa, Sidama, Ethiopia

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ABSTRACT

Sleep is a natural, restorative, physiological process which is characterized by perceptual disengagement from and unresponsiveness to whatever going around, which must be reversible. Its deprivation leads to negative health-related consequences that may be physical, cognitive, poor problem solving, or emotional depression. Sleep quality refers to a sense of being rested and refreshed after waking up from sleep. People with HIV/AIDS are vulnerable to poor sleep quality as they suffer from the social stigma of the disease, unpleasant side effects of ARV medications including increased risk for metabolic syndromes. The aim of this study is to assess prevalence of poor sleep quality and associated factors among peoples with HIV/AIDS those attending Anti-retroviral Therapy at Hawassa University Comprehensive Specialized Hospital, Sidama, Ethiopia Institutional-based cross-sectional study was conducted on peoples living with HIV/AIDS those attending ART at Hawassa University Comprehensive Specialized Hospital. All patients living with HIV/AIDS at Hawassa University Comprehensive Specialized Hospital those visiting for ART follow-up during the data collection period and individuals those fulfilling the inclusion criteria were picked out. Systematic random sampling was used to get 408 respondents. The data was collected every 6 patient, and the first individual was selected by lottery method. We assessed prevalence of poor sleep quality in people living with HIV/AIDS those attending ART at Hawassa University Comprehensive Specialized Hospital and the study result shows prevalence of poor sleep quality to be 57.6%. Out of 408 respondents, 389 were used for analysis, making response rate of 95.3%. The mean age of respondents was 38.2 (±9.7) years. Of those assessed, 231 (59.4%) were females. Concerning marital status 261 (67%) of respondents were married. 58 (14.9%) of study participants were Civil servants. Regarding educational status, 49 (12.6%) did not attend formal education. The mean estimated monthly income of patients was 1612.7 (±1349) ETB.

Keywords: Prevalence, Quality of sleep, PLWHA, ART, HIV/AIDS

Introduction

Sleep is a natural, restorative, physiological process that is characterized by perceptual disengagement from and unresponsiveness to whatever going around, which must be reversible (Carckadon MA, Dement WC, 2005). During sleep, most of the body's systems are in an anabolic state, helping to restore the immune, nervous, skeletal and muscular systems, which are vital processes that maintain mood, memory and cognitive function, and play important roles in daily functions (Barlow DH (2014, National sleep foundation (2006).

Sleep quality refers to how long an individual sleeps each night and how well he/she sleeps. Also, it includes how difficult it is for an individual to fall asleep, remain slumbering, and how many times he/she wakes up during the night. Moreover, it is a sense of being rested and refreshed after

waking up from sleep (Christopher M. et al, 2015). Having a good sleep quality is an indicator of wellbeing whereas poor sleep quality results in increased co-morbidity, mortality, health care costs and poor quality of life of PLWHA (Garbarino, S., et al, 2016).

Sleep disturbances impair the quality of life, cognitive function, and emotion of PLWHA that could lead to poor medication adherence (Babson KA, et al, 2013). It can induce various adverse outcomes in patients living with HIV/AIDS (PLWHA), including diminished health-related quality of life, excessive day time sleepiness, and cognitive impairment (Tedaldi, E. M, et al, 2015).

HIV/AIDS is a chronic, potentially life-threatening condition caused by the human immunodeficiency virus (HIV), which interferes with the body's ability to fight against disease causing organisms (Johnston L, O 'et al, 2017). It is one of the most devastating illnesses that human beings ever faced (M.S. Bhatia and SahilMunjal , 2014). As of 2017, approximately 36.9 million peoples worldwide are living with HIV/AIDS. Sub-Saharan Africa is the most affected region, in 2017, an estimated 66% of new HIV infections occurred in this region (UNAIDS, 2018). Ethiopia is one of Sub-Saharan counties, reported a prevalence of 1.1% HIV/AIDS infection in 2016 among individuals aged between 15- 49 (Country/Regional Operational Plan, 2017).

In the United States of America, 50-70 million adults are suffering from sleeping problems (Centers for Disease Control and Prevention ,2015). Among them, insomnia and sleep apnea commonly dominate with a prevalence of 6%-10% and 10-25% respectively (Chai-Coetzer CL, et al, 2015). Sleep disturbances are thought to be common among HIV infected individuals in the US (Crum-cianflone NF, et al, 2012) and have a 40 to 70% prevalence of sleep disturbance and Patients with HIV were found to have a higher risk of sleep disturbances than the general population (Oshinaike O., A 2014).

PLWHA are vulnerable to poor sleep quality as they suffer from the social stigma of the disease, unpleasant side effects of ARV medications including increased risk for metabolic syndromes (Márcio M De,.et al 2018). There is a controversy regarding the association of duration since HIV diagnosis with sleep quality, in which some studies state that short duration since diagnosis is negatively associated with sleep quality (Oshinaike O., et al 2014); whereas others discussed that individuals with long durations since HIV status known are more likely to have diminished sleep quality (Allavena C, et al 2016 and Evelyn E,. et al 2018).

Despite all the above evidence in developed and middle-income countries, little is known in low-income countries, especially in Ethiopia. So, the current study tried to fill this gap and examined the prevalence and associated factors of poor quality of sleep among people living with HIV/AIDS attending ART clinic at Hawassa University Comprehensive Specialized Hospital.

Objectives

General Objective

The general objective of the study is to assess prevalence of poor sleep quality and associated factors among peoples with HIV/AIDS those attending Anti-retroviral Therapy at Hawassa University Comprehensive Specialized Hospital, Sidama, Ethiopia

Specific Objectives

To assess prevalence of poor sleep quality among peoples with HIV/AIDS those attending Anti-retroviral Therapy at Hawassa University Comprehensive Specialized Hospital, Sidama, Ethiopia.

To identify factors associated with poor sleep quality among people living with HIV/AIDS those attending Anti-retroviral Therapy at Hawassa University Comprehensive Specialized Hospital, Sidama, Ethiopia.

Methods

Study design and setting

An institutional-based cross-sectional study was conducted to examine the prevalence and associated factors of poor quality of sleep among PLWHA attending ART clinic at Hawassa University Comprehensive Specialized Hospital (HUCSH) from May1-30, 2020. Hawassa University Comprehensive Specialized hospital is located in Hawassa city, SNNPR, which is 275 km far from Addis Ababa. Beyond other inpatient and outpatient medical services, the hospital provides ART services for PLWHA.

Population

All PLWHA attending ART clinic at Hawassa University Comprehensive Specialized Hospital were source population. PLWHA attending ART clinic at Hawassa University Comprehensive Specialized Hospital ART clinic during the data collection period were the study population. Individual ART client attending ART clinic at Hawassa University Comprehensive Specialized Hospital was the study unit.

PLWHA attending Hawassa University Comprehensive Specialized Hospital ART clinic with age 18 years and above were included in the study but those with a severe medical condition (unconscious or critically ill) and unable to communicate due to hearing difficulty were excluded from the study.

Sample size and sampling technique

The sample size was determined using a single population proportion formula considering assumption (Z=1.96, d=0.05, and P=50%). Then, adding a 10% non-response rate, the final estimated sample size was 408. Among the total ART clients currently being enrolled in ART service, 408 study participants were selected through systematic random sampling technique using sampling fraction; K=6. The sampling fraction (K) was obtained by dividing the total ART clients who have follow-up at Hawassa University comprehensive specialized hospital (n=2533) by the sample size, 2533/408 which is 6. The first individual was selected using a lottery method, and the rest were selected at a regular interval (every 6th).

Measurements and data collection technique

Data were collected by four psychiatry nurses using interviewer administered technique. During data collection daily base supervision was conducted by one MSc psychiatry professional to check for completeness of data collection tool.

Sleep quality was assessed by using the Pittsburgh Sleep Quality Index (PSQI), a 19-item self-rated scale which examined Sleep Quality and disturbances over a 1-month time interval. The tool mainly addresses seven sleep components: sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of hypnotics, and daytime dysfunction during the last month. The total PSQI score is then calculated by summing-up the seven component scores, giving an overall score ranging from 0 to 21. The score >5 points indicates poor sleep quality (30). For the current study the internal consistency of PSQI was found Cronbach's alpha α=0.76.

The hospital anxiety and depression scale (HADS) was used to assess anxiety and depression. It has been validated in Ethiopia and its internal consistency was α=0.78 for anxiety, α=0.76 for depression subscales and α=0.87 for full scale. It has two subscales: the anxiety subscale (HADS-A) and the depression subscale (HADS-D). Each subscale contains seven items, giving a total of 14 items in the HADS**.** It has cutoff point ≥ 8 for each subscale suggestive of depression and anxiety **(31**). For the current study the internal consistency was Cronbach's alpha α=0.81 for full scale.

Social support was measured by using 3 items Oslo social support scale (OSS-3) which is classified as poor social support (3-8 OSS score), intermediate social support (9-11 OSS score), and strong social support (12-14 OSS score) (32). For the current study the internal consistency of OSS-3 was Cronbach's alpha α=0.73. Current substance use: assessing the use of any substance (alcohol, tobacco, cigarette and other) in the last 3 months. Ever use of the substance was assessed if a study participant used any substance (alcohol, tobacco, cigarette and other) at least once in his lifetime.

Monthly income was categorized using the 2015 World Bank poverty line classification. World Bank re-established the international poverty line; from 1.25 US $- 1.9 US $ (1.9*29.06*30=1656 Ethiopian birr (ETB)) monthly income considered as the poverty line. Below poverty line: < 1656 ETB and above poverty line: ≥ 1656 ETB (33).

Variables and data analysis

The dependent variable was quality of sleep (poor/good) and the independent variables were sociodemographic factors (age, sex, marital status, occupation, religion, educational status, income), clinical factors (CD4 count, WHO clinical stage of HIV/AIDS, duration since HIV/AIDS diagnosis, ART drug type, presence of co-morbid medical illness), Substance use (ever use/current use), psychosocial factors (depression, anxiety, social support) and environmental factors (noise disturbance).

Data entry and analysis was conducted using SPSS 22 software. Bivariable logistic regression analysis was conducted to identify independent factors associated with poor quality of sleep. Possible confounding (important variable which have a hidden effect on the outcome) variables were entered into a multivariable logistic regression model to identify the association of each

independent variable with poor quality of sleep. In the final model, variables with a p-value of less than 0.05 declared as statistically significant, and AOR with 95 % CI was calculated to determine the strength of association. Model fitness was checked using the Hosmer and Lemeshow test, and it was found to be 0.71. Multi-collinearity was checked by the variance inflation factor (VIF) and tolerance.

Ethics approval and consent to participate

Ethical clearance was obtained from the Institutional Review Board (IRB) of Hawassa University, college of medicine and health sciences. The data collectors clearly explained the aim of the study for every study participant. Written consent was sought from individual ART client who agreed to participate. Participants who can't read and write gave a fingerprint to indicate consent. Each participant was informed that they have the right to refuse or discontinue participation at any time they want. All participants were randomly selected without any discrimination on any ground. Filled out questionnaires were carefully handled, and all access to results was kept strictly within the members of the research team.

Results

Socio-demographic characteristics

Out of 408 estimated study participants, 389 were included in the analysis, making a response rate of 95.3%. The mean age of respondents was 38.2 (±9.7) years. From the total study participants, 231 (59.4%) were females and 261 (67%) were married. The mean estimated monthly income of patients was 1612.7 (±1349) Ethiopian birr (ETB) (**Table 1**).

Table 7: Socio-demographic characteristics of PLWHA attending ART clinic at Hawassa University Comprehensive Specialized Hospital, Sidama, Ethiopia, 2020 (n=389).

Variable	Category	Frequency (%)
Age	18-24	53 (13.6)
	25-54	233 (59.9)
	55-64	85(21.9)
	>65	18(4.6)
Sex	Male	158 (40.6)
	Female	231 (59.4)
Religion	Orthodox	177 (45.5)
	Protestant	155 (39.8)
	Muslim	51 (13.1)
	Others	6 (1.5)
Marital status	Married	261 (67)
	Single	46 (11.8)
	Divorced	38 (9.8)
	Widowed	44 (11.3)
Educational status	Unable to read and write	49 (12.6)
	Primary	164 (42.2)
	Secondary	110 (28.3)

	College/University	66 (17)
Occupation	Civil servant	58 (14.9)
	Merchant	109 (28)
	Day worker	107 (27.5)
	Student	16 (4.1)
	House wife	66 (17)
	Unemployed	23 (5.9)
	Others	10 (2.6)
Monthly income	<1656ETB	245 (63)
	≥1656 ETB	144 (37)

Clinical characteristics

Out of 389 respondents, 267 (68.6%) were in stage I for WHO clinical staging. Regarding the time since HIV diagnosis, 314 (80.7%) have a duration above 1 year and 259 (66.6%) of respondents have CD4 count ≥500 cells/ml. 209 (53.7%) study participants used EFV based combination ART drug type, and 106(27.2%) have a co-morbid medical illness (**Table 2**).

Table 8: Clinical characteristics of PLWHA attending ART clinic at Hawassa University Comprehensive Specialized Hospital, Sidama, Ethiopia, 2020 (n=389).

Clinical factors	Frequency and (%)
WHO clinical stages	
Stage I	267 (68.6)
Stage II	96 (24.7)
Stage III	20 (5.1)
Stage IV	6 (1.5)
Time since HIV diagnosis	
≤1 year	75 (19.3)
>1 year	314 (80.7)
CD4 count	
<200 cells/ml	11 (2.8)
200-499 cells/ml	119 (30.6)
≥500 cells/ml	259 (66.6)
ART drug Type	
EFV-based	209 (53.7)
Non-EFV	180 (46.3)
Presence of any comorbid chronic medical illness (DM, Ca, HTN or other)	
No	283 (72.8)
Yes	106 (27.2)

Abbreviation: DM: Diabetes Mellitus, Ca: Cancer, HTN: Hypertension, ART: Antiretroviral Therapy, EFV: Efavirenz

Substance use

Out of 389 respondents, 156 (40.1%) and 102 (26.2%) used at least one substance in their lifetime and within the last 3 months respectively (**Figure 1**).

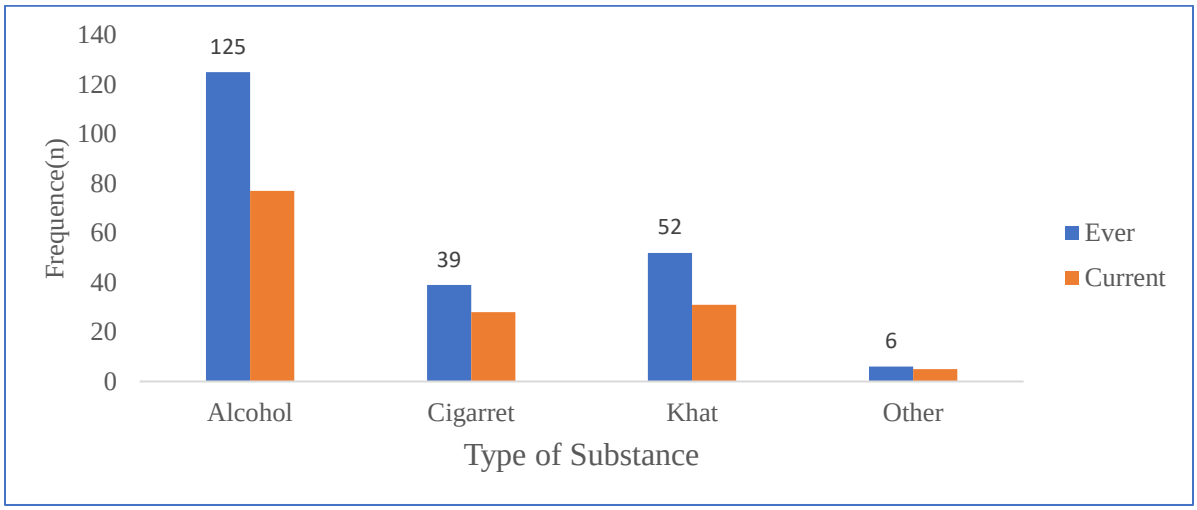

Figure 1: Types of substances used by study participants attending ART clinic at HUCSH, Sidama, Ethiopia, 2020 (n=389)

Psychosocial and Environmental factors

Based on the Hospital Anxiety and Depression Scale, 124(31.9%) and 119(30.6%) of respondents had anxiety and depression respectively. 167(42.9%) of participants received poor social support. Out of the total respondents, 66(17%) complained about the experience of noise disturbance during their sleeping time.

Quality of Sleep

The prevalence of poor quality of sleep among PLWHA was 57.6%. The mean total PSQI score of individuals with poor quality of sleep was 8.43(±2.74) as compared to 3.21 (±1.47) of those with good quality of sleep (**S1 Table**).

Table 3: Sleep quality and its components score of PLWHA attending ART clinic at HUCSH, Sidama, Ethiopia, 2020 (n=389)

PSQI components	**Mean (SD)**	
	Poor	Good
C-1 Self-rated sleep quality (0-3 score)	1.17 (±0.51)	0.65(±0.52)
C-2 Time it takes to fall asleep (min)	58.57 (±49.02)	23.9(±12.3)
C-3 Total hours of sleep per night (hr.)	6.7 (±5.6)	8.2(±6.2)
C-4 Sleep efficiency (%)	74.3 (±13.74)	96.4(±86.9)
C-5 Sleep disturbances (0-27 score)	9.85 (±4.57)	6.05(±3.97)
C-6 Need for sleep medication (0-3 score)	0.33 (±0.7)	0.08(±0.29)
C-7 Day time dysfunction (0-3 score)	1.0 (±0.97)	0.3(±0.6)
Total PSQI score	8.43 (±2.74)	3.21 (±1.47)

N.B: Sleep efficiency= Total hours of actual sleep per night/Total hours in bed per night x100

Factors associated with poor quality of sleep

From the total variables included in the multivariable logistic regression analysis, five variables were found to be statistically significant (P<0.05). Accordingly, age (55-64 and >64), average monthly income (<1656 ETB), having anxiety, having depression and poor social support were found to be significantly associated with poor sleep quality (**Table 4**).

Table 4: Bivariable and multivariable logistic regression of factors associated with poor quality of sleep among PLWHA attending ART clinic at Hawassa University Comprehensive Specialized Hospital, Sidama, Ethiopia, 2020 (n=389).

Variable	Category	Poor Sleep Quality		COR (95%CI)	AOR (95%CI)
		Yes	No		
Age	18-24	23	30	1	1
	25-54	114	119	1.25 (0.69,2.3)	1.4 (0.6, 3.4)
	55-64	72	13	7.2 (3.2, 16.1)	**5.7(1.9, 17.8)***
	≥ 65	15	3	6.5(1.6, 25.2)	**6.6(1.2, 36.9)***
Marital status	Married	142	121	1	1
	Single	29	15	1.6(0.86, 3.27)	1.6 (0.5, 5.0)
	Divorced	26	12	2.1(1.01, 4.46)	1.1(0.4, 3.0)
	Widowed	27	17	1.37(0.7, 2.64)	0.9(0.34, 2.2)
Educational status	Unable to read & write	36	13	2.8(1.25,6.14)	0.5(0.13, 1.6)
	Primary	101	63	1.56(0.8,2.78)	0.6(0.26, 1.7)
	secondary	54	56	1.0(0.54,1.84)	0.8(0.35, 2.2)
	College/university	33	33	1	1
Occupation	Civil servant	19	39	1	1
	Merchant	59	50	2.4 (1.24, 4.7)	2.7(1.01, 7.3)
	Day worker	71	34	4.29(2.16,8.5)	1.83(0.57,5.8)
	Student	11	5	4.5(1.37,14.9)	2.28(0.32,16.2)
	House wife	36	30	2.46 (1.2, 5.1)	1.27(0.37,4.3)
	Unemployed	19	6	6.5 (2.2, 18.9)	3.4 (0.9, 13.2)
	Others	9	1	18.5(2.1,25.6)	5.6 (0.3, 9.6)
Monthly income	<1656 ETB	163	82	2.7(1.77,4.13)	**2.17(1.06,4.4)***
	≥1656 ETB	61	83	1	1
Anxiety	No	116	149	1	1
	Yes	108	16	8.6(4.86,15.4)	**4.4(2.12, 9.2)****
Depression	No	119	151	1	1
	Yes	105	14	9.5(5.19,17.4)	**4.97 (2.28, 10)****
WHO stages of HIV/AIDS	Stage I	131	136	1	1
	Stage II	74	22	3.49(2.05,5.9)	0.77(0.18, 3.4)
	Stage III & IV	19	7	2.82(1.14, 6.9)	0.17(0.03, 1.2)
Duration since HIV diagnosis	≤1 year	39	36	1	1
	>1 year	185	129	1.41(0.85, 2.3)	0.86(0.43, 1.7)

CD4 count	<200 cells/ml	9	2	5.1(1.07,23.8)	1.9 (0.22, 18.2)
	200-499 cells /ml	93	26	4.01(2.44, 6.6)	3.0 (0.7, 13.2)
	≥500 cells/ml	122	137	1	1
ART drug type	EFV-based	136	73	1.86 (1.24,2.8)	1.7 (0.9, 3.04)
	Non EFV-based	88	92	1	1
Chronic medical illness	No	147	136	1	1
	Yes	77	29	2.45(1.5, 3.99)	1.6 (0.8, 3.3)
Lifetime substance use	No	120	113	1	1
	Yes	104	52	1.88(1.2, 2.87)	1.3(0.6, 2.8)
Current substance use	No	151	136	1	1
	Yes	73	29	2.27(1.4, 3.7)	1.03(0.4, 2.6)
Social support	Poor	127	40	5.8(3.02,11.3)	**2.9(1.16, 7.3)***
	Moderate	77	90	1.57(0.8, 2.97)	1.2(0.5, 2.8)
	Good	19	35	1	1

***Significant association (P-value <0.05), ****Significant association (P-value <0.01)**,* **Abbreviation:** COR: Crudes Odds Ratio, AOR: Adjusted Odds Ratio, CI: Confidence Interval, ART: Anti-Retroviral Therapy, ETB: Ethiopian Birr

Discussion

In the current study, the prevalence of poor sleep quality was 57.6% (95% CI: 54.72, 60.48). The result is somewhat in agreement with the result reported from Mexico which is 58.9% (Evelyn E, .et al 2018). However, the prevalence in the current study was lower than the study conducted in Nigeria which is 59.3% (Oshinaike O, .et al 2014). The finding in the current study was higher than the result reported from South Africa which showed that the prevalence of poor sleep quality was 52% (Kirsten Redman (2016), Iran 47.5% (Dabaghzadeh F,. et al 2013), China 43.1% (Huang, X., et al 2017), Brazil 46.7% (Ferraira LTK, Coelim MF 2012), France 47% (Allavena C, et al 2016), Southern US 40% (Janelle McDaniel 2011), John Hopkins Medical Institution USA 56% (Gamaldo CE et al. 2013), another study in USA 46.1% (Crum-cianflone NF, et al 2012) and Taiwan 27.4% (Chen YC,.et al 2017). These discrepancies might be due to various factors including differences in the geographical area, socio-cultural variation, characteristics of study participants and the inclusion and exclusion criteria used.

An individual living with HIV/AIDS age between 55-64 years was 5.7 times more likely to experience poor sleep quality compared to the younger (18-24 years) individual. Also, study participants with age ≥ 65 were 6.6 times more likely to experience poor quality of sleep compared with those with younger age groups. This implication might be related to various factors including age-related immunity deterioration, dropping of growth hormone levels, which is known to facilitate deep sleep, psychological and socio-economic factors including retirement from jobs result in a poor quality of sleep. Also, as an individual gets older, the neurological receptors that connect with sleep signaling chemicals weaken, which results in the brain face a long time figuring out when individuals are tired (Winkleby MA, et al1992). The current finding was consistent with the study conducted in China (Wenwen Wu,. et al 2018).

Individuals below the poverty line (<1656 ETB) were 2 times more likely to experience poor quality of sleep compared with those above poverty lines. This might be related to some negative emotions posed by survival pressure over low-income earners might result in a poor quality of sleep. Also, individuals with higher socioeconomic status have been hypothesized to get positive social, psychological, and economic skills that protect against the effect of hardship (Winkleby MA, .et al 1992) which would protect sleep problems. This finding is in agreement with the study reported in China (Wenwen Wu, Wenru Wang, Zhuangzhuang Dong,. et al 2018).

Our study also revealed that the presence of both anxiety and depression increases the possibility of experiencing poor quality of sleep compared with their counterpart. This might be due to the linkages between sleep, emotional regulation and alteration in the Hypothalamic-pituitary-adrenal axis implication of psychopathology and sleep-wake cycle. Also, the presence of insomnia symptoms was higher among individuals who have anxiety and depression which results in poor sleep quality (Mellinger GD, Balter MB, Uhlenhuth EH. Insomnia and its treatment. Prevalence and correlates. Arch Gen Psychiatry. 1985). The result is in agreement with the studies conducted in the USA (Crum-cianflone NF,.et al 2012), Mexico (Allavena C,. et al 2016) and Iran (Azizeh Afkham Eb,. Et al 2010).

Lastly, our study results suggested, individuals who received poor social support to be 2.9 times more likely to develop poor quality of sleep. Social support is thought to promote sleep quality by providing a safe context in which close family or friends protect sleepers from enemies or other threats (Dahl RE., & El-Sheikh, M. 2007). The current finding was in line with the study conducted in Mexico (Allavena C, .et al 2016).

Limitation of the study

One limitation of our study is that it's cross-sectional nature, which is weak to evaluate the cause-effect relationship. Lack of a control group limited our study's ability to characterize the sleep pattern of people with HIV/AIDS in contrast to the general population. Also, since only 1.5% of the samples in the current study were classified as stage IV, the finding can't be generalized for study participants at severe HIV stage.

Conclusion

The prevalence of poor quality of sleep among PLWHA was high (57.6 %), which indicates desperate life of individuals living with HIV/AIDS in Ethiopia. Average monthly income, age, anxiety, depression, and social support were found to be significantly associated with poor sleep quality. *Health care professionals working at the ART clinic need to regularly assess the sleep pattern of ART clients*, give psychoeducation on prevention and management of sleep pattern problems. *Special consideration has to be given to those with age >55 years, having poor social support, having depression and anxiety, and individuals living below the poverty line.*

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Routine Health Information Use and its predictors in the Public Health Facilities of Hawassa City, Sidama Region, Ethiopia

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ABSTRACT

A well-functioning Health Information System produce reliable and timely information on health determinants, health status and health system performance, and be capable of analyzing this information. In Ethiopia, utilization of routine health information is poor among health workers at all levels of health facilities. Therefore, this study aimed to assess Routine Health Information Use Status and its predictors in the Public health institutions of Hawassa City, Sidama Region, Ethiopia;2019

Institution based Cross Sectional study design was used to conduct the study among 333 Health care providers recruited from all governmental Health Facilities of Hawassa City. A stratified sampling technique was used and Health Facilities was considered as strata and then from each stratum all current data owners and those staffs who acted as a data owner in the past two years were recruited in the study. The data was collected through interview and it was analyzed using STATA 14 software. Descriptive statistics was employed to describe the background characteristic of the study population. Knowledge status on RHIS was measured by calculating the median score of all items related to knowledge questions and classifying as good or poor. Multiple binary logistic regression model was used to determine predictors of health information use status. The final result is presented using frequency distribution table and figures. The regression model result was determined at the 95%CI with the α value of 0.05.

***T**he overall health information utilization is 28%. Educational status 1.70[1.68 2.96], having supportive supervision on HIS 2.89[1.84 9.99], training on service planning 2.44[1.15 5.20], having performance monitoring plan 2.28[1.31 3.96] and knowledge status on health information use 4.75[2.8 7.91] are the statistically significant predictors of health information use.*

According to this study, health care providers mainly use health related data for planning but few of them are using for provision of feedback and conducting research. Educational level, supportive supervision, having updated performance monitoring plan, having training on service planning and knowledge status on health information use are the significant predictors of health information use. Supportive supervision should be provided for the individual staffs and they should also have their own plan. Training should also be provided for staffs on how to do their own plan and awareness should be created for all staffs on what health information is.

Keywords: Health information system, median score, health information utilization;

INTRODUCTION

Good *health services* are those which deliver effective, safe, quality personal and non-personal health interventions to those that need them, when and where needed, with minimum waste of resources. The World Health Organization (WHO) recommends supporting and strengthening a health system based on the six building blocks; Health Information Systems(HIS), health workforce; health services; health financing; governance and leadership and medical products, vaccines(WHO, June 2008.).

Sound and reliable information is the foundation of decision making across all health system building blocks. It is essential for health system policy development and implementation, governance and regulation, health research, human resources development, health education and training, service delivery and financing(ABOUZAHR, 2005).

A well-functioning HIS should produce reliable and timely information on health determinants, health status and health system performance, and be capable of analyzing this information to guide activities across all other health system building blocks(Aqil A Lippeveld T Hozumi D, 2009). Thus, an HIS enables decision-makers at all levels of the health system to identify progress, problems, and needs; make evidence-based decisions on health policies and programs; and optimally allocate scarce resources(Pakenham-Walsh, 2009)– all of which are key elements in the success of large-scale efforts to achieve health improvements(KOLS, 2009.)**.**

Data from different sources are used for multiple purposes at different levels of the health care system. At the individual level, data about patient's profile, health care needs, and treatment serve as the basis for clinical decision-making. Health care records provide the basis for sound individual clinical care. At the Health facility level, both from aggregated facility-level records and from administrative sources such as drug procurement records, enable health care managers to determine resource needs, guide purchasing decisions for drugs, equipment and supplies, and develop community outreach. Data from health facilities can provide immediate and ongoing information relevant to public health decision-making process. At the Population level data are essential for public health decision-making and generate information not only about those who use the services but also, crucially, about those who do not use them. Household surveys have become a primary source of data in developing countries that has been needed everywhere because they are the only good source of information on individual beliefs, behaviors and practices that are critical determinants of health care use and of health status(WHO, June 2008.)**.**

The Federal Ministry of Health (FMoH) of Ethiopia introduced the Health Sector Transformation Plan (HSTP)which focuses on addressing quality and equitable distribution of health service delivery for all(FMOH, 2015). Owing to the observed gap in the health sector, information use has been given substantial prominence in HSTP as part of information revolution which is one of the four transformation agendas in the current HSTP.

There are a variety of barriers that influences the creation of information use culture. While most of these barriers are technical issues that can be addressed by technical solutions, many barriers are linked to organizational and behavioral factors as explained in the Performance of Routine Information System Management(PRISM) framework(Aqil A Lippeveld T Hozumi D, 2009)**.**

Statement of the problem

Since the 1990s, knowledge and understanding of the role of health information on global health systems have markedly improved. Despite this, use of information for evidence-based decision making is still very weak in most low- and middle-income countries, particularly for data produced by health facility. In those countries, data are not optimally used for routine planning, monitoring and evaluation by the private or public sectors (Atsede Mazengia Shiferaw1*, 2017 , Kols, 2009). This is due to: the lack of sharing of complete, accurate and timely data; duplicate and parallel reporting channels; and insufficient capacity to analyze and use data for decision-making(HARDEE, 2004. , FMOH, 2015, FMOH, 2012.).

Ethiopia has demonstrated standardized comprehensive health management information system (HMIS)which is one of the cross-cutting attributes in the health systems building blocks that have been implemented since 2008.The aim was to capture core indicators used to monitor the provision of health services and ultimately improve health status of the population. Since then, some improvements have been observed with regards to information use for evidence-based decision making. However, information use culture is far behind the expectations(FMoE;, June 2018.).

Access to health information in developing countries is key not only for designing sound health programs at the national level but also for implementing quality services at different level. Yet many health professionals and health policymakers in Africa lack access to the information needed to make evidence-based decisions and provide effective health care(ATSEDE MAZENGIA SHIFERAW1*, 2017)**.**

Frontline health care providers cite poor availability of current health information that is context-specific and that supports patient care. At the district level, many providers lack reliable monitoring and supervision data. Provincial-level managers often cannot access current data for program planning and evaluation, and national-level policymakers lack timely, relevant data upon which to base decision making(KOLS, 2009)**.**

The Federal Ministry of Health (FMoH) of Ethiopia introduced the Health Sector Transformation Plan (HSTP) which focuses on addressing quality and equitable distribution of health service delivery for all(FMOH, 2015). District facility staff rarely used routine data to identify performance gaps, make plans, and monitor progress. The health data generated at health facility only used for report purposes and not to drive decisions and program improvements(FMOH, 2012. , FMOH, 2016.)**.** Furthermore, the inadequacy of information use among health care professionals in the southern region remains a problem.

In Southern Nations and Nationality and peoples Region (SNNPRs), although there is dearth of literature, recent findings revealed that there is limited use of health information in the region. There is also limited competence in data analysis, interpretation and problem solving at the health facilities. Having the skill on data management has its own role for Health information use. But there are no enough opportunities for continuous transfer of skills through on job-training or orientation mechanisms. In addition to that, support given through integrated supervision is not specifically geared towards HMIS tasks. There is no specific supervisory checklist for HMIS tasks, particularly for checking information use culture. The technical aspects of HIS such as integration

of data collection tools, availability and accessibility of user friendly database and availability of data collection and definition procedure manual are not well-established that are helpful for insuring accessibility of health information for its utilization(H, 2014.).

This study will, therefore, helps us to fill the gaps in a more efficient and effective way by focusing on the routine Health information use in the selected Hospitals of Hawassa City.

Significance of Study:

The study finding will act as an eye opener for the public health facilities on the importance of routine health information use for the purposes of decision making, planning and evaluation. Once this study is implemented, it will be useful for public health facilities to appreciate the relevance of fitting health information systems for better information management. It will guide and change the mindset of public health facilities management orienting their behavior and practice towards better and improved service delivery.

The study may also become an input for the Ministry of Health and other relevant health authorities in strengthening capacity and systems to improve routine health information use status. It will also enable health care providers andmanagers to monitor performance and to identify barriers to provision of equitable and quality of health services and ultimately design solutions to improve performance of the health system.

Objective

General objective:

To assess routine Health Information Use and its predictors in the Public Health Facilities of Hawassa City, Sidam region, Ethiopia, from November 1st to 30 of 2019

Specific Objectives

To determine the extent of routine Health Information use status in the Public Health facilities of Hawassa City, Sidama Region, Ethiopia

To determine knowledge status of health care providers on routine Health Information System in the Public Health Facilities of Hawassa City, Sidama region, Ethiopia

To identify predictors of routine Health Information use status in the Public Health Facilities of Hawassa City, Sidama region, Ethiopia

MATERIALSANDMETHODS

Description of the study area

The study was conducted in the Governmental public health facilities found in Hawassa City which is the capital of Sidama Region and Southern Nations, Nationalities and Peoples (SNNPR) of Ethiopia. The city is located 275 Km to the south of Addis Ababa on the shoreline of Lake Hawassa. Based on the information obtained from Plan and Development Core Process of Hawassa City Administration Health Office, the City had an estimated total population of 376,541 in 2019 G.C of which 50.2 % of them are females. In the town, there are 10 health centers, 1

General Hospital, 1 Primary Hospital and 1 Referral Hospital owned by Ministry of Science and Technology. The study participants were recruited from all Health Facilities. The study unit wase listed from all case teams of the Health Facilities.

Study subjects

Source population: All health care providers working in the selected Health Facilities were the source population.

Study population: All Health care providers involved in the study were the study population.

Study unit: The study unit was an individual health care provider

Study Variables

Dependent variable

The dependent variable was health information use status and is classified as good or poor

Independent variables

The independent variables are**:**

Socio Demographic Related Variables like age, sex, educational level, work experience

Organizational factors: being supervised, receiving feedback, having computer, printer, telephone in the department etc

Technical factors: having training on the basic skill on computer, having training on planning, having training on data management, analysis etc.

Operational Definition

Data: Unprocessed raw data or facts.

Data owners: A person who have the power to control information that includes not just the ability to access, create, modify, package, derive benefit from, sell or remove data, but also the right to assign these access privileges to others.

Determinants: The elements guiding and limiting use of routine health data and information

Information: In this study, information refers to processed data.

Health Information System:(HIS) A set of component and procedures organized with the objective of generating information which will improve health care management decisions at all levels of the health system. Health information system integrates data collection, processing, reporting, and use of the information necessary for improving health service effectiveness and efficiently through better management at all levels of health services (Leppeveld et al, 2000).

Routine Health Information System (RHIS): Ongoing data collection on health status, health interventions and resources

Knowledge on RHIS: knowledge on RHIS was measured by calculating the median score of all items related to knowledge and classifying as good knowledge when the health care provider score greater than the median knowledge question or poor knowledge when the health care provider score less than the median score for knowledge related questions by considering the distribution of data.

Study design (Study type, Sample size and Sampling Procedure)

Institution based cross sectional study design was used to conduct the study. The Sample size was calculated using the single population proportion formula, considering the following assumptions: **32.9%**prevalence of health information utilization in Jimma Zone of Oromia Region(Sultan Abajebel1, August 2011), 95% level of confidence, 5% of margin of error, and 5% of non-response rate. Finally, a minimum sample size of **356**was obtained and used for this study.

A stratified sampling technique was employed to conduct this study. Selected health facilities were considered as strata and then the sample size was proportionally allocated to each Hospital according to the size of Health care providers available. Then from each health facility all case teams were considered and again we used proportional allocation to select individual health care providers from each case team **(Figure1).**

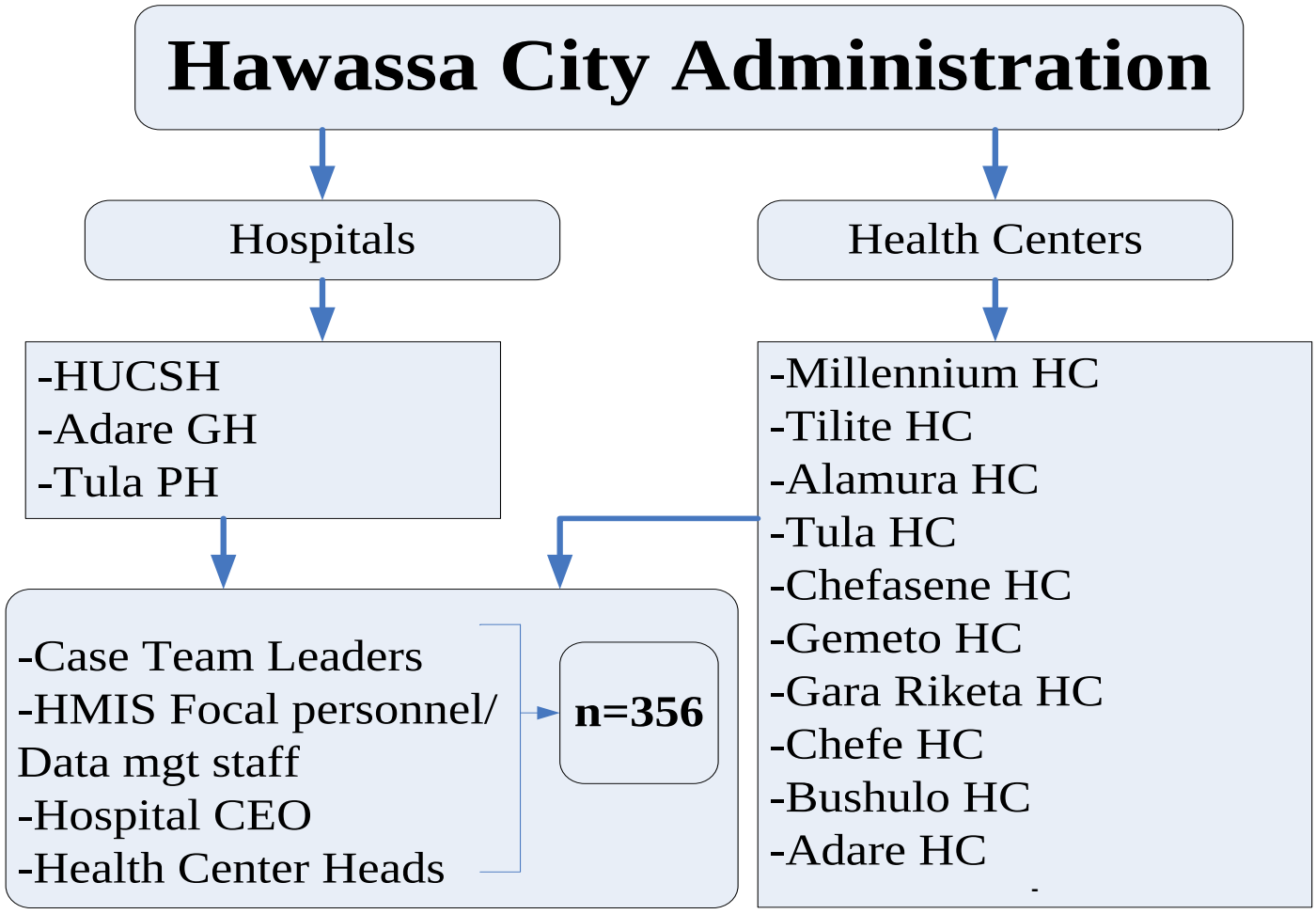

Figure 2: Sampling technique and its procedure

Study Methodology

Data collection tool and its procedures:

We have used an interview as a tool to collect the data. The questioner was adapted from the Performance Routine Information System Management (PRISM) framework. The tool contains information about respondent background characteristics, organizational and technical related factors and Health care providers knowledge status on routine health information use status.

Data quality management

To ensure data quality, training was given for data collectors on the tools needed to collect the data, on the objective of the study and on the confidentiality of information. During the time of data collection, participants were informed about the objective and processes of the study and confidentiality of the information. Data collectors were supervised at the study site and meetings were held at the end of every day to discuss on challenges phased and we crosschecked data completeness and its accuracy.

Data management and analysis

The data was cleaned and entered into Epi-data version 7.2 and exported to STATA Version 14 for further analysis. Before analyzing the data; we cleaned up for missing values, outliers and extreme values. Descriptive statistics was performed to explain background characteristics of the study population. Categorical variables were described using frequency and percentage and figures. For continues variables the plot of normality was checked using histogram. Since all the continuous variables were not normally distributed, we categorized it into different non overlapping class interval and reported using table.

Simple binary logistic regression analysis for each independent variable was performed against the dependent variable to see the association between information use statuses the potential predictors without controlling the other covariates. To identify the candidate predictors for the multiple binary logistic regression model, a P value of <0.25 was used as a cut of point in the simple binary logistic regression.

Confounding and interaction effect were tested by checking the percentage of the difference in beta coefficient value and change in value>15% was checked for interaction effect. Multicollinearity was checked by calculating the Variance Inflation Factor (VIF).The cut off point for acceptability of multicollinearity effect was VIF <10. Goodness of the model was tested by diagnosing correctness of formulation of the model by using Hosmer_ Lemshow test. The predicting ability of the model was tested using receiver Operating characteristics (ROC) curve and the area under the ROC curve was assessed. Finally, the multiple binary logistic regression model assume that health information use status and its predictors were related through the following equation with the 95% CI and α=0.05.

$$ln\left(\frac{P}{1-P}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots$$

Ethical considerations

Ethical approval was given from a research review Board of Hawassa University. Letter was secured from Hawassa city administration health office for all Hospitals. Verbal informed consent was obtained from each study participant. All information obtained from each study participant was kept confidential throughout the process of study, and the name of the participant was not used.

RESULT

Socio-demographic and economic background characteristics

In this study; 51.2 % of the interviewed heath care providers are within the age range of 25-29. Around three fourth (72.46%) of the employees' educational status is degree and above. From the total study population, 94.61% had been supervised before with senior supervisors. Majority of them (64.56%) were supervised every 3 months and 90.51% of them received feedback on the supportive supervision provided for them. About 95.51% of the study population respond that their Health Facility has a separate room for HIS implementation. Only 60.48% of the study population

respond that there is HMIS data management standard guideline in the unit where they are working in. From the total study population, 93.71% of them responded that their HF allocated budget for HIS implementation. Three fourth (73.95%) of the respondents didn't take training on basic computer skill and 58.68% of them have taken training on HMIS. Only 21.56% of the study population Have taken Training on data utilization. A total of 320(95.81%) respondents heard about Health information use and their source of information is mainly from their own Health Facility(56.56%).Just 240(71.86%) of the study population responded that they have an updated performance monitoring plan(table 1).

The average utilization of HMIS data is 28% and majority of the health care providers use for planning (81%) and the others for identification of performance gap (34%), performing plan and achievement (28%) and for clinical management (25%) (Figure 2).

Table 9: Background characteristics of health care providers in the health facilities of Hawassa town, 2019

Characteristics	No.	%	Characteristics	No.	%
SECTION 1. Socio-demographic and economic background characteristics			There is a person assigned to HIS in the HF		
Title of interviewee			0. Yes	319	95.51
0. HMIS focal	51	15.27	1. No	15	4.49
1. Case team leader	174	52.1	There is a separate room for HIS/HMIS Implementation		
2. Care provider	84	25.15	0. Yes	319	95.51
3. Health Facility Head	12	3.59	1. No	15	4.49
4. Data clerk	13	3.89	Have a graph paper and marker for PMC		
Age			0. Yes	277	82.93
0. 20_24	43	12.87	1. No	57	17.07
1. 25_29	171	51.2	Have HMIS data management standard guideline in the unit		
2. 30_34	84	25.15	0. Yes	202	60.48
3. 35_39	24	7.19	1. No	132	39.52
>=40	12	3.59	The HF allocated budget for HIS implementation		
Educational status			0. Yes	313	93.71
1. Diploma	92	27.54	1. No	21	6.29
2. Degree and above	242	72.46	SECTION 3: Technical characteristics		
Field of study					
			Have taken training on basic computer skill)		
0. Laboratory technician/technologist	8	2.4	0. Yes	87	26.05
1. HIT/ or IT	34	10.21	1. No	247	73.95

2. BSc Nurse	126	37.84	have taken training on Health Service planning		
3. BSc Midwifery	35	10.51	0. Yes	67	20.06
4. BSc Health Officer	54	16.22	1. No	267	79.94
5. Masters in PH or related	16	4.8	Have taken training on HMIS		
6. Physician	7	2.1	0. Yes	138	41.32
7. Diploma Nurse	42	12.61	1. No	196	58.68
8. Diploma Midwifery	11	3.3	Have taken training on data analysis and management	76	22.75
Currently working as a data owner			0. Yes	258	77.25
0. Yes	255	76.35	Have taken Training on data utilization		
1. No	79	23.65	0. Yes	72	21.56
Used HMIS data before			1. No	262	78.44
Yes	206	61.86	Have participated on Presentation/workshop related with HIS		
No	127	38.14	0. Yes	119	35.63
ZECTION 2. Organizational Factors			1. No	215	64.37
Ever supervised on HIS			heard about Health Information use before		
0. Yes	316	94.61	0. Yes	320	95.81
1. No	18	5.39	1. No	14	4.19
If yes frequency of supervision done)			If yes source of Information		
0. Every Year	19	6.01	0. Electronic media	7	2.19
1. Every 3 month	204	64.56	1. Training	115	35.94
2. Every 6 month	33	10.44	2. From Health facility	181	56.56
3. Every Month	40	12.66	3. Friends	17	5.31
4. Not regular	20	6.33	have an updated performance monitoring plan		
Receiving regular feedback on HIS			0. Yes	240	71.86
0. Yes	286	90.51	1. No	94	28.14
1. No	30	9.49	Knowledge status on Health information use		
Thinking the feedback is relevant			Good	176	52.38
0. Yes	301	95.25	Poor	160	47.62
1. No	15	4.75			

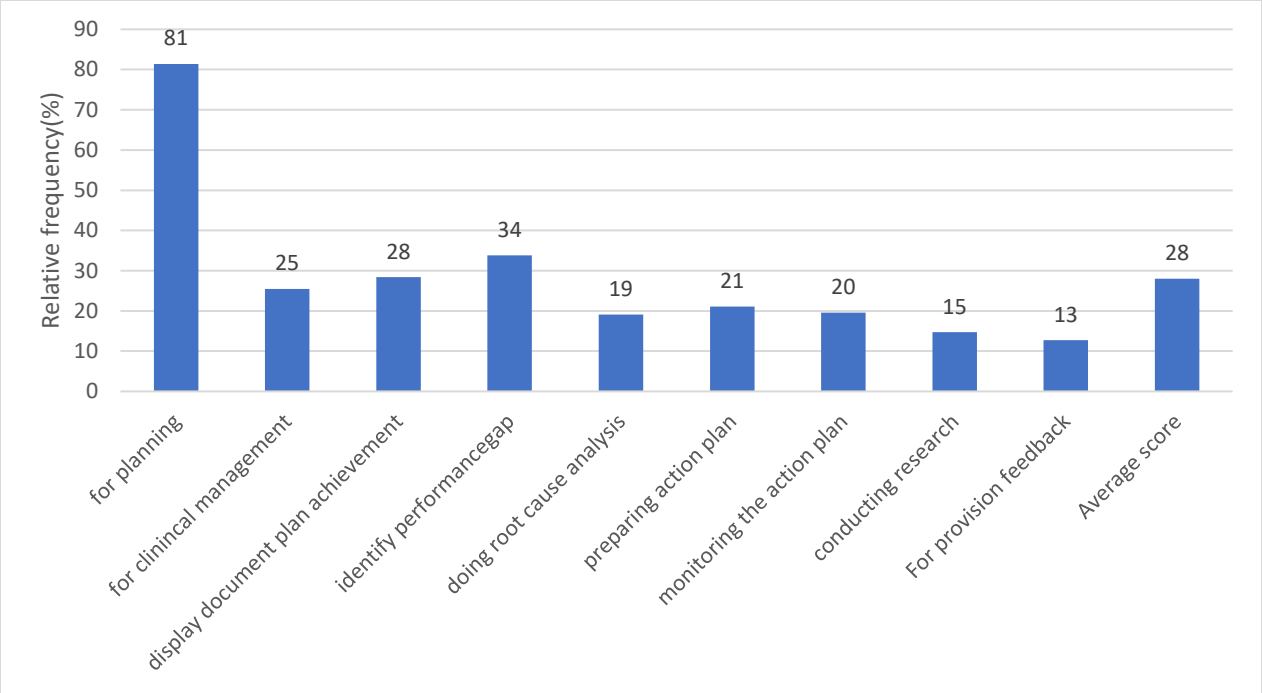

Figure 3: Utilization status of routine HMIS data in the public health facilities of Hawassa Town;2019

Knowledge status of Health care providers on Routine Health Information Use

Knowledge status of the study population was assessed with four different spectrums. They are; knowing reasons for collecting or using aggregated diseases data; reasons for collecting or using aggregated age/sex of patients/clients; reasons for collecting or using geographical data or residence of patients and the reason for using population data.

A total of 214(67.94%) respondents said to know change in magnitude burden of selected diseases and only 58(9.63%) of them to triage patients who need urgent care are the reasons for collecting or using aggregated diseases data. A total of 243(82.37%) respondents said that

Ensuring equitable service overage across peoples of all groups is the reason for collecting or using aggregated age/sex of patients/clients. Regarding to the reasons for collecting or using geographical data, 205(40.43%) of the respondents said for disease surveillance to control epidemic disease outbreak and 171(33.73%)of them said service targeted toa certain geographic area. For the purpose to use population related data,202(44.69%) of the respondents said to plan the provision of various health services and 111(24.67%) of them said to use as a denominator for calculation of indicators (table 2).

1	What is /are the reasons for collecting or using aggregated diseases data:	Frequency	% of responses	% of cases
	To_provide_individual_level_care	63	10.47	20.00
	To_know_change_in_magnitude_b urdon_of_selected_diseases	214	35.55	67.94
	To_triage_patients_who_need_u rgent_care	58	9.63	18.41
	To_identify_disease_outbreak_ and_take_action_to_adress_epidemic	120	19.93	38.10
	To_plan_preventive_and_promotive_activities)	147	24.42	46.67
	Total	602	100.00	191.11
	Valid cases: 315			
	Missing cases: 21			
2	What is/are the reasons for collecting or using aggregated age/sex of patients/clients?			
	To_ensure_equitable_servicec overage_across_peoples_of_allg roups)	120	26.43	40.68
	To_know_which_group_is_affect ed_by_certain_diseases)	243	53.52	82.37
	To_know_if_the_appropriate_group_is_getting_the_relevant_se rvice	91	20.04	30.85
	Total	454	100.00	153.90
	Valid cases: 295			
	Missing cases: 41			
3	What is/are the reasons for collecting or using geographical data or residence of patients, i.e., where they come from?			
	To_plan_preventive_promotive targated_to_acertain_geograph	171	33.73	55.34
	To_improve_access_and_utiliza tion_of_health_services)	83	16.37	26.86
	To_determine_the_behavioure_of_clientsorpopulationgroups	48	9.47	15.53
	For_disease_surveilance_to_control_epidemic_disease_outbreak	205	40.43	66.34
	Total	507	100.00	164.08
	Valid cases: 309			
	Missing cases: 27			
4	Why are population data needed (e.g., number of people living in the catchment area)?			
	To_use_as_a_denominator_for_ alculation_of_indicators)	111	24.67	39.78
	To_plan_the_provision_of_vari ouse_health_services)	202	44.89	72.40
	To_calculate_the_workload_of_ health_services	101	22.44	36.20
	To_know_the_knowledge_and_skill_of_health_professionals)	36	8.00	12.90
	Total	450	100.00	161.29
	Valid cases: 279			
	Missing cases: 57			

Table 10:Knowledge status of Health care providers on Routine Health Information Use (RHIS)

Variables	Frequency	% of responses	% of cases
What is /are the reasons for collecting or using aggregated diseases data:			
To_provide_individual_level_care	63	10.47	20.00
To_know_change_in_magnitude_b urdon_of_selected_diseases	214	35.55	67.94
To_triage_patients_who_need_u rgent_care	58	9.63	18.41
To_identify_disease_outbreak_ and_take_action_to_adress_epidemic	120	19.93	38.10
To_plan_preventive_and_promotive_activities)	147	24.42	46.67
Total	602	100.00	191.11
Valid cases: 315			
Missing cases: 21			
What is/are the reasons for collecting or using aggregated age/sex of patients/clients?			
To_ensure_equitable_service_c overage_across_peoples_of_allg roups)	120	26.43	40.68
To_know_which_group_is_affect ed_by_certain_diseases)	243	53.52	82.37
To_know_if_the_appropriate_group_is_getting_the_relevant_se rvice	91	20.04	30.85
Total	454	100.00	153.90
Valid cases: 295			
Missing cases: 41			
What is/are the reasons for collecting or using geographical data or residence of patients, i.e., where they come from?			
To_plan_preventive_promotivetargated_to_acertain_geograph	171	33.73	55.34
To_improve_access_and_utiliza tion_of_health_services)	83	16.37	26.86
To_determine_the_behavioure_of_clientsorpopulationgroups	48	9.47	15.53
For_disease_surveilance_to_control_epidemic_disease_outbreak	205	40.43	66.34
Total	507	100.00	164.08
Valid cases: 309			
Missing cases: 27			
Why are population data needed (e.g., number of people living in the catchment area)?			
To_use_as_a_denominator_for_ alculation_of_indicators)	111	24.67	39.78
To_plan_the_provision_of_vari ouse_health_services)	202	44.89	72.40
To_calculate_the_workload_of_ health_services	101	22.44	36.20
To_know_the_knowledge_and_skill_of_health_professionals)	36	8.00	12.90
Total	450	100.00	161.29
Valid cases: 279			
Missing cases: 57			

Explanatory Variables	COR	[95% CI]		AOR	[95% CI]	
Educational_Status						
Diploma	1			1		
Degree and above	2.93	[1.18	7.28]**	1.70	[1.68	2.96]**
Beinig_ever_supervised						
Yes	2.65	[0.67	10.51]*	2.89	[1.84	9.99]**
No	1			1		
training_onserviceplanning						
Yes	2.15	[0.82	5.64]*	2.44	[1.15	5.20]**
No	1			1		
Training_onHMIS						
Yes	0.53	[0.26	1.10]*			
No	1					
Participation_inpresentation						
Yes	2.03	[0.90	4.6]*			
No	1					
Having_performanceMP						
Yes	2.91	[1.44	5.88]***	2.28	[1.31	3.96]***
No	1					
Service year						
1_5	1					
6_10	0.37	[0.18	.76]***			
>10	0.66	[0.19	2.27]			
Knowledge status	1					
Good	5.57	[3.07	10.11]***	4.75	[2.8	7.91]***
Poor						
_cons	0.37	[0.03	5.22]			

The multivariable binary logistic regression result showed that Health professionals with educational status of secondary level and above 70% more likely use health information compared with health care providers with diploma level 1.70[1.68 2.96]. Regarding to supportive supervision on HIS, health care providers who have been supervised 2.89 times use health information compared with health care providers who have not been supervised 2.89[1.84 9.99]. Health care providers who had taken training on service planning 2.44 times more likely utilize health information compared with health professionals who have not been trained on service planning 2.44[1.15 5.20].Health professionals who have prepared performance monitoring plan 2.28 times more likely use health information use compared with health professionals who have not been prepared performance monitoring plan 2.28[1.31 3.96](table 3).

Table 11: Factors significantly associated with Health Information Use status in the Public Hospitals of Hawassa Town, 2019.

DISCUSSION

Findings in this study evidently showed that routine health information use is low among health care providers.The overall health information utilization is 28%.Consistent finding was observed from a study conducted in western Amhara region 38.4% and from a study conducted in Jimma Zone of Oromia Region 32.9% (Mulusew Andualem Asemahagn, (2017), Sultan Abajebel1, August 2011). The possible justification behind this condition might be knowledge status of data

owners on data utilization, the dedication given for health information utilization might be less. The monitoring and mentorship support might be also poor from the higher level.

The main areas of routine health information use reported by health workers were mainly on planning (81%). Other areas like Provision of feedback(13%), preparation of an action plan(21%); monitoring an action plan(20%); and for clinical management (25%) are low. This is consistent with the current practice whereby facilities develop yearly plans and must use previous year data as their baseline information during the planning process. This findings also corresponds with a study results in India, Tanzania and Uganda which showed that most staff at district level reported using routine health information for program related management especially planning, monitoring, medical supply and drug management(B., 2008, Harrison T, 2010, MEASURE 2009).

Knowledge status on health information use was determined by assessing whether the respondents know the reason for collecting or using aggregated diseases data; reason for collecting/using aggregated age/sex of patients/clients; the reasons for collecting or using geographical data or residence of patients and the reason for collecting population data.

More than half (67.94%) of the respondents said that the reasons for collecting or using aggregated diseases data is to know change in magnitude or Burdon of selected diseases. When HMIS report is generated always it is in the form of aggregation. Aggregated data tells us a lot of things about the event. It is used to develop information about groups of patients. It allows healthcare professionals to identify common characteristics that might predict the course of the disease or provide information about the most effective way to treat a disease.

About 82% of the study population know that the reason for collecting/using aggregated age/sex of patients/clients is to know which group is affected by certain diseases. The availability of sex- and age-disaggregated data allows program managers and decision makers to examine service delivery, treatment, and health outcome data in depth. This helps them detect differences between the sexes, age groups, and key populations, which can lead to better understanding of the health needs of each of these groups and populations. Access to these data can also ensure that health systems do not perpetuate inequities associated with negative health outcomes (MEASURE Evaluation University of North Carolina at Chapel Hill 400 Meadowmont Village Circle, April 2017).

Two hundred five (66.34%) of the study population responded that the reason for collecting geographic data is for disease surveillance and outbreak investigation. Geographical data helps to generate thematic maps that depict the intensity of a disease or vector. It can create buffer zones around selected features and then combine this information with disease incidence data to determine how many cases fall within the buffer. It can also map the impact zone of vector breeding site, where control activity needs to be strengthened(Dr. C.P. Johnson Dr, 2009).

A total of 202 (72.40%) of the cases responded that the reason for collecting population data is to plan the provision of various health services. In a number of countries, the population census plays a major role in the allocation of elected political seats in government. The number of elected officials for each governmental administrative unit is determined by the population size of a given locale. For some countries, the information is also used in the allocation of government resources.

The size of the population determines, in part, the amount of money that is provided by government for development efforts.

For planners, census information is used in just about all planning decisions. The census of population provides information on the age and sex distribution, in addition to household composition and size, all of which are vital in determining the needs of different segments of the population. The census of housing allows planners to assess changes in the quality of housing and related facilities and plan for future housing needs. Table 4-1 provides possible planning-related uses for population and housing data(Evaluation)

The level of education, being supervised, having training on service planning, having performance monitoring plan and having good knowledge on health in formation use played a significant role in the utilization of information. Participants with degree and above educational level reported to use health information always compared to diploma level. This indicates that education is likely to be associated with health information use. It appears those health workers who are better-educated places more value on information and use it more often(HRIM);, 2017).

According to our study, having supportive supervision from the higher officials helps the health care providers to utilize health information. This is similar to a study done in in western Amhara region of Ethiopia(Mulusew Andualem Asemahagn, (2017)). The justification behind this is that, when health care providers get regular supportive supervision on health information system, they will improve their knowledge and skill of health information use for various purposes.

According to the current study, respondents who have good knowledge on health information utilization are more likely to be good on information use than others. This finding is also supported by various studies: WHO (World Health Organization), Kenya, Ethiopian Federal Ministry of Health(World Health Organization, 2007b, Mucee, 2016, Andarge, 2006). This could be justified that health care providers who had good knowledge on health information utilization can use it because they can easily manage, process, communicate and use health information for decision making process.

CONCLUSION

According to our study, the overall health information utilization is low compared to previous studies and national expectation. Data owners mainly use health related data for planning but only few of them are using for provision of feedback and conducting research. More than half of the study population have good knowledge on health information use. Educational level, supportive supervision, having updated performance monitoring plan, having training on service planning and knowledge status on health information use are the statistically significant predictors of health information use.

RECOMMENDATION

In order to strengthen utilization of routine health information, Ministry of Health should apply appropriate and effective strategies that will promote the consistent health information use for decision making: Create organizational culture through increased demand for and use of routine health information for evidence-based decision making in all aspects.

Health care providers should upgrade themselves by education to advance their understanding on the utilization of health information. A regular supportive supervision should be provided for the individual staffs to correct their mistake during their routine work. Health institutions should have an updated performance monitoring plan and individual staffs also should have their own plan. Training should also be provided for staffs on how to do their own plan and awareness should be created for all staffs on what health information is, how to use health information for decision making process at all levels.

Areas of further Research: When we review literatures, studies related to information use are manly conducted in the governmental health institution. The status of private health institution is not clearly known. Therefore, it is better to conduct related studies by comparing the private health institutions with the governmental.

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Menstrual Hygiene Management and its Determinant among Adolescent, Live In Hawassa Town in Public Schools, Ethiopia

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ABSTRACT

Menstrual hygiene management (MHM) is an essential aspect of hygiene for women and adolescent girls between menarche and menopause. Managing menstruation is essentially dealing with menstrual flow and also in continuing regular activities like going to school, working etc. However, menstruation can place significant obstacles in girls' access to health, education and future prospects if they are not equipped for effective menstrual hygiene management (Caruso, A B, Fehr A2013). To assess the menstrual hygiene management and its determinant among schoolgirls in Sidama regional state, Hawassa town, Ethiopia.

Cross-sectional study design with quantitative method was carried out among 405 systematically selected adolescent schoolgirls of Hawassa town from Nov to Jan, 2020/21. A self-administered pre-test close ended Amharic questionnaire at school setting was used for data collection. The coding was done using the original English version and entered to EPI-7 software. The quantitative file exported to statistical package for social science (SPSS) version 25.0 software for analysis. Total mean score was used to categorize individuals as good and poor while AOR; 95% CI with $p < 0.05$ was used to determine factors of menstrual hygiene management practice. This study had 98% response rate. Out of the total respondents 72.1% (67.1-73.5) had good knowledge about menstruation and its hygiene while 27.9 % of them had below the mean score of knowledge and categorized as poor knowledge. Out of the total respondents, 52.5 % (48.7-56.1) of the respondents had good practice on menstrual hygiene. Majority 246 (60.7%) of students used sanitary napkins and the rest 132 (33%) and 27 (6.66%) of them used homemade cloth and underwear as menstrual soak-up during their last menstrual period respectively. This study evidenced that menstrual hygiene practice related school absenteeism was prevalent amongst respondents, 54.3% of whom miss school at least once in a month (mean 1.14, SD 1.132). Out of these respondents, 218(53.82%) of the girls were absent from school during their last menstrual period up to four days. The main reasons for school absenteeism during menstruation were; pain 132 (60.55%), followed by lack of washing facility at school 48 (22.01%), feel uncomfortable or tired 21 (9.63%), no private place to change sanitary pad 11 (5.04%), and didn't have sanitary pad, 6 (2.7%). good knowledge about menstruation and menstrual hygiene were 6.01 times higher for those respondents from high school compared to the elementary one (COR=6.01%, 95% CI: 4.736-9.952The findings also showed a significant positive association between good knowledge of menstruation and girls from mother's whose education, current age of school girl students above fifteen years, girls whose mother's education secondary and above, girls whose fathers from private employee were secondary (AOR = 10.012, 95 % CI = 3.628-27.629).). In addition, the overall knowledge of the respondents was significantly associated with their practice. Majority of participants had good knowledge and practice of menstrual hygiene. Although knowledge was better than practice, girls should be educated about the process, use of proper pads or absorbents and its proper disposal.

Keywords: *practices of menstrual hygiene, Menstrual knowledge, adolescent girl, Sanitary napkins, Menarche, school health.*

INTRODUCTION

Background of the study

Early adolescence, defined here as 10-14 years old, brings with it significant physiological changes, and social and cultural pressures for girls growing up around the globe. Menarche is an important milestone in a girl's transition to womanhood Menstruation is a naturally occurring physiological phenomenon in adolescent girls and pre-menopausal women. Menarche is an important milestone in a girl's transition to womanhood (Jagruti P. et.al 2015).

The first menstruation is often horrifying and traumatic to an adolescent girl because it usually occurs without her knowing about it (GuptaJ, Gupta H. 2001). Menstruation necessitates the availability of material resources to absorb or collect menstrual blood, facilitate personal hygiene and dispose of waste, ideally with adequate privacy. Women and girls in low-income settings have low awareness on hygienic practices and lack culturally appropriate materials for menstrual hygiene management (MHM) practices. Menstruation is surrounded by various psychological and religious barriers due to lack of knowledge about the scientific process of menstruation (EphremBiruk et.al 2018).

Managing menstruation is essentially dealing with menstrual flow and also in continuing regular activities like going to school, working etc. However, menstruation can place significant obstacles in the way of girls' access to health, education and future prospects if they are not equipped for effective menstrual hygiene management (MHM). Good hygienic practices such as the use of sanitary pads and adequate washing of the genital area are essential during menstruation. Women and girls of the reproductive age need access to clean and soft, absorbent sanitary products which can in the long run, protect their health (Caruso, A B, Fehr A2013).

Girls are likely to be affected in different ways from inadequate water, sanitation and hygiene conditions, because the lack of such facilities they cannot attend their daily activities. Menstrual hygiene and management has not received adequate attention in the health and water, sanitation and hygiene (WASH) sectors in developing countries including Ethiopia (Water Aid Nepal, 2009). Hygiene during menstruation is an inevitable part of woman's life. Various aspects such as physiology, pathology and psychology of menstruation have been found to associate with health and well-being of women; hence, it is an important issue concerning morbidity and mortality of female population.

Several research studies have revealed that there was a low level of awareness about menstruation among the girls when they first experienced it. Many study finding revealed that adolescent girls had incomplete and inaccurate information about the menstrual physiology and hygiene. Good hygienic practices such as the use of sanitary pads and adequate washing of the genital area are essential during menstruation. It has a health impact in terms of increased vulnerability to reproductive tract infections (RTI) (Jagruti P. 2015).

Girls going to school with poor menstrual hygiene and management and inadequate water, sanitation and hygiene conditions in schools, because the lack of such facilities they cannot attend school during menstruation. This may result in absenteeism rates that can reach 10–20 per cent of

school time. The available sanitation facilities in most secondary schools are poor, in construction design, not convenient for sick, disabled, elderly and MHM (EphremBiruk et.al 2018). This in turn, results in significant unwanted impacts on health, economic activity and education. However, much attention was not given to this problem and studies on menstruation and its hygienic management as well as its influence on girls' day to day activities are limited in Ethiopia. Therefore, the aim of this study was assessed Menstrual Hygiene management and its determinants among girls live in Hawassa town live in public schools, Ethiopia.

GENERAL OBJECTIVE

To assess the menstrual hygiene management and its determinant among adolescent, live in Hawassa town in public schools, Ethiopia.

SPECIFIC OBJECTIVES

To measure level of knowledge about menstrual hygiene management among adolescent girls

To measure level of menstrual hygiene management practice among adolescent girls

To determine factors affecting menstrual hygiene management knowledge and practice among adolescent girls

MATERIALS AND METHODS

Description of the study area

The study was e conducted in Sidama Region of Ethiopia, Hawassa City Administration, . The Climatic condition of study is of Hawassa sub-city is midland or "weinadega". It is the capital city of Sidama regional state which is found 273 Km South of Addis Ababa. The city administration has eight sub-cities. The population of the city is estimated that 350,000.The study was conducted among governmental primary and secondary school girls from Nov to Jan, 2020/21. The study was conducted inNigistFurra and stadium governmental elementary school and Alamura and Addis ketemagovernmental high school.

The Hawassa city, Sidama regional states have a total of 26 governmental elementary and secondary schoolshave a total number 16,808students enrolled from 7th to 10th grade in the year 2019/2021. Of which 14,992females enrolled from grade 7-10in.

Study subject

The study subjects were randomly selected all grade 7th to 10th female students in Nigistfurra and stadium elementary and Alamura and Addis ketema secondary public schools of the 2 selected sub cities of Hawassa town, Sidama region. Total of 405 female students were participated in this research.

Study Design (Study Type, Sample Size and Sampling Procedure)

School based cross-sectional study with a quantitative study design was employed. The survey was conducted among female adolescent students. The interviews were explored female students'

views about menstruation and its hygienic management and availability, accessibility and adequacy improved sanitation and hygiene keeping facilities for menstrual hygiene management

Sample size and sampling procedure

A single proportional formula was used to determine the number of respondents who were included in the in the study with the assumption95% confidence interval (CI), marginal error(d) of 0.05, and proportion of menstrual hygiene management practice among adolescent school girls in previous study done (prevalence of use of sanitary napkins 60.4%) from the previous study in Addis Abeba,(Ephrem B.& Worku T. 2018:7).Then adding non-response rate 10%. The actual sample size for this study will be determined by using the formula of single population proportion.

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

Where n = Sample size, $Z_{\alpha/2}$= Z value corresponding to a 95% level of significance = 1.96, p = expected prevalence of female using sanitary napkin during menstruation was (p) of 60.4%, =0.60, q = (1 - p) = (1-0.60) = 0.4, d = absolute precision (5%), none response rate =10%. From the above assumptions and calculations the final representative sample size were 405 adolescent elementary and high school female students were included.

Sampling procedure

This study was implementing a multi-stage sampling technique to select the respondents (elementary and high school girls). At first stage, in Hawassa town sidma regional statehave 7 elementary schools(grade7-8) and 10 secondary and preparatory schools. From the sub cities randomly select two sub cities (Tabour and Hikedar sub cities) then; from each sub city randomly select two elementary and secondary school namely Nigistfura and stadium elementary schools and Addis ketema and Almura secondary schools. Samples of participants were taken proportionally from each elementary and high school.

Study Methodology

Data collection tool and procedure

A self-administered pre-test close ended Amharic questionnaire at school setting was used. The questionnaire was contained variables related to socio-demographic characteristics, knowledge about menstruation and menstrual hygiene management, practice about menstrual hygiene. Study subjects were invited to take part voluntarily by explaining the purpose of the study and data were collected after obtaining verbal consent. Data was collected by ten female health professional data collectors with health background one supervisor.

Students were instructed on how to fill the questionnaire. Data quality was assured through careful design of the questionnaire. Data collectors and supervisor were received a one-day training on the purpose and procedure of data collection related to this research. During the training, special emphasis was given to establishing trust before asking questions. The training session were also pay attention to careful consideration for sensitive questions, observations where needed, and avoidance of participation bias. Data were checked for completeness and consistency after each

day of data collection checking filled questionnaires by supervisors. The overall data collection process was coordinated by the principal investigator.

Variables

Dependent variables: Practice on menstrual hygiene management.

Independent variables: Socio-demographic variables, age, grade, religion, parent's education, parent's occupation, menstrual hygiene, school learning on menstrual hygiene, discussion with parents on menstrual hygiene, information before menarche on menstrual hygiene

Data quality management

The quality of data was assured at the maximum attainable level by using standardized adapted questionnaire and following the necessary procedures in order to get the intended results. To ensure quality of data, pre-test of data collection tools was done on primary school girls in Hogobaelementary school and Tabor high school by taking 5% of the total sample size. The data collectors were got orientation. Besides, the questionnaire was checked for completeness and correctness on daily basis by immediate supervisors.

Data Management and Analysis

All responses to the survey questionnaires were coded on pre-arranged coding sheet by the principal investigator to minimize errors. The coding will be using the original English version and were entered to EPI-7 software. The data file will export to statistical package for social studies (SPSS) version 25.0 software for analysis. Descriptive analysis including frequency, proportions, and measures of mean were done. Cross tabulations were made to calculate Crude and adjusted odds ratio. All variables with p<=0.20 in bivariate analysis were fitted in to the multiple logistic regression model to identify factors associated with menstrual hygienic practice. P value <= 0.05 were considered as a level of significance.

RESULT (DATA ANALYSES AND INTERPRETATIONS)

Socio-demographic characteristics of study population

A total of 405primary and secondary school girls were participated from two (Nigistfura and Stadium) primary schools and secondary (Addis ketema and Alamura) public schools, with response rate of 98%. Among the total respondent 115(28.39%), 103 (25.43%), 98 (24.19%) and, 89(21.97%) were grade seven, eight, nine and ten respectively. The mean age of the study participants was 14.18 with SD + 1.165 years, while their age range between 12-20 years. The mean age of menarche of the respondents was 12.34 with SD +0.645 years.

The study also indicated that 235 (58.02%) and 90(22.22 %) of the respondents' father completed secondary and higher level of education respectively rest of them 80 (19.50%) they only read and write. Regarding respondent's mother occupation, 212 (46.66%) of them were housewife while 193(48.88%) government employed. The majority 70.2% (345) of the respondents didn't earn pocket money from their families. (See table 1)

Table 1 Socio-demographic characteristics of primary and secondary school girls, Nov to Jan 15, 20/21 Addis Ababa, Ethiopia. (n =405)

Socio-demographic characteristics	Frequency	Percentage
Religion	=n	%
Orthodox	203	50.12
Protestant	109	26.91
Muslim	78	19.25
Catholic	15	3.70
Total	405	100%
Mothers educational status		
Read & write	206	20.5
Primary	175	23.1
Secondary and above	163	21.6
Illiterate	79	11.1
Total	405	100%
Fathers educational status		
Illiterate	89	21.97
Read & write	102	25.18
Primary	78	19.25
Secondary and above	136	33.58
Total	405	100%

Adolescent school girls' knowledge about menstruation and its hygienic management

This study also found that 82 percent of respondents knew about menstruation before it occurred and their chief source of information was mothers and fathers,(75%) followed by friends (34%), elder sister (32.48%) and school (28.18%).Out of the total respondents, 124 (30.61%) didn't learn about menstrual hygiene in the school. Two hundred ninety-seven (26.9%) of the respondents didn't discuss about menstrual hygiene with their parents and friends.

Out of the total, 346 (79.2%) of girls knew that menstruation was a physiological process, whereas 42 (5.6 %) of them believed that it was a cause from God. Majority of girls (79.3%) correctly responded hormone as the cause of menstruation. More than half, 64.6% of the respondents knew that uterus is the source of menstrual blood. (See table 2)

Table 2 School girls' Information and knowledge grading on menstruation and its management, Nov to Jan 15, 2020/21, Hawassa, Ethiopia. (n =405).

Variable	Number	Percentage
Normal menstrual cycle		
Less than 25 days	24	5.92
25-28 days	311	76.79
28-35 days	55	13.58
More than 35 days	15	3.70
Total	405	100
Normal regular menstrual bleeding duration		
<2 days	30	7.4
Days	354	87.40
>7 days	21	5.1
Total	405	100
Is Foul smelling during menstruation normal		
Yes	73	18.1
No	332	81.9
Is menstrual blood is unhygienic		
Yes	200	26.5
No	556	73.5
Pain during menstruation means that's on not sick		
Yes	151	37.29
No	254	62.71
Is menstruation is not harmful for a women's body if she dances or runs during her period		
Yes	149	36.8
No	256	63.20
Hear about menstruation before attaining menarche		
Yes	63	15.6
No	342	84.4
Menstruation is not lifelong process		
Yes	76	18.77
No	329	81.23
Is girls took more nutritious diet during menstruation		
Yes	104	25.67
No	301	74.3

Based on the Knowledge summary of the respondent, 72.1% (67.1-73.5) had good knowledge about menstruation and its hygiene while 27.9 % of them had below the mean score of knowledge and categorized as poor knowledge.

Menstrual Hygiene Practice

Out of the total respondents, 52.5 % (48.7-56.1) of the respondents had good practice on menstrual hygiene. Majority 246 (60.7%) of students used sanitary napkins and the rest 132 (33%) and 27

(6.66%) of them used homemade cloth and underwear as menstrual soak-up during their last menstrual period respectively. This study also enlisted the main reason for the non-use of sanitary napkins includes; 213(52.59%) high cost, 126(31.11%) difficulty in disposal, and 66(16.2%) lack of knowledge. Two hundred twenty-one participants change their pads during menstruation at school. 267 (65.92%) of girls change their pads two and above times per day and 129(31.85%) changed their pads once in a day.

Table 3: Showed that Practice of among government school girls on MHM, Nov to Jan 15, 2020/21Hawassa, Ethiopia

Variable	Number	Percentage
Change pad at school		
Yes	116	29.8
No	289	71.35
Frequency of changing absorbent material per day		
Once	94	23.20
Twice	92	22.71
Three times	212	52.38
More than three times	7	1.72
Clean genitalia		
yes	113	27.91
No	292	72.09
Material using clean genitalia		
Soap and water	143	35.30
Water only	226	55.80
Plain paper	36	8.88
Clean external genitalia		
Yes	130	32.1
No	275	67.90
Material using clean external genitalia		
Soap and water	126	31.11
Water only	256	63.20
Plain paper	23	5.69
Hand washing		
Yes	205	50.61
No	200	49.39
Material for hand washing		
Soap and water	171	42.23
Water only	234	57.77
Shower		
Yes	111	27.5
No	294	72.5
Material for showering		
Soap and water	392	96.79
Water only	12	2.22
Drying of washed re-usable clothes		
In the shade, outside	45	11.11
In the shade, inside	90	22.22
In the sunlight, outside	87	21.48
In the sunlight ,in side	134	33.08
Hidden under other clothes	32	7.90
Hidden elsewhere	17	4.19

Table 4 Cross tabulations between socio-demographic variables and knowledge about menstrual hygiene management among primary and secondary school girls, Nov to Jan, 2020/21 Hawassa, Ethiopia. (n =391)

characteristics	Knowledge			crude OR
	Poor	Good	Total	95% (CI)
Age at first menarche				
<=13	69	79	148	1
>13	24	219	243	2.84(2.01-4.29) *
Grade				
Primary	43	89	132	1
Secondary	32	227	259	5.01(4.94-9.95) *
Live with				
Both parents	89	189	278	1
Only mother	41	12	53	0.069 (0.036-0.134)
Only father	18	13	31	0.090 (0.035-0.232)
Relatives	22	0	22	0.000 (0.000-0.000
Mothers educational status				
Illiterate	12	13	26	1
Read & write	19	21	40	3.846(2.24-6.598) *
Primary	25	16	41	4.04(4.42-11.195) *
Secondary	12	120	132	11.09(6.56-18.75) *
College and above	7	145	152	31.49(13.96-71.05) *
Fathers educational status				
Illiterate	6	8	14	1
Read & write	8	24	32	4.914(2.66-9.095) *
Primary	28	52	80	4.434(2.64-7.438) *
Secondary	32	90	122	27.65(13.887-55.045) *
College and above	15	128	143	27.65(13.887-55.045) *
Fathers occupation				
Merchant	34	89	123	7.74(4.31-13.898) *
Private employee	17	70	87	12.778(6.91-23.62) *
Governmental employee	26	48	74	16.92(8.85-32.35) *
Driver	44	45	89	2.62(1.38-4.98) *
Daily laborer	57	21	78	1
Mothers occupation				
Housewife	27	65	92	1.374(0.802-2.357)
Merchant	13	86	99	3.24(1.714-6.138) *
Private employee	45	34	79	3.281(1.809-5.953) *
Governmental employee	29	45	74	20.098(8.52-47.398) *
Daily laborer	15	32	47	1
Earn pocket money				
Yes	57	36	93	1.99(1.38-2.89) *
No	109	189	298	1

In this study three hundred fifty nine (88.6 %) of the respondents disposed their used sanitary pads in the latrine, 29 (7.16%) wrap in paper and put in the bin, and the rest 17(4.1%) threw in the open field. Two hundred twenty-one (54.56%) of the respondents dried their reusable sanitary pads in sunlight. 38.2% of the study participants store their sanitary pads in separated plastic bag for the next use.

This study evidenced that menstrual hygiene practice related school absenteeism was prevalent amongst respondents, 54.3% of whom miss school at least once in a month (mean 1.14, SD 1.132). Out of these respondents, 218(53.82%) of the girls were absent from school during their last menstrual period up to four days. The main reasons for school absenteeism during menstruation were; pain 132 (60.55%), followed by lack of washing facility at school 48 (22.01%), feel uncomfortable or tired 21 (9.63%), no private place to change sanitary pad 11 (5.04%), and didn't have sanitary pad, 6 (2.7%).

Association between overall good knowledge of menstrual hygiene management and socio demographic factors

The crude value in the bivariate analysis, some of socio-demographic characteristics of the respondents were significantly associated with the outcome variable-knowledge of menstrual hygiene. The odds of good knowledge about menstruation and menstrual hygiene were 6.01 times higher for those respondents from high school compared to the elementary one (COR=6.01%, 95% CI: 4.736-9.952). Whereas the odds of good knowledge about menstruation and menstrual hygiene were 32.493 times higher for respondents' mother education collage and above compared to the illiterate (COR=31.493%, 95% CI: 13.959-71.053).

Association between overall practice of menstrual hygiene management and socio demographic factors on the bivariate analysis, among the ten socio-demographic variables, level of grade (secondary), respondent's mother's educational status (college and above), respondent's father educational status (college and above), both respondent's mother and father occupational status, Age at first menarche (>=13) and pocket money were significantly associated with 95 % CI COR at P<0.05 with overall practice of menstrual hygiene management among respondents.

The crude value also showed that the odds of overall practice of menstrual hygiene management among secondary school girls were 2.344 (95% C.I: 1.759-2.177) times higher compared to primary school girls. In this study, it was found that pocket money was associated with overall practice of menstrual hygiene management. The odds of overall practice of menstrual hygiene management among girls 2.177 (95% C.I: 1.575-3.009) times higher for respondent who had earned pocket money from their families. (see table 7)

The finding of this study found that the current age of schoolgirl students above fifteen years old were 3.242 [AOR (95% C.I: 1.613-4.971)] times more likely to have good practice than their counterparts. Girls whose mother's education secondary and above were five times more likely to have good practice about menstrual hygiene compared to those from illiterate mothers [AOR = 5.761, 95 % CI: 3.583-16.809)]. Girls whose fathers from private employee were [AOR (95% C.I): 3.324 (1.215-10.991) times more likely had good menstrual hygiene management practice than those who were daily laborer family. This study also found that girls whose age at first menarche greater than thirteen were 2.4371 times more likely to have good practice about menstrual hygiene compared to those who were less than thirteen years old. [AOR (95% C.I): 2.4371 (1.409-4.473)]. In addition, the overall knowledge of the respondents was significantly associated with their practice [AOR (95% C.I): 4.581 (2.462-8.526)] (See table 8)

Association between overall knowledge and practice of menstrual hygiene management and other menstrual related factors

The regression model also evidenced other menstrual related factors like learning and discussing about MHM in the school and with parents and friend and also hearing about it before menarche were significantly associated with both the outcome variables. The odds of good knowledge about menstrual hygiene management among those who learn about menstrual hygiene at school were 3.110 (95% CI: 1.569-6.162) times higher than those who didn't learn at their school.

Table 5Association between other related variables and knowledge about MHM among primary and secondary school girls, Nov to Jan 15, 2017 Hawassa, Ethiopia. (n=391)

characteristics	Knowledge		Crude OR (95% CI)	Adjusted OR (95% CI)
	Poor	Good		
Learn about menstrual hygiene in the school				
Yes	189	41	3.11(1.57-6.16) *	3.11(1.57-6.16) *
No	98	63	1	1
Heard about menstruation before attaining menarche				
yes	229	72	10.24(6.49-16.15)	5.03(2.21-11.48) *
No	27	63	1	1

This study found that good practice about menstrual hygiene management among those who discuss about menstrual hygiene with their parents were 11.651 (95% CI: 7.087-26.296) times higher than those who didn't discuss about menstrual hygiene with their parents. (See table 6)

Table 6: Association between other related variables and knowledge about MHM among primary and secondary school girls, Nov to Jan 15, 2017 Hawassa, Ethiopia. (n=391)

characteristics	Knowledge		Crude OR	Adjusted OR
	Poor	Good	95% (CI)	95% (CI)
Learn about menstrual hygiene in the school				
Yes	143	49	4.14(3.05-5.61)	2.47(1.52-4.01) *
No	63	136	1	1
Discuss about menstrual hygiene with their parents				
yes	251	69	13.88(18.86-21.73)	11.65(7.09-26.296) *
No	14	57	1	1
Heard about menstruation before attaining menarche				
yes	42	234	4.78(3.003-7.59)	0.779(0.366-1.656)
No	29	86	1	1

DISCUSSION

Managing menstruation is essentially dealing with menstrual flow and also in continuing regular activities like going to school, working etc. However, menstruation can place significant obstacles in the way of girls' access to health, education and future prospects if they are not equipped for effective menstrual hygiene management (MHM). The onset of menstruation is one of the most important changes occurring among the girls during the adolescent years. The bodily changes associated with puberty will have an impact in the girl's physical, psychological, and social development (Caruso A. & Fehr A.2013).

This study was conducted to identify factors affecting practice of menstrual hygiene among school girls in Hawassa. In this study, the mean age of menarche of the respondents was 12.34 with SD +0.645 years which is similar to studies conducted in Jammu district, India ,Argoha village of Haryana Addis Abeba and EphrameBiruk in Addis Abeba the mean age of menarche 13.43±.83, 12.76 ± 0.936 and 13.43±.83 and 12.76 ± 0.936, 12.84 ± 0.745 years respectively .The main source in consistent with study reports from Jimma district, IndiaandEphrameBiruk in Addis Abeba (66.15%) for about 68% school girls, their mothers were main source of information on menstruation. This could be suggestive of the contribution of mothers for hygienic practice of girls during menarche. In contrast to this finding, school teachers and sisters respectively, were reported to be important source of such information in Amhara North East, Ethiopia.

Factors of menstrual hygiene management

The current study reported that, majority (72.1 %) of the students had good knowledge about menstruation and menstrual hygiene. The finding was similar with the result from studies done in western Ethiopia; 60.9% and Ephrame , in Addis Abeba; 70.1. This study notified that three hundred forty six (79.2%) of girls knew that menstruation to be normal a physiological process. Such prevalence found to be consistent with a result of a study done in western Ethiopia (76.9%), Argoha village of Haryana 71.3%, and Central India 89% of school girls knew correctly that menstruation as physiologic process. A possible explanation for this similarity may be that girls had good discussion in families openly. This finding however, was higher than that of those in previous a study done in Northeast Ethiopia; 319 (57.89%). This difference might be due to the study method difference (mixed qualitative and quantitative method for the previous study.

Adolescent girls who knew that uterus was the source of blood in menstruation were 64.6% which is similar to studies conducted in Amhara Ethiopia, western Ethiopia, and Central India was found out to be 60.9%, 59.3% and 60% respectively . This study disagrees with results obtained from a study in Argoha village of Haryana 38.7%, possibly due to minimum information provided about menstruation and menstrual hygiene by schools and families.

In this study, multivariable analysis showed that girls whose mother's educational status secondary school and above were 10.012 times more likely to had good knowledge about menstruation and menstrual hygiene than their counterparts [AOR = 10.012, 95 % CI: 3.628-27.629]. A similar study done in western Ethiopia and Jammu District India showed that, parental education was positively associated with girls' menstrual knowledge. The reason could that educated mothers

may provide information about menstruation and menstrual hygiene to their daughters. Girls from educated families may discuss openly about menstruation.

Unlike a study done in Amhara region, Ethiopia 2016 [AOR = 0.94, 95 % CI: 0.46–1.92], this study found that, the grade level of respondents was positively and significantly [AOR = 13.74, 95 % CI: 5.39 35.04] associated with knowledge about menstruation and menstrual hygiene management. Due to the fact that high school girls might have high possibility for exposure to information regarding menstruation and its hygienic management.in another study done in Odisha. But in this study only government employed mothers were the one associated with knowledge on menstruation.

Regarding hygiene related practices during menstruation, this study found that 9.27% girls took daily bath during menstruation and 29.48% clean their external genital with soap and water during menstruation. A similar study done in Jammu and Kashmir, India indicated that 93.18% had daily bath and 66.67% clean external genital with soap and water. The difference might be due to socio cultural, weather condition and economic factors.

In this study, three hundred ninety-seven (52.5%) of the respondents had good practice of menstrual hygiene. The finding of this study was lower than studies conducted in the Amhara region of Ethiopia and Jammu and Kashmir, India which were 84.28 % and 59.09%, respectively. Comparatively, lower level of practice of menstrual hygiene was recorded from similar study conducted on high school girls in Western Ethiopia, it was indicated that only 39.9 % of the study participants practice good menstrual hygiene. Thus, the reason for the observed difference could be due to low awareness and communication of menstrual hygiene by high school Western Ethiopia girls which affects their menstrual hygienic practice.

In this study, it was found that 17.3% of the study participants dried their reusable pads in the sun light outside which is similar with the finding in Amhara, Ethiopia 15.5% of the participants dried in the sun light. In contrast, a study done in central India indicated that 93% of adolescent girls dried reusable pads in the sun light. This difference might be due to different in the socio-cultural factors. 457(60.4%) of participants use disposable sanitary pads during menses. In a similar study done in Argoha village of Haryana and central India Indicated that, 80.7 % and 98% girls use only napkin during menses respectively. Comparatively, lower level of use of sanitary pads was recorded from similar study conducted on high school girls in north east Ethiopia, it was indicated that 35.38% of the study participants use disposable sanitary pads during menses. This may be due to differences in socio economic differences. The main reason for not using pads in present study was non-affordability due to high cost (53.02%) followed by non-availability and disposal problems which is similar to study in Jammu district India (78.94%).

The adjusted value of this study found that, both mother's educational category was [AOR = 7.761, 95 % CI: 3.583-16.809] positively associated with practice of menstrual hygiene which agrees with the study done in western Ethiopia, in 2014 and Northeast Ethiopia [AOR = 2.03, 95 % CI: 1.38–2.97] [AOR = 4.26, 95 % CI: 1.61 - 11.28] respectively . Multivariable analysis showed that girls who learn and discuss about menstrual hygiene in their school and with their parent were 2.472, and 13.651 times more likely to had good practice about menstruation and menstrual

hygiene than their counterparts. A similar study done in northeast Nigeria that learn about menstrual hygiene in the school was positively associated with girl's menstrual practice. Possibly due to information provided about menstrual hygiene management at schools. Students whose age above fifteen were 2.832 times more likely to have good practice than age less than fifteen a similar study done in northeast Nigeria. A significant association was also observed between girls whose first menarche were above thirteen (AOR= 2.572) and below with the practice of MHM. Which was also significant in another study done in south India.

CONCLUSION

Seventy two percent of the participants had good knowledge of menstruation and menstrual hygiene and it was better among private school girls than the government. Half of the total respondents had good practice of menstrual hygiene among respondents, and alike to that of knowledge, the large proportion of them was from private school. Good knowledge of menstruation showed a significantly positive association with the level of grade, educational status of the mother, and mother's occupational status. Except for the level of grade, all the above variables plus current age of respondents' and age at first menarche were positively associated with practice of menstrual hygiene management.

All those factors considered in addition to socio demographic variables, which assume to be predictive of the outcome variables including learn about menstrual hygiene in the school, discuss about menstrual hygiene with their parents and friends and hear about menstruation before attaining menarche were positively associated.

RECOMMENDATION

Federal level managers are recommended to:

Strengthen the enabling environment through advocacy and policy initiatives for improved WASH and MHM education.

Promote an innovative, intercultural, and multi-sectorial and gender approach in all programming, ensuring that MHM aspects are included in planning processes and budget allocation processes by the water and sanitation, health, and education ministries.

Collaborate with other stakeholder like water agency to avail water and private toilet

Regional Level: in addition to federal recommendations, regional level managers are advised to:

Give technical assistance and advocacy to prioritize budgets and investment in WASH facilities in schools by health, and education bureau. Strengthen teachers' capacities and equips them with tools to provide in-depth and medically accurate information to students in a safe learning environment by education bureau.

Strengthen school health packages provided by health extension professionals by health bureau.

Current policies and advocacy efforts surrounding menstrual hygiene

Enhance Knowledge, attitudes and beliefs surrounding menstrual hygiene for Adolescent girls and parents, teachers and the community

School level managers suggested to:

Establish coordination between students, teachers and parents to improve MHM conditions at schools.

Complement menstrual hygiene management as part of the school health programs and should also give special attention towards making schools a comfortable place for girl's menstrual hygiene practice by 382 continuous provision of sanitary pad especially for the neediest ones.

Consult parents about the need to support their children with sanitary materials for menstrual hygiene in addition to other basic hygienic products during parent-school teacher meeting.

Availability and access to hygienic menstrual management materials in school and the community

Access to information on menstruation and MHM

Having access to safe and convenient facilities to dispose of used menstrual hygiene materials" as a key component for proper MHM programming in school environment

Thee school community should implement WASH 5 Minimum commitments: The WASH partners in the school environment are committed to implement the 5minimum commitments (Assessment, Design, Implementation, Response monitoring and Given priority to girls and women participation across the response) for safety, privacy and dignity developed by the Global WASH Cluster, which encompass an inclusive and consultative process throughout the MHM programming phases.

Educate and counsel girls about the important and the need for good personal hygiene including hand washing practice during menstruation by using peer group discussion which purposely mediated by female school teachers.

Parents are advised to:

Educate their daughters about the process, good personal hygiene, use of proper pads, and its proper disposal.

Support their children with sanitary materials for menstrual hygiene.

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Water, Sanitation and Hygiene Standards for Schools in Low-cost Settings [Internet]

Depression and suicidal behavior among people living with HIV/AIDS, in public hospitals of Hawassa town, Ethiopia.

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ABSTRACT

*Depressive disorders are a significant contributor of suicide characterized by a feeling of sadness, loss of interest or pleasure, feelings of low self-esteem or guilt, disturbance of sleep or appetite, decreased energy, and poor concentration. main objective of our study is to assesses depression, suicidal behavior and associated factors among people living with HIV/AIDS (PLWHA) attending follow up treatment at Hawassa town public hospitals, Ethiopia, 2020 We used**a** hospital based cross sectional study design was employed. Data was collected by interviewer administeredpre-tested structured questionnaire from 423 ofPLWHAattending treatment follow up at ART clinics. Depression was assessed by using Patient Health Questioner 9 (PHQ9) and Suicidal behavior was assessed using Suicide Behavior Questioner-Revised (SBQ-R). Systematic random sampling method was used to select study participants. The collected data was coded and entered to Epi data version 3.1 and analyzed by IBM SPSS version 25. Simple and multiple logistic regression analysis was used to identify associated factors. Majority (62.1% (n = 261)) of the participants were males with a mean (SD) age of 38.6 (±10.5) years. The study suggests that nearly one-third, (30.2%) of PLWHA were suffering from depression and suicidal behavior is the most important variables that significantly predicted depression (AOR = 5.28 CI: 2.68-10.41). PLWHA who developed AIDS related opportunistic infections have four times higher odds of having depression in comparison to their counterparts (AOR=3.92 CI: 1.51-10.22) and high level of internalized stigma is associated with depression (AOR=2.07 CI: 1.29-3.33). This study demonstrated a high prevalence of depression. Therefore, according to our findings, routine screening for comorbid depression and suicidal behavior on every hospital visit of the client and linkage with mental health service providers will benefit patients.*

Key Words: *Depression, Suicidal behavior, HIV/AIDS, Public Hospital, Hawassa, Ethiopia.*

INTRODUCTION

Background

The human immunodeficiency virus (HIV) is a retrovirus that infects cells of the immune system, destroying or impairing their function. As the infection progresses, the immune system becomes weaker, and the person becomes more susceptible to infections. The most advanced stage of HIV infection is acquired immunodeficiency syndrome (AIDS). It can take 10-15 years for an HIV-infected person to develop AIDS(WHO, 2017b). Globally, 36.9 million [31.1–43.9 million] people were living with HIV at the end of 2017. An estimated 0.8% [0.6-0.9%] of adults aged 15–49 years worldwide are living with HIV, although the burden of the epidemic continues to vary considerably between countries and regions(WHO, 2018).

Depressive disorders are a significant contributor of suicide characterized by a feeling of sadness, loss of interest or pleasure, feelings of low self-esteem or guilt, disturbance of sleep or appetite, decreased energy, and poor concentration. Depression can be chronic or short lasting, markedly impairing an individual's functioning at work or school or cope with daily life. In 2015 World

Health Organization (WHO) estimated that 4.4% (322 million people) of the global population live with depression(APA, 2013, WHO, 2017a)

Suicide isthe act of killing oneself, most often as a result of depression or other mental illness.(Boldt, 1987, APA, 2019). Globally, every year nearly 800,000 people take their own life and suicide is the second leading cause of death among 15–29-year-olds. Of all completed suicide around the globe 79% occur in low and middle-income countries. Ingestion of pesticide, hanging and firearms are among the most common methods of suicide globally (Kalafat, 1997, WHO, 2019).

Depression plays a role in more than one half of all suicide attempts, whereas the lifetime risk of suicide among patients with untreated depressive disorder is nearly 20%(Gotlib and Hammen, 2008).The suicide rate among PLWHA is more than three times higher than in the general population however, introducing ART shown declined in suicide rate among HIV-positive persons, and this appeared to be due partially to improvements in health status(Carrico, 2010).

Statement of the problem

Since the beginning of the epidemic, more than 70 million people have been infected with the HIV virus and about 35 million people have died of HIV. The African region remains most severely affected, with nearly 1 in every 25 adults (4.1%) living with HIV and accounting for nearly two-thirds of the people living with HIV worldwide(WHO, 2018). According to the 2017 global burden of disease report depression is the third leading cause of disability in the world and HIV/AIDS is reported to be the 8th leading cause of early death globally(IHME, 2018). A report from WHO stated that suicide is the second leading cause of death among 15–29-year-olds(WHO, 2019).

People with HIV/AIDS are at a higher risk for mental health disorders. The sequel of the virus itself, long term treatment, medication side effect or different stressors are potentials to expose PLWHA for mental illness. For example, PLWHA are twice more likely to have depression than those who are not infected with HIV(NIMH, 2019). In other direction, mental health problems are associated with increased risk of HIV infection and AIDS and interfere with their treatment, and, conversely, some mental disorders occur as a direct result of HIV infection(WHO, 2008).

Depression has a wide range of negative effects on the lives of PLWHA and on efficient treatment and prevention of HIV infection. The PLWHA with depression have increased risk of HIV disease progression and nonadherence to antiretroviral therapy(ART) (Uthman et al., 2014).They are also less likely to follow care providers' advice and engage in high-risk sexual behaviors and develop suicidal ideation. Likewise, depressed HIV-positive individuals face higher expenditures on health care and poorer health-related quality of life than their nondepressed counterparts(Rodkjaer et al., 2010, Amberbir et al., 2008).Significant depressive symptoms are often found with long-term chronic diseases and can result in increased risk of suicide(Karasouli et al., 2014).

Even though there are few studies in Ethiopia assessing depression and suicide among PLWHA(Berhe and Bayray, 2013, Bitew, 2014, Eshetu et al., 2015, Gebremariam et al., 2017),so far there is no published study assessing relationship between suicidal behavior and depression

among PLWHA. Therefore, our study will determine the relationship between suicidal behavior and depression among PLWHA and factors associated with both depression and suicidal behavior.

Significance of the study

In a condition in which there are majority of PLWHA live in Sub-Saharan Africa and PLWHA are at a higher risk for mental health disorders it is expected to have a strong base line data set. As far as investigators concerned, though there are few studies separately measuring depression and suicide, we found no published studies assessing relationship between depression and suicide among PLWHA.

Therefore, the findings fromour study would add to the limited body of knowledge by revealing the prevalence and associated factors of depression and suicidal behavior among PLWHA at Hawassa public hospitals.

The findings from this study could help as a foundation for future public health and mental health research in the area of supporting PLWHA. In addition to this, findings from this study will help in providing information for government and non-governmental bodies in the development of appropriate policies, plans and intervention programs in order to prevent and manage psychiatric morbidities among PLWHA, which might include training health workers for early recognition and counseling of depression and suicide. Furthermore, researchers in the field could use the result of this study to design further studies at a larger scale at national level and with robust study design in the future.

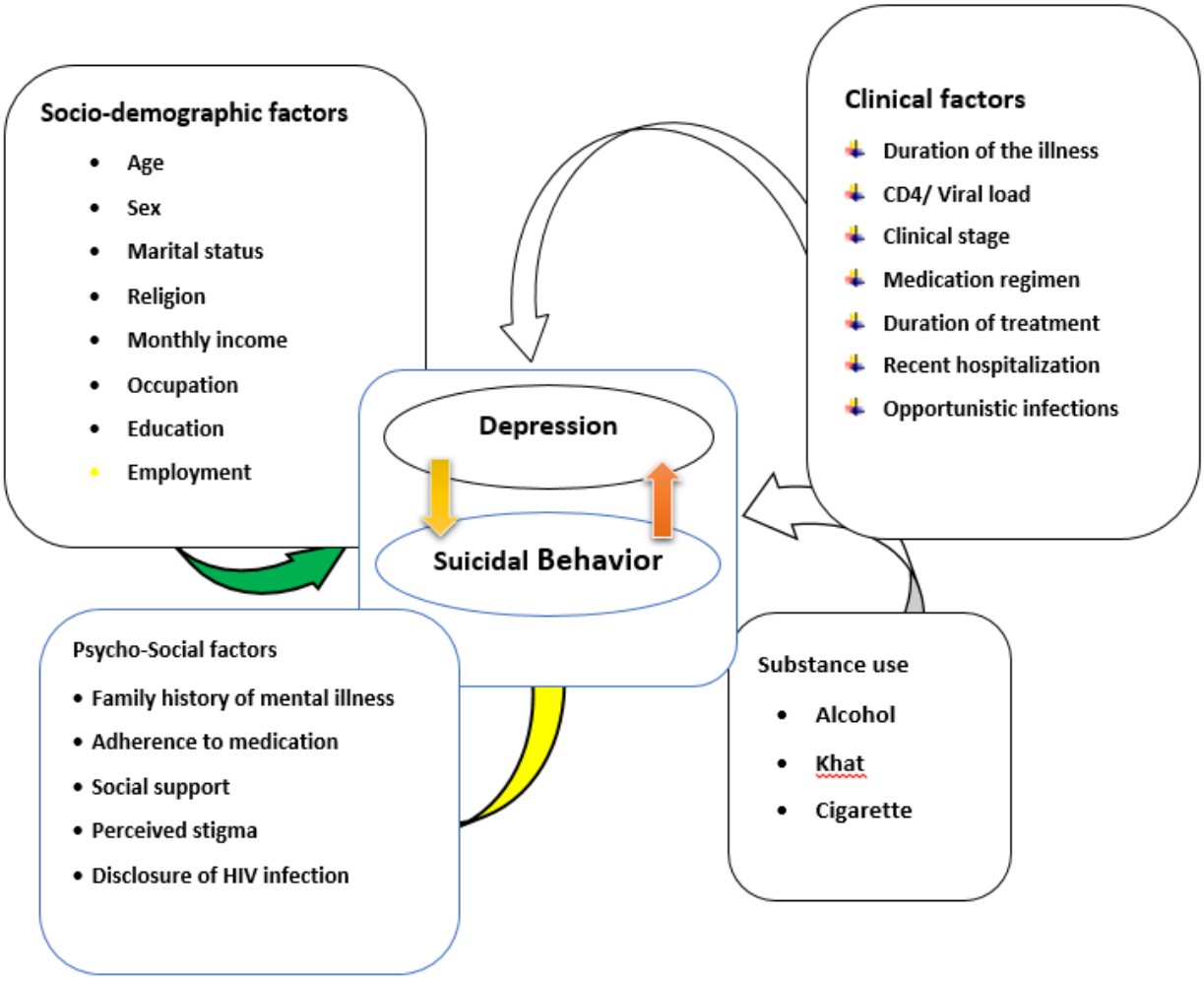

Figure 4: Conceptual framework of factors related with depression and suicidal behavior among PLWHA, 2019

OBJECTIVES

General objectives

To assess depression, suicidal behavior and their associated factors among people living with HIV/AIDS (PLWHA) attending follow up treatment at Hawassa town public hospitals, Ethiopia, 2020.

Specific objectives

To determine the level of depression among PLWHA attending follow up treatment at Hawassa town public hospitals, Hawassa, Ethiopia, 2020.

To determine magnitude of suicidal behavior among PLWHA attending follow up treatment at Hawassa town public hospitals, Hawassa, Ethiopia, 2020.

To examine the relationship between depression and suicidal behavior among PLWHA attending follow up treatment at Hawassa town public hospitals, Hawassa, Ethiopia, 2020.

To identify factors associated with depression among PLWHA attending follow up treatment at Hawassa town public hospitals, Hawassa, Ethiopia, 2020.

Methods and Materials

Study design

Institution based cross sectional study design was implemented.

Study area and period

Hawassa a capital city of South Nations Nationalities and Peoples Region (SNNPR) located 273 km south of Addis Ababa (capital city of Ethiopia) on the shores of Lake Hawassa in the Great Rift Valley. It has got its name from city 'Hawassa' which means large water body (lake Hawassa) in Sidama language. The city has two public hospitals: Hawassa university comprehensive specialized hospital (HUCSH)and Adare General Hospital (AGH).

HUCSH was established in 1996 with a mission to provide standardized quality service with disciplined professional ethics. It provides diversity of both outpatient and inpatient services for about more than 18 million people from all over SNNPR and neighboring region. The other public hospital is Adare Hospital is established in Hawassa town in 1962 as a health center, providing health care service for 2695 people. The health center developed to general hospital on February 9, 2011.Totally there are 2554 and 1821 PLWHA attend treatment with average daily visit 55 and 30 at HUCSH and AGH respectively.

The study was conducted from April–May, 2020.

Population

Source population

Source population of the study was all PLWHA attending ART follow up treatment at HUCSH and AGH during data collection.

Study population

The study population was a sample of PLWHA attending ART follow up treatment at HUCSH and AGH during data collection.

Inclusion and Exclusion criteria

Inclusion criteria

All PLWHA who are 18 years old and above, available during the time of the study period.

Exclusion criteria

Patients who are seriously ill, cognitively impaired to consent and unable to communicate and recall events were excluded.

Sample size and sampling techniques

Sample size determination

As far as the researchers concerned, in Ethiopia there was no published study examining a relationship between depression and suicidal behavior among PLWHA. Therefore, 50% prevalence wasconsidered to obtain the maximum sample size.

The minimal difference is taken as 5 % (d=5 %) with 95 % confidence of certainty.

To determine the sample size, the formula for single population proportion is used:

$$n = \frac{(Z\ \alpha/2)\ 2\ p\ (1-p)}{d2}$$

n = sample size,

Z α/2= significance level at α =0.05

P= expected proportion of depression or suicidal behavior in PLWMI (50%)

d = margin of error of 0.05

Therefore, using the formula the calculated sample size is 384 and with 10% nonresponse rate the total sample size was433.

Sampling techniques

HUCSH and AGH ART clinics serve for about 2554and 1821number of (pre-ART and ART) patients with an estimated daily flow of 55 and30number of patients respectively. The total sample size was proportionally allocated to each of the hospitals based on the total number of patients they are serving (HUCSH=247 and AGH=176) and the sample from each of the hospitals was selected using a systematic random sampling by dividing the total population to each of proportional sample size. The first study participant to be included in the sample is chosen by lottery method. In case when a patient is found ineligible based on inclusion and exclusion criteria, the next patient was considered.

Study variables

Dependent variable

Depression

Independent variables

Socio-demographic factors

Age

Sex

Ethnicity

Religion

Monthly income

Marital status

Educational status

Occupation

Clinical factors Psycho-social factors

Duration of the illness

CD4/Viral load

Adherence to medication

Clinical stage

Suicidal behavior

Substance use(alcohol, Khat & cigarette)

Social support

Perceived stigma

Duration of treatment

Opportunistic infections

Medication regimen

Data collection procedure and instrument

Data collection Instrument

PHQ-9 questioner that is extracted from DSM IV to measure the depression level. PHQ-9 is found to be reliable and valid tool indifferent countries including Ethiopia (Gelaye et al., 2013, Manea et al., 2012, Woldetensay et al., 2018, Kohrt et al., 2016). The PHQ-9 has demonstrated acceptability reliability, validity, sensitivity, and specificity. It has a sensitivity of 86% and a specificity of 67% for diagnosis of MDD among Ethiopian adult(Gelaye et al., 2013). In another country PHQ-9 sensitivity of 88% and a specificity of 88% for major depression(Kroenke et al., 2001, Kroenke and Spitzer, 2002). PHQ-9 consists of 9 items and each item response is rated as “0” (not at all)to

"3" (nearly every day) and the score can range from 0 to 27(Woldetensay et al., 2018, Kroenke et al., 2001)

To assess suicide behavior a 4 items suicidal behavior questionnaire revised (SBQ-R) was used. SBQ-R item 1 taps in to life time suicidal ideation and attempt; item 2 assesses the frequency of suicidal ideation over the past twelve months; item 3 taps into the threat of suicide behavior; and item 4 evaluates self-reported likelihood of suicidal behavior. The sensitivity 80%, specificity 91% with a score of 3-18 and cut-off point ≥ 8 for adult clinical population(Osman and Bagge, 2001).

The measure for internalized stigma in this study uses the 6-item Internalized AIDS Stigma Scale(IASS-6) having dichotomous response. This instrument has been previously used for PLWHA in Cape Town, South Africa(Kalichman et al., 2008) and proven to be valid and reliable to use in east Africa (Tsai et al., 2013).For analysis, we dichotomized the score into low and high stigma by the mean (4.00).

Social support was determined by using Oslo-3 item social support scale with items sum ranging from 3-14. A total score of 3-8, 9-11 and 12-14 indicates; poor, moderate and strong social support respectively [37].

Substance abuse was assessed by using CAGE-AID, which consists of four items in which any yes response to any of the four questions considered as positive for screen (Brown and Rounds, 1995, Couwenbergh et al., 2009, Aklog et al., 2013).

Patient card were viewed for recording different clinical factors (CD4 count, viral load, stage, etc...)

Data collection procedure

The data was collected by face-to-face interview using structured and pre-tested interviewer administered questionnaires. Four data collectors(2 BSc nurses at each data collection sites) and 2 supervisors (1supervisor at each data collection site) were employed for 1-month data collection period and clinical data was recorded from patient chart.

Data quality control

The original English version of the questioner was translated into Amharic and translated back into English by experienced professionals and its consistency was checked. Data collectors and supervisors was trained for two days on the purpose of the study, details of the questionnaire, on interviewing techniques, importance of privacy, and insuring confidentiality of the respondents. To ensure data quality daily close supervision at the end of every data collection was made; the questionnaire was reviewed and checked for completeness, accuracy and consistency by supervisors and investigator and timely corrective measures was taken.

Pre-test of the tool

Before the actual data collection, the questionnaire was pre-tested on 5% of similar population which was not included in the actual data collection. Data collectors was exposed to practical situation before the start of actual data collection, and both principal investigator and supervisors

assessed clarity, understandability, flow and completeness of items and the time needed to fill them. This helped to correct systematic errors, to ensure consistency in items flow, and to estimate the time needed for completing the questioner.

Data Processing and Analysis

The collected data was checked, coded and entered into Epi-Data (Classic) Entry version 3.1 with the gold standard double entry to minimize errors during data entry before starting analysis, then entered data was exported to IBM SPSS version 25 for cleaning and further analysis. We used percentage and frequencies to present descriptive statistics. Variables associated at simple binary logistic regression (P<0.05), was computed to multiple binary logistic regression to control confounders. Adjusted Odds ratio was used to measure the strength of association between explanatory and outcome variables at a significance level <0.05.Finally, the results of the study were summarized by using tables, graphs and narrative description.

Operational definitions

Depression: Participants with a totalPHQ-9score >5claimed to have depression

Suicidal behavior: According to SBQ-R; If the patient scores ≥ 8 on SBQ-R, positive for suicide behavior and if the patient scores < 8 on SBQ-R, negative for suicide behavior

Internalized stigma: High internalized stigma is claimed if an individual IARSS score is above the mean score and low internalized stigma is claimed if an individual IARSS score is less than or equal to the mean score.

Social support: A totalOslo-3 score of 3-8, 9-11 and 12-14 specifies; poor, moderate and strong social support respectively.

Adherence is measured according to WHOs' good, fair and poor classification which often filled by clinicians.

Substance use: use of any psychoactive substance with in the last one month.

BMI is categorized to underweight (<18.5 kg/m2),normal (18.5-24.9 kg/m2), over weight (24.5-29.9 kg/m2) and obese (30-39.9 kg/m2) according to WHO.

Current substance use: Any use of substance with in the last one month

Life time substance abuse: Any yes answer for CAGE-AID.

Ethical consideration

Ethical clearance was obtained from the Ethical review board of Hawassa University, college of medicine and health sciences. The data collectors were clearly explained the aims of the study for study participant. Information was collected after obtaining written signed informed consent from each participant. The right was given to the study participants to refuse or discontinue participation at any time they want and the chance to ask any thing about the study. For the purpose of anonymity participant's name or card number was not use at the time of data collection and confidentiality was assured throughout the study period.

Dissemination Plan

The results of the study will be submitted to Hawassa University College of medicine and health sciences and the copies of papers will also disseminated to hospital administration of HUCSH and AGH. The research paper will be presented in health professional organizations (annual meetings, professional conferences and symposiums). Finally, attempts will be made to publish results on international journal to disseminate the result worldwide.

RESULT AND DISCUSSION

Result

Socio-demographic and economic characteristics of PLWHA

Out of 433contacted study participants, we got a complete data from 97.0% (n = 420) PLWHA. Majority (62.1% (n = 261)) of the participants were males. The age of participants ranged from 18 to 74 years, with a mean (SD) age of 38.6 (±10.5) years. Regarding marital status, relatively married have the highest proportion(44.3% (n = 186)) followed by divorced (22.4% (n = 94)).Half of the total participants are Ethiopian Orthodox religion followers (52.9% (n = 222)) and Nearly one-thirds of the participants (30.5% (n = 128) were Amhara in terms of ethnicity. Concerning education, 36.4% (n=153) and 28.1% (n=118) had attended primary and secondary school respectively. The large proportion of the participants (55.8% (n = 203)), had a monthly income of less than 2500 ETB and majority were housewives (23.1% (n = 97)). Details of sociodemographic and economic characteristics are presented below in table 1.

Table 12: Socio-demographic and economic characteristic of PLWH attending follow up treatment at Hawassa town public hospitals, Ethiopia, 2020.

Variable	Category	N	%
Hospital	HUCSH	246	58.6%
	AGH	174	41.4%
Sex	Male	159	37.9%
	Female	261	62.1%
Marital status	Single	55	13.1%
	Divorced	94	22.4%
	Married	186	44.3%
	Widowed	85	20.2%
Religion	Orthodox	222	52.9%
	Muslim	26	6.2%
	Protestant	164	39.0%
	Other (Catholic, Adventist and Jehovah)	8	1.9%
Ethnicity	Amhara	128	30.5%
	Oromo	71	16.9%
	Sidama	57	13.6%
	Wolayta	86	20.5%
	Guragea	40	9.5%
	Other (Kembata, Silte and Gamo)	38	9%
Educational status	Illiterate	56	13.3%
	1-8th grade	153	36.4%
	9-12th grade	118	28.1%
	College and above	93	22.1%
Occupation	Merchant	95	22.6%

	House wife	97	23.1%
	Government employee	82	19.5%
	NGO	78	18.6%
	Student	14	3.3%
	Unemployed	38	9.0%
	Other (Daily labourer and Pastor)	16	3.8%
Income (N=364)	<2500	203	55.8%
	2500-5000	122	33.5%
	>5000	39	10.7%

Clinical characteristics of PLWHA

About 39.0% (n=164) and34.5% (n=145) of the participants had a duration of below five years since first diagnosed with HIV/AIDS and since first started ART respectively. Regarding functional status almost all 97.6% (N= 410) participants were on working functional status and 93.3% (N=392) classified in stage one. History of default is reported by 14.3% (n= 60) and 92.1 (n=387) of PLWHA has good adherence for ART.According to WHO BMI classification 20.5% (n=86) were overweight (24.5-29.9 kg/m2) and 35 (8.3%) were Obese (30-39.9 kg/m2). Only 2.9% (n= 12) of the participants had AIDS related opportunistic infection and 6.2% (n=26) of the participants were on anti TB treatment. Nearly all, 96.4% (n= 405) of participants were on first line ART regimen. Large percentage, 93.1% (n=365) of the participants had a low viral load and around 11.0% (n=44) CD4 cell count <200. Details are presented on table two.

Table 13*:* Clinical characteristic of PLWHA attending follow up treatment at Hawassa town public hospitals, Ethiopia, 2020.

Variable	Category	N	%
Duration since first diagnosed	0-5 years	117	27.9%
	6-10 years	139	33.1%
	> 10 years	164	39.0%
Duration since start of ART	0-5 years	137	32.6%
	6-10 years	145	34.5%
	>10 years	138	32.9%
Functional status	Working	410	97.6%
	Ambulatory	8	1.9%
	Bedridden	2	0.5%
WHO staging	Stage one	392	93.3%
	Stage two	18	4.3%
	Stage three	7	1.7%
	Stage four	3	0.7%
BMI	Normal(18.5-24.9 kg/m2)	241	57.4%
	Under weight(<18.5 kg/m2)	58	13.8%
	Over weight (24.5-29.9 kg/m2)	86	20.5%
	Obese (30-39.9 kg/m2)	35	8.3%
History of default yes or no	Has no history of default	360	85.7%
	Has history of default	60	14.3%
Does the patient currently on anti TB treatment?	Yes	12	2.9%
	No	408	97.1%
Does the patient currently develop any AIDS related opportunistic infection?	Yes	26	6.2%
	No	394	93.8%
Adherence of the patient for ART	Good	387	92.1%
	Fair	20	4.8%
	Poor	13	3.1%
ART drug regimen	1J	290	69.0%

	1E	79	18.8%
	1F	8	1.9%
	1C	16	3.8%
	1D	12	2.9%
	Second line	15	3.6%
Recent Viral load	<1000 (low)	365	93.1%
	≥1000 (high)	27	6.9%
CD4 cell count (N=399)	<200	44	11.0%
	200-1000	330	82.7%
	>1000	25	6.3%

Psycho-social characteristics of PLWHA

Social support

More than half of the participants, 54.0 % (n=227) reported that only one or two people are so close to them that they can count on them and around31.9% (n=134) of participants experienced little interest and concern from other people on what they do as well it is difficult for the majority (39.5% (n=166)) of the participants to get practical help from neighbours in time of need. Details are presented on table tree.

Based on using a cut-off Oslo-3 score of 3-8, 9-11 and 12-14 to categorise level of social support in to; poor, moderate and strong social support respectively, we have found out that 57.1% (n=240)(Fig:2).

Table 14: OSLO-3 social support scale response of PLWHA attending follow up treatment to at Hawassa town public hospitals, Ethiopia, 2020.

Variable	**Count**	**Frequency**	**%**
How many people are so close to you that you can count on them if you have	None	84	20.0%
	1-2	227	54.0%
	3-5	76	18.1%
	5+	33	7.9%
How much interest and concern do people show in what you do?	None	35	8.3%
	Little	134	31.9%
	Uncertain	43	10.2%
	Some	91	21.7%
	a lot	117	27.9%
How easy is it to get practical help from neighbours if you should need it	Very difficult	74	17.6%
	Difficult	166	39.5%
	Possible	59	14.0%
	Easy	76	18.1%
	Very Easy	45	10.7%

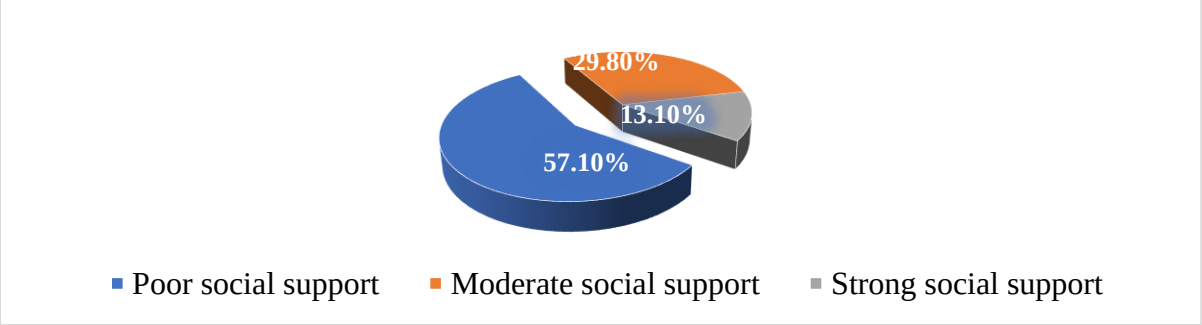

Figure 2: Level of social support among of PLWHA attending follow up treatment at Hawassa town public hospitals, Ethiopia, 2020.

Code	Items		Frequency	%
IARSS1	It is difficult to tell people about my HIV infection	Yes	325	77.4%
		No	95	22.6%
IARSS2	Being HIV positive makes me feel dirty	Yes	81	19.3%
		No	339	80.7%
IARSS3	I feel guilty that I am HIV positive	Yes	91	21.7%
		No	329	78.3%
IARSS4	I am ashamed that I am HIV positive	Yes	112	26.7%
		No	308	73.3%
IARSS4	I sometimes feel worthless because I am HIV positive	Yes	66	15.7%
		No	354	84.3%
IARSS6	I hide my HIV status from others	Yes	271	64.5%
		No	149	35.5%

Internalized stigma among PLWHA

77.4% (n=325) of PLWHA responded positively to the statement "It is difficult to tell people about my HIV infection". 64.5% (n=271) reported that they hide their serostatus from others and about 26.7% (n=112) agreed to the statement "I am ashamed that I am HIV positive". Details are presented in table 4.

Table 15: IARSS response of PLWHA attending follow up treatment to at Hawassa town public hospitals, Ethiopia, 2020.

The mean score (+SD) of IARSS is 2.25 (+1.59) and marking the mean as a cut-off to determine low or high level of internalized stigma we found that 36.4% (n=153) of PLWHA experienced high level of internalized stigma.

Substance use history among PLWHA

In this study 7.9% (n=33) of PLWHA reported to have current use of substance. According to CAGE-AID screening tool in which one or more "yes" response is regarded as a positive screening test; our study revealed that 9.0% (n=38) possible lifetime substance abuse. Depression and suicidal behavior among PLWHA

Based on a cut-off point a PHQ-9 score ≥5 the prevalence of depression is found to be 30.2% (95% CI, 26.0- 34.8); from which 73.2%, 19.7%, 5.5%, 1.6% have mild, moderate, moderately severe and severe depression, respectively.

Taking in to account that prevalence of suicidal behavior is determined by SBQ-R scores ≥ 8; our study revealed that 12.0% (CI:8.8-15.2) of PLWHA have suicidal behavior and about12.4% (n=52)of PLWHA reported that they have a history of at least one life time suicidal attempt from which greater proportions;44.2% (n=23) and 34.6% (n=18)used poison and hanging as a method of suicide attempt respectively(Figure 3).

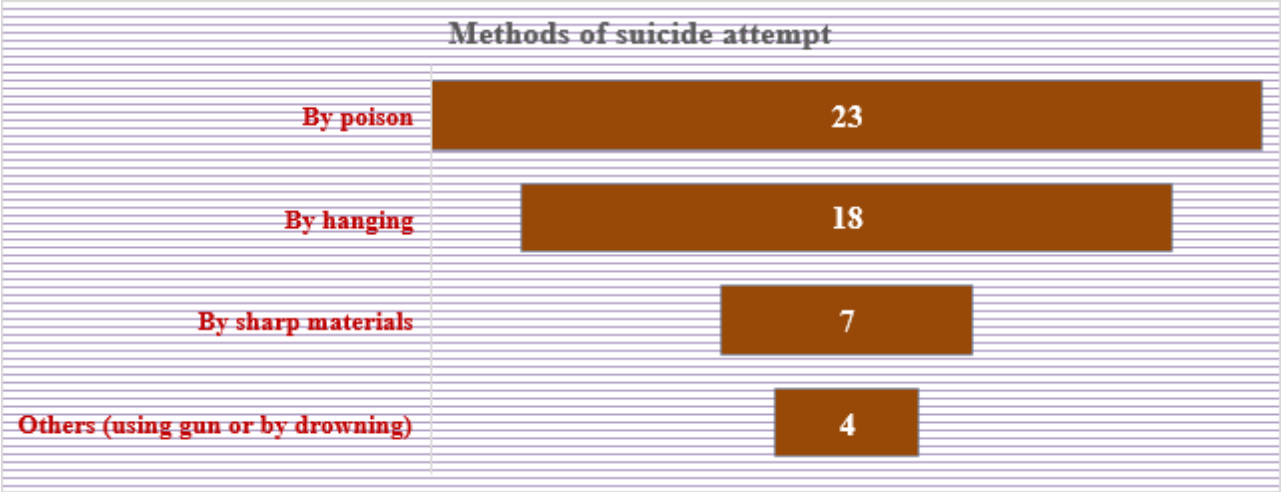

Figure 3: Mechanisms of suicidal attempt by PLWHA (N=52) attending follow up treatment to at Hawassa town public hospitals, Ethiopia, 2020.

As shown below in figure 4, prevalence of suicide is highly prevalent among patients with depression than those having no depression. In comparison 36.6% of PLWHA having depression were reported to have suicidal behavior and only 9.4 % of non-depressed PLWHA have shown suicidal behavior (Figure 4).

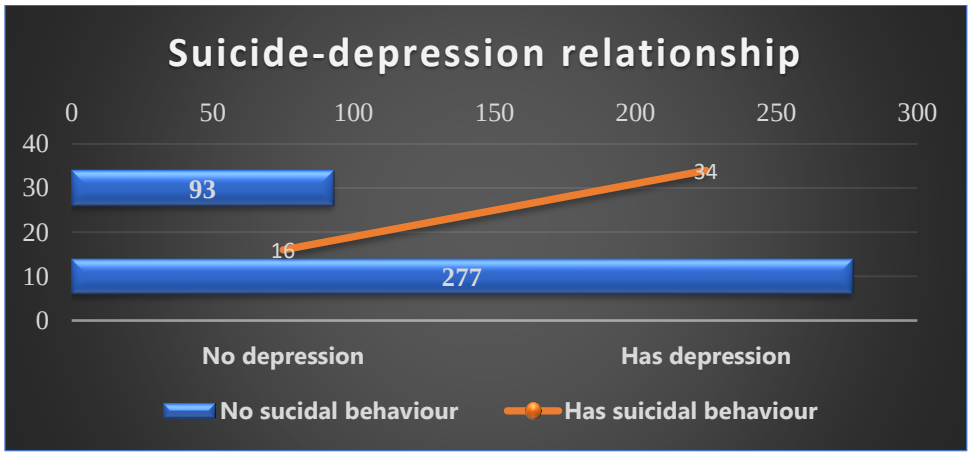

Figure 4: A graph of relationship between suicidal behavior and depression among PLWHA attending follow up treatment to at Hawassa town public hospitals, Ethiopia, 2020.

Determinants of depression among PLWHA

During Bi-variable analysis institution data gathering sites, educational status, BMI, duration since first diagnosed and duration on ART, history of default, medication adherence, presence of AIDS related opportunistic infections, social support, internalized stigma and suicidal behavior were significantly associated with depression.

Multivariable binary logistic regressions were used to control confounder, and variables with a p-value of < 0.05 are reported as a significantly associated variable with depression. We found that

suicidal behavior is the most important variables that significantly predicted depression in which, the odds of having depression is five times higher in PLWHA having suicidal behavior when compared to those who do not have suicidal behavior (AOR = 5.28 CI: 2.68-10.41). PLWHA who developed AIDS related opportunistic infections have four times higher odds of having depression in comparison to their counterparts (AOR=3.92 CI: 1.51-10.22). High level of internalized stigma is associated with depression; those PLWHA experiencing high level of internalized stigma have twice higher odds of having depression than those PLWHA experiencing low level of internalized stigma (AOR=2.07 CI: 1.29-3.33) and in detail results are presented on table 5.

Table 16: Factors associated with depression among PLWHA attending follow up treatment to at Hawassa town public hospitals, Ethiopia, 2020.

Variables	Category	Depression		OR with 95% CI	
		No	Yes	Crude	Adjusted
Hospitals	HUCSH	182	64	1	1
	AGH	111	63	1.61(1.06-2.46) *	1.01 (0.62-1.66)
Educational status	Illiterate	33	23	2.54 (1.23-5.26) *	1.87 (0.84-4.19)
	1-8th grade	105	48	1.67 (0.91-3.04)	1.40 (0.72-2.70)
	9-12th grade	82	36	1.60 (0.85-3.01)	1.45 (0.73-3.00)
	College and above	73	20	1	1
History of default	Yes	34	26	1.96 (1.12-3.13) *	1.09 (0.53-2.22)
	No	259	101	1	1
Adherence of the patient for ART	Good	275	112	1.32 (0.51-3.4)	1.30 (0.45-3.68)
	Fair	13	7	3.93 (1.26-12.27) *	2.58 (0.65-10.25)
	Poor	5	8	1	1
AIDS related opportunistic infection	Yes	9	17	4.88 (2.11-11.27) *	3.92 (1.51-10.22) *
	No	284	110	1	1
Social support	Poor social support	158	82	2.33 (1.12-4.87) *	1.74 (0.77-3.95)
	Moderate social support	90	35	1.75 (0.79-3.85)	1.37 (0.57-3.28)
	Strong social support	45	10	1	1
Internalized stigma	Low level of stigma	206	61	1	1
	High level of stigma	87	66	2.56 (1.67-3.9) *	2.07 (1.29-3.33) *
Suicidal behavior	No	277	93	1	1
	Yes	16	34	6.33 (3.34-12.00) *	5.28 (2.68-10.41) *

Discussion

This study assessed the prevalence of HIV depression, suicide and its associated factors among PLWHA. The study suggests that nearly one-third, (30.2%) of PLWHA were suffering from depression. The finding from this study is in line with the previous studies conducted among PLWHA in Ethiopia (31.2%, 30%, 32% and 31.7%) (Girma et al., 2021, Dorsisa et al., 2020, Duko et al., 2019, Wonde et al., 2019) and Kenya (32.2%) (Mathai et al., 2018). However, this finding is lower than the previous studies done in Addis Ababa, Ethiopia (35.5%)(Abebe et al., 2019), 50.5% in Wolaita sodo, Ethiopia (Beyamo et al., 2020)and Kenya (52.6%) (Gaitho et al., 2018). The reason for this discrepancy might be attributable to difference in; study population, the study periods, the depression diagnostic tools difference, and the sample size used. Conversely, this finding is much higher than the study conducted among PLWHA in Ethiopia such as, 11.7% in Debre Markos (Kibret and Salilih, 2015), 14.6% in Aksum (Beyene Gebrezgiabher et al., 2019) and 20% in Dessie (Seid et al., 2020). Additionally, this finding is higher than the study among other African countries (Malawi (18.9%) and Nigeria (20%)) (Kim et al., 2015, Bankole et al., 2017) and UK (16%) (Le Prevost et al., 2018). The difference may be attributable to the use of difference in study settings, psychometric scales, and also socio-demographic and economic changes.

On multivariable logistic regression we found that suicidal behavior is the most important variables that significantly predicted depression in which, the odds of having depression is five times higher in PLWHA having suicidal behavior when compared to those who do not have suicidal behavior (AOR = 5.28 CI: 2.68-10.41). This finding is consistent with a studies done in Nigeria (Shittu et al., 2014) and in Nepal (Amiya et al., 2014) and it is a long standing scientific evidence that suicide is the major cause of death among people with depression (Gotlib and Hammen, 2008).

In this study PLWHA who developed AIDS related opportunistic infections have four times higher odds of having depression in comparison to their counterparts (AOR=3.92 CI: 1.51-10.22). This finding is supported by similar study from Jimma, Ethiopia (AOR = 2.16, 95%CI:1.17–3.97)(Girma et al., 2021), Rwanda (Fawzi et al., 2016) and USA(Brown et al., 2015). This can be explained by opportunistic infections have synergistic effects on the disease progression, AIDS-related mortalities and psychosocial crisis(Christ et al., 1986).

Another major finding of this study was high level of internalized stigma is associated with depression; those PLWHA experiencing high level of internalized stigma have twice higher odds of having depression than those PLWHA experiencing low level of internalized stigma (AOR=2.07 CI: 1.29-3.33); this finding is in line to studies from Ethiopia (Abebe et al., 2019, Abadiga, 2019, Duko et al., 2019), South India(Charles et al., 2012) and Cambodia(Yi et al., 2015) and this might be explained by the fact that PLWHA in fear of blooming stigma from the community often they prefer to keep their sero-status secrete this might result in delay in seeking HIV/AIDS treatment, poor follow-up and ART adherence, which in turn might result in depression.

CONCLUSION AND RECOMMENDATIONS

Conclusion

This study demonstrated a high prevalence of depression, suicidal behavior and internalized stigma among PLHA. Factors such suicidal behavior, internalized stigma and AIDS related opportunistic infection were significantly associated with depression among PLWHA

Recommendation

Therefore, according to our finding routine screening for comorbid depression and suicidal behavior on every hospital visit of the client and linkage with mental health service providers will benefit patients by preventing further complications and premature deaths due to suicide and further studies are required on effective integration of mental health service working in conjunction with HIV/AIDS programs.

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Acceptance, Utilization and Associated factors of Immediate Postpartum IUCD among mothers delivered in public health facilities of Hawassa City, Sidama, Ethiopia: Facility Based Study

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ABSTRACT

Immediate post-partumintra uterine contraceptive device placement within 48 hours after delivery and before discharge from hospital is a safe and effective method when provided after comprehensive counseling. Studies on its acceptance, utilization and associated factors are scarce in study area. This study aims to assess the acceptance, utilization, and associated factors for immediate postpartum intra uterine contraceptive device among mothers delivered at public health facilities in Hawassa city.

A facility based cross sectional study was conducted among mothers delivered in public health facilities in Hawassa city administration who started immediate post-partum intra uterine device provision in the city. Data were collected by a pretested structured questioner following a two days training for data collectors. A face to face interview was administered by five midwifes data collector, working out of selected health facilities. Principal investigators were supervise overall process data collection. EPI-Data version 7.2 was used for data entry and STATA 14 was used for analysis. Data were analyzed by descriptive statistics. To measure association all variables in binary logistic regression model with p value 0.25 and less transferred into multivariable logistic regression model. Statistical significance was determined at p value of 0.05 with 95% confidence interval.

A total of 392 postnatal mothers were interviewed making 98.5% response rate. Acceptance and utilization of immediate post-partum IUCD were 64(16.5%) & 39(9.95%) respectively. Factors associated with acceptance of IPPIUC were caesarian section C/S mode of delivery(AOR= 0.2857 with 95% CI, O.087, 0.935) than spontaneous vaginal delivery(SVD), Women who do not get counseling about immediate post-partum IUCD (AOR= 0.04525 with 95% CI, 0.241, 0.893 than counseled, Good attitude to IUCD (AOR= 7.8 with 95% CI, 2.7, 22.37) than who have poor attitude towards IUCD, counseling during the post-natal period (AOR= 3.096, with 95% CI, 1.334, 7.1878) than counseled during ANC and large number of children (AOR= 3.7436, with 95% CI, 1.1959, 11.75) than with small number of children have significant association. Factors associated with utilization were educational states of respondents college level of education with AOR=.1919, 95% CI= (.043, .8554) than no formal education. Counseling during postnatal period AOR=7.968293 95% CI, (3.293302, 19.27964) than counseled during ANC time and mothers with no support from their partner for family planning AOR = .0974418 95% CI (.0117596, .8074172) than have spouse support for family planning use were significantly associated.

Acceptance and utilization of immediate post-partum IUCD were low. Lack of counseling about immediate post-partum IUCD and women delivered by caesarian section(C/S) mode of delivery might be attributers of low acceptance of immediate post-partum IUCD. Having good attitude towards IUCD, receiving counseling during the post natal period and having large number of children have contribution for more acceptances of IPPIUCD. All mothers in addition to other methods of family planning should be counseled about IPPIUCD. Infancies should be given for mothers with caesarian section mode of delivery to be given option of receiving counseling about IPPIUCD. College level education and lack of spouse support were preventive for utilization whereas, counseling during postnatal period fevered the utilization. Partner should be included in the counseling of family be helpful.

Key words: *immediate postpartum IUCD, long-acting family planning, acceptance of immediate postpartum IUCD*

NTRODUCTION

Family planning is one of the global indicators in measuring the attainment of sustainable development goal and a strategy in reducing maternal, infant and child mortalities by reducing unintended pregnancy(Askew *et al.*, 2020).Estimation of85 million (40%) of all pregnancy were unintended in 2012 globally indicating a reduction. But, the rate of unintended pregnancy is high in African country 80/1000 women of reproductive age and Ethiopia is among countries having more than 100/1000 women of reproductive age(Singh and Sedgh, 2010).Women and couples who desire safe and effective protection against pregnancy will advantage from access to more contraceptive choices, including long acting and permanent contraceptive methods(Sexual and Services, 2004).

Intra uterine devices (IUDs) are one of a long acting reversible contraceptive (LARC) family planning method in which a couple uses it to limit or space the number of children they want to have through the use of contraceptive methods. It is small flexible devices made of metal and/or plastic; they may be inert, or may release copper or hormone(Sexual and Services, 2004). Immediate Postpartum IUD remains a possible choice for clients who desire to use a long-acting reversible contraceptive method and to have it placed at the time of their delivery(Trivedi *et al.*, 2014)

Immediate Postpartum intrauterine contraceptive device (IPPIUCD) has been recognized for its low rate of complications, risk of perforation and lower incidence of infection when used both vaginal and caesarian section mode of delivery(Shanavas, Jacob and Chellamma, 2017)(Rekha Aseri, Kalpana Mehta, 2019)(Hooda *et al.*, 2016). It is preferred for relief of overcrowded in outpatient facilities, protection against unwanted pregnancy and consequent abortion(Kanhere, Pateriya and Jain, 2015). Placement of IPPIUCD is preferred because it does not interfere with breastfeeding and also breastfeeding is associated with reduced need of IUD removal due to bleeding or pain.(Goldstuck ND, Steyn PS 2013)(Jeffrey M. Smith, Barbara Deller, Chandrakant Ruparelia, no date). And also postpartum IUD placement provides a highly effective method for preventing unintended pregnancy, especially for patients who may not return for the postpartum visit(Cwiak and Cordes, 2018).Women who have short birth interval and who have early postnatal sexual resume without using any method of contraception will have grate benefit from IPPIUD (State, 2019). Among mothers who resume sexual intercourse during postnatal period 55.4% was before six weeks of postnatal period(Tg *et al.*, 2018)

Acceptance of immediate PPIUCD was high when mothers are counseled during early pregnancy and early labour. Promising increase of ANC and institutional delivery utilization (EPHI,2019) gives good opportunity for counseling a pregnant mother for IPPIUCD. Acceptance and utilization of IPPIUD washigher for those mothers who have third trimester visits(Lopez *et al.*, 2019). Utilization of implant is growing from time to time (implant which was <1 in 2000, 8% 2016 EDHS and 9% in 2019 Mini EDHS) among the long acting reversible contraceptives, whereas IUCD remains still very low 2% (EDHS, 2016)(EPHI) [Ethiopia] and ICF. 2019).

Acceptance is important for the utilization of any effective method of family planning program. Currently the popular contraceptive method in Ethiopia is a short acting, especially the injectable one. Even though, its effectiveness and several benefit are well known among the long acting family planning methods IUCD is the least utilized (EDHS2016). Additionally, with increasing maternal health services the utilization of IPPIUCD has the opportunity to increase, like institutional delivery utilization, but, it has no change through time (MEDHS, 2019). There is limited study on acceptance, utilization and factors associated with its in study area. This study aims in assess the acceptance, utilization and contributing factors of immediate post-partum IUCD.

METHODS AND MATERIAL

Study area

This study was conducted in Hawassa city which is a capital city of SNNPR and recently emerged Sidama region, which is found 275 km south of Addis Ababa a capital city of Ethiopia. The city administration has a total area of 157.2 sq.kms divided in to 8 sub cities and 32 kebeles. In the City administration, there are a total of 12 public health facilities providing health services for the respective community. These are 2 hospitals (one referral and one primary hospital), 10 primary health care units 'health centers. According to the Hawassa city Administration health office report of 2018/2019G.c. Currently immediate post-partum IUCD is provided in Hawassa city at Adar Health Center, Hawassa comprehensive referral Hospital, Adare Hospital, Alamura and Millennium Health Center science 1 year. Two midwifes from each health facility were trained by In gender Health on Immediate post-partum IUCD.

Study design and period

Facility based cross sectional study was conducted from January 1st up to February 31st of 2020Source population

All postnatal mothers delivered in public health facilities of Hawassa city

Study population

All postnatal mothers delivered in the selected public health facilities of Hawassa city during the study period

Study units

Randomly selected postnatal mothers from all mothers delivered in the selected public health facilities of Hawassa city during the study periods.

Inclusion and exclusion criteria

Inclusion: Those mothers in there postnatal delivered in the selected health facilities, reside for six month in Hawassa town and willing to participate in the study were included

Exclusion: Mothers who are in poor health condition and unable to communicate properly were excluded.

Study Variables

Dependent variable:

Acceptance of immediate post-partum IUCD

Utilization of immediate post-partum IUCD

Independent Variables

Socio demographic, Husband factor: support use of F/P does not support F/P or not known his support status. And decision maker for family planning, , Reproductive history, current pregnancy, Family planning history Counseling about PPIUC and Knowledge and Attitude about IUCD current pregnancy, current and future delivery plan and counseling situation in this delivery.

Reason for acceptance and utilization and reason for declaring acceptance and utilization

Measurement

Acceptance of IUCD:

Acceptance of IUCD: woman's verbal consent to use IUCD within 10 min to 48 h of delivery of placenta after they counseled about PPIUCD.

Utilization: Women who accepted PPIUD as a method of family planning and had actual PPIUCD insertion after the post placental period or before they discharged from the health facilities.

Decline to utilize PPIUD: those women who refused insertion of PPIUCD after the post-placental period, before discharge from health facilities were classified as decline to utilize PPIUD

Knowledge and attitude knowledge were measured by calculating the mean score of 8 to5 items and classifying as good knowledge if the woman responded greater than the mean score knowledge question or poor knowledge if the woman responded less than the mean score for knowledge question and the same step were applied for attitude question.

Sample size determination

The sample size was determined using the formula of sample size determination for single population proportion taking the prevalence of acceptance of post-partum IUCD use among women who gave birth at Sidama zone health facilities to be 38%(Tefera *et al.*, 2017).

$n= [(Z(1-\alpha/2))2.p.(1-p)]/d2$

Where n estimated minimum sample size

z standard normal variable at 95% (1.96) level

p 38. % is a population proportion who acceptance PPIUCD in Sidama zone

d 5% margin of error

$n=(1.96)^2 * 0.38(1-0.38)/ (0.05)^2$

n=362

Using the above formula, a total sample size of 362was calculated. To account for non-response 10% considered and therefore, a total of 398 mothers were included in the study.

Sampling procedure

Data was collected from five health facilities providing IPPIUCD service in Hawassa city administration. The calculated minimum sample size 398 postnatal mothers were allotted by proportionate allocation based on one year delivery report, after calculating the average estimated monthly delivery in each health facilities. A sample of 169, 168, 17, 26 and 17 from Hawassa comprehensive referral hospital, Adare hospital, Adare, Millennium and Alamura health centers respectively (See fig. 1). Study participants were selected by using systematic random sampling method. The first woman was selected by lottery method from their order of delivery registration.

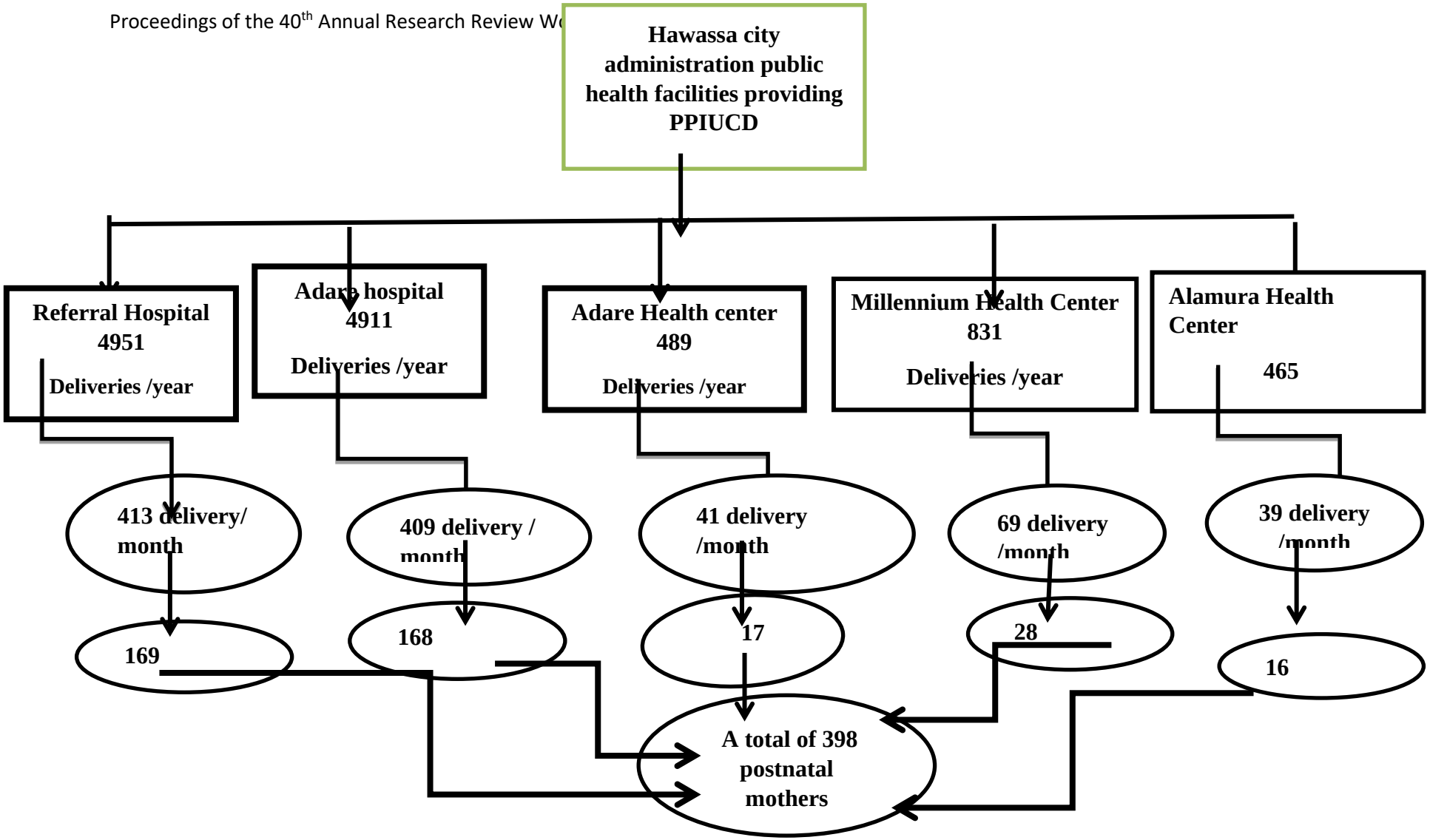

Figure5: Schematic Presentation of Sampling Procedu1

Data collection technique

A face to face interview was carried out by five midwifery nurses using structured questionnaire which is developed after reviewing different literatures. Data collectors recruited other than data collection health facilities. Data were collected at the exit of delivery in postnatal room. Data collection process was supervised by principal investigator and co-investigator.

Data quality management

Before administering the questionnaire, data collection tools was tested on5%of mothers from Yirgalem hospital, who reside in Yirgalem town, which may have the same characteristics with study subjects, but not be included under the study. Two days training was provided for data collectors about the objective of the study and how to collect the data. During data collection every questionnaire was checked for completeness and incomplete questionnaires were filled by data collector. Questionnaire prepared in English and was translated to Amharic by expert and back to English to check its consistence. Data was cleaned before and after entry.

Data analysis

Collected data was checked and entered into EPI-Data version 7.2 and was exported to STATA 14 version 22 for cleaning and analysis. Data was analyzed using frequency, mean, median, proportion, and standard deviation. To measure factors affecting acceptance and utilization of IPPIUD binary logistic regression model was used. Those statistically significant variables with p-value < 0.25 at binary logistic regression level were included in multivariable logistic regression model to control potential confounder variables. Hosmer–Leme show test was used to compare and rule out the goodness of fit of the models. Multicollinearity was examined, and all covariates having a value of variance inflation factor of 10 was tolerated.

Ethical considerations

Ethical approval was taken from Institutional Review Board of Hawassa University. Hawassa city administration health office was written permission letter for each health facilities. Verbal informed consent was obtained from study participant. Information obtained from each study participant was kept confidential. Name of the study participant was replaced by code in each questionnaire. Study participation was completely volunteer; withdrawal from the study at any point was assured when they are not willing to participate.

RESULT

Socio demographic economic status of respondents

A total of 392 post-natal mothers were interviewed making 98.5% response rate. The mean and median age n=381 of respondents was 25 years with standard deviation of **(± 4.5)**. Majorities382(97.9%) were married and nearly half 223(56.9%), 211(53.8%) were protestant and housewife respectively. One third of mothers educated up to primary level while equal number of their husbands were educated college level. Majorities 364(92.9%) were urban dwellers. (See table 1).

Table17: Socio demographic and economic condition of mothers give birth in Hawassa public health facilities

Variables	Number	Percent	Remark
Age/ years	**N= 381**		
<20	72	18.9	
20- 25	137	36	
26- 30	135	35.4	
>30	37	9.7	
Marital status	N= 390		
Married	382	97.4	
Single	8	2.1	
Religion	N= 389		
Protestant	223	56.9	
Orthodox	103	26.3	
Muslim	58	14.8	
Catholic	5	1.3	
Educational status of respondent	N= 389		
No formal education	35	9	
Primary level	148	38	
Secondary level	104	26.7	
College	79	20.3	
University	23	5.9	
Occupation status of respondents	N=392		
House wife	211	53.8	
Farmer	4	1.0	
Merchant	47	12	
Student	27	6.9	
Government employee	77	19.9	
Private employee	23	5.9	
Daily labourer	3	0.8	
Educational status / Husband N= 384			
No formal education	22	5.6	
Primary level	101	25.8	
Secondary level	118	30.1	
College	140	35.7	
University	3	0.8	

Occupational status /husband N=386		
Privet employee	120	30.6
Merchant	111	28.3
Government employee	107	27.3
Daily laborer	21	5.4
Farmer	23	6
Student	4	1
Residence N=392		
Urban	364	92.9
Rural	28	7.1
Income N=384		
<12000	39	10.2
12001-2400	60	15.6
24001-48000	101	26.3
48001-84000	102	26.5
>84000	82	21.4

Reproductive related history

One hundred eighty-four (46.9%) mothers have one to two children before this delivery and 150(38.3%) have no child or this delivery may be the beginning of child Bering. Almost half 118(49.6) mothers have more than three years birth interval. A desired total number in the future is four in 179(49.3%) where and there future birth plan in 237(67.7%) were after three years. And also mothers who have experienced delivery most 170 (72.6%) and half 119(51.1) have a sexual and menstrual resume after 45 days of delivery respectively. (See table 2)

Table 18: reproductive related history of mothers who gives birth in Hawassa city public health facilities 2020, Sidama, Ethiopia

Variables	Number	Percent
Gestational Age	**N=392**	
Term	362	92.3
Preterm	23	5.9
Post term	7	1.8
Number of children you have	**N= 390**	
No child	150	38.3
1-2 children	184	46.9
3-4 children	52	13.3
Above 5 children	4	1
Birth interval	**N= 238**	
Below 24 months	20	8.4
24-36 months	100	42
Above36 months	118	49.6
Have Future plan to give birth	N= 392	
Yes	347	88.5
No	32	8.2

Not decided yet	13	3.3
Future number of children	**N= 363**	
Below 4 children	88	24.2
4 children	179	49.3
Above 4 children	96	26.4
Future time to give birth	**N= 350**	
Below 24 month	10	2.9
24-36 months	103	29.4
Above 36 month	237	67.7
Sexual Resume in previous delivery	**N= 234**	
Before 45 days	47	20.1
After 45 days	170	72.6
After 6 months	17	7.3
Menstrual Resume	**N= 233**	
Before 45 days	34	14.6
After 45 days	119	51.1
After 6 month	80	34.3

Health service utilization condition of respondents

Three hundred seventy-seven 96.2% of mothers have antenatal care follow up. Of the total who received ANC 198 (52.8%) received up to fourth ANC follow up and Most 259(66.1%) were delivered spontaneous vaginal delivery. (Table: 3).

Table 19: Health Service Utilization of Mothers who was given births the public health facilities in Hawassa city administration 2020, Sidama, Ethiopia.

Variables	Number	Percent
ANC follow up		
Yes	377	96.2
No	15	3.8
Number of ANC follow up reported N= 375		
Third & below	177	47.2
Fourth	198	52.8
Mode of delivery	**N= 392**	
SVD	259	66.1
Instrumental	36	9.2
C/S	97	24.7
Current delivery	**N= 391**	
Planed	350	89.5
Not planed	41	10.5

Family planning history

From a total study participants 242(61.7%) receiver family planning counseling in current pregnancy and most of mothers 160(66%) counseled during antenatal care (ANC). Majorities 254(96.2%) women were used a family planning method before this pregnancy. Among the users 102(40.1%) Implant was the highest and IUCD 23(9.1%) was the least utilized (see table 4).

Table20: Family planning counseling and use of family planning in the past and current pregnancy among mothers who give birth in public health facilities of Hawassa city administration 2020, Sidama, Hawassa

Variable	Frequency	Percentage
F/ p counseling current pregnancy	**N= 392**	
Yes	242	61.7
No	150	38.3
Time of counseling	**N=242**	
ANC	160	66.1
Delivery	16	6.6
Postnatal	68	27.3
Past use of F/P	**N= 390**	
Yes	264	67.7
No	126	32.3
Use F/P Before current pregnancy	N= 265	
Yes	254	96.2
No	10	3.8
Method used in the past	N= 254	
Implant	102	40.1
IUCD	23	9.1
Pills	27	10.6
Condom	3	1.2
Injectable	99	39.0

Table 21: Husband support on use of modern family planning among mothers give birth in Hawassa city public health facilities 2020 Sidama, Ethiopia

Variable	Number	Percent
Decision for modern contraception	**N = 346**	
Me and my Husband	201	58.1
Me	87	25.1
Husband	49	14.2
Health extension worker/ health workers	9	2.6
Husband support on modern contraception		
Yes	233	64.5
No	84	23.3
Don’t know	44	12.2

Knowledge level and attitude level of respondents about IUCD

Majorities of mothers delivered in Hawassa public health facilities were having poor knowledge and attitude respectively 352 (90%) and 320(81.6%) about intrauterine contraceptive device about intrauterine contraceptive device.

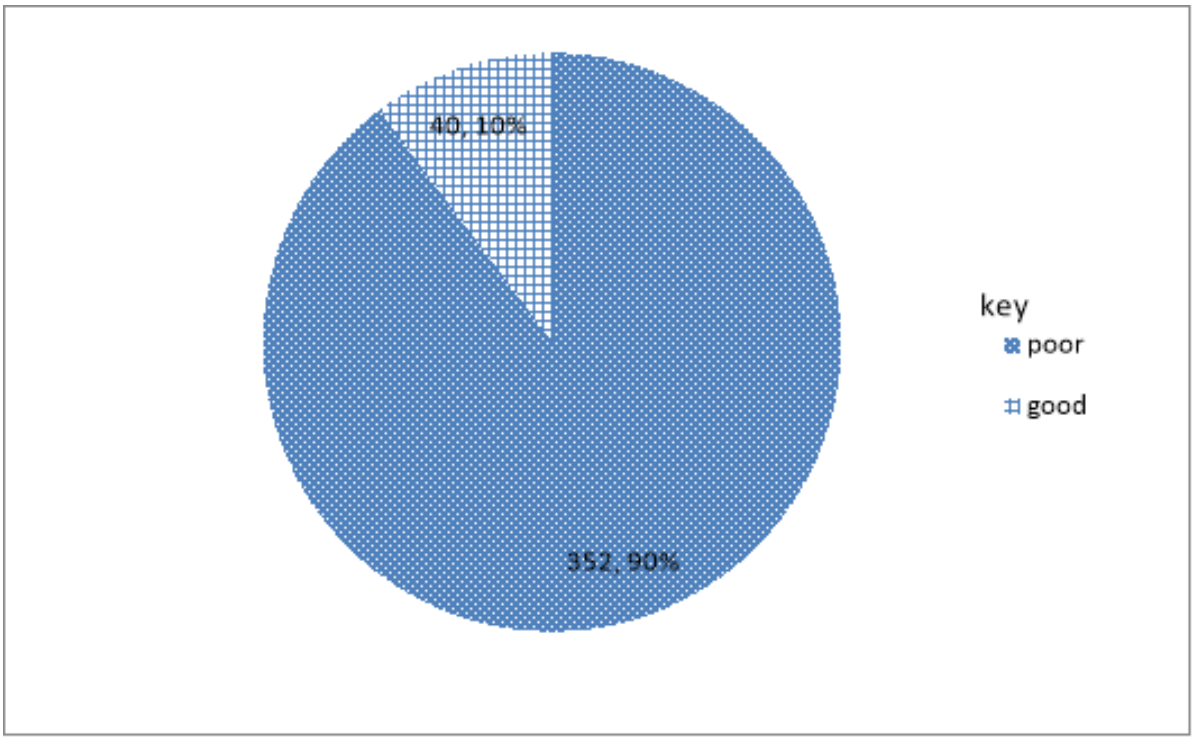

Figure6: knowledge of mothers delivered in public health facilities in Hawassa city, Sidama, Ethiopia, 2020

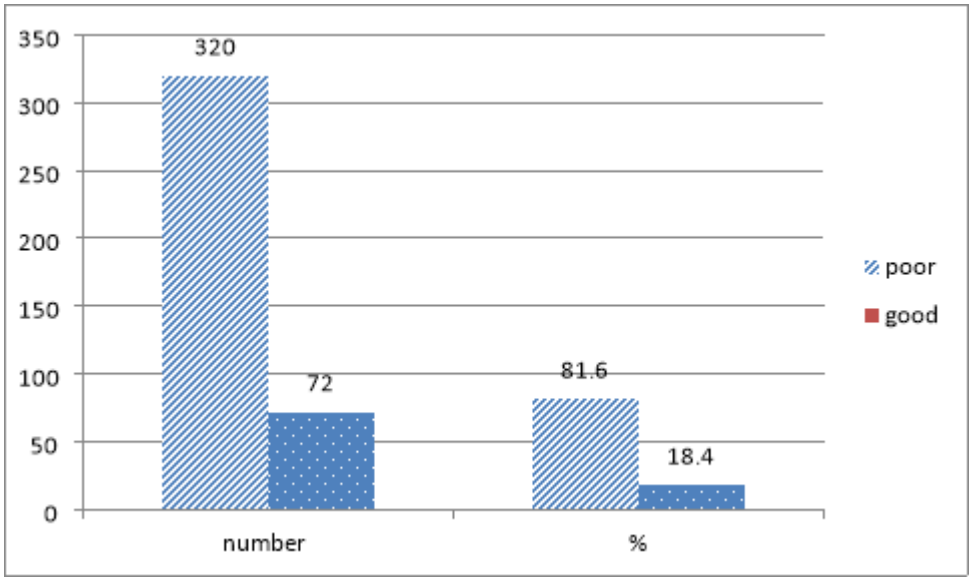

Figure 7 Attitude towards IUCD among mothers delivered in public health facilities of Hawassa city, Sidama, Ethiopia, 2020

Acceptance and utilization of immediate post-partum uterine contraceptive device

Among mothers delivered in public health facilities of Hawassa city administration 133(34.02%) acquired counseling about immediate postpartum IUCD and only 64(16.4) from the total and majorities 326(83.59%) fail to accept. Those declared to accept IPPIUCD as a family planning method 157(40%) due to preference of other family planning method, 65(16.6%) due to lack of counseling, 62(15.8%) fear of side effect, 48(12.2%) have no reason and 21(5.3%) due to need of additional child. Utilization of IPPIUCD among mothers gives birth in Hawassa city public health facilities were 39(9.95%) only.

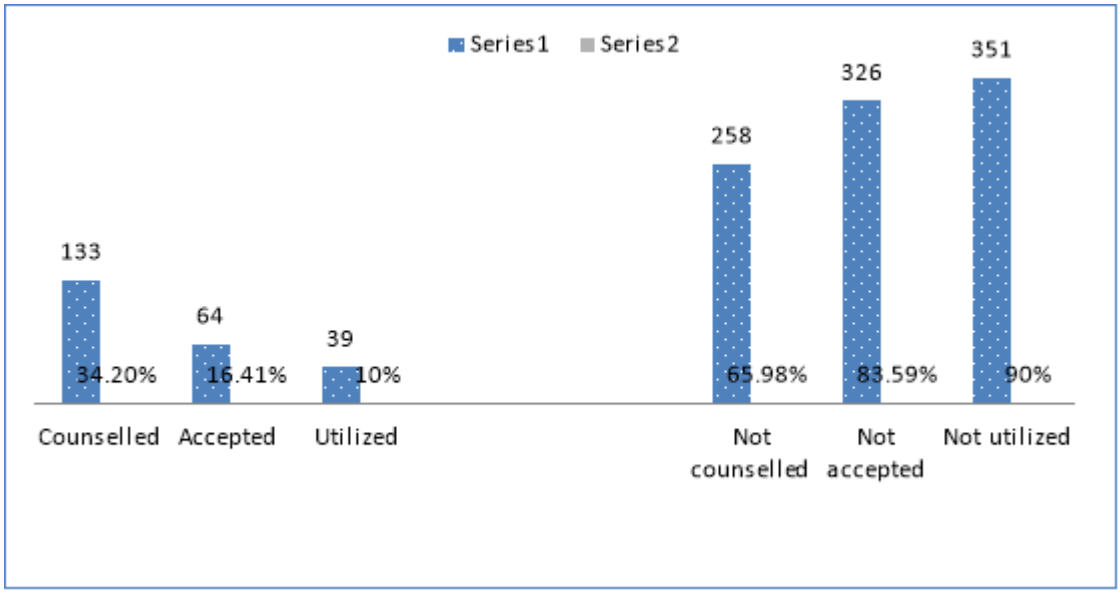

Fig 8 : Counseling, Acceptance and Utilization situation of IPPIUCD among mothers delivered in public health facilities of Hawassa City Administration, Sidama, Ethiopia, 2020

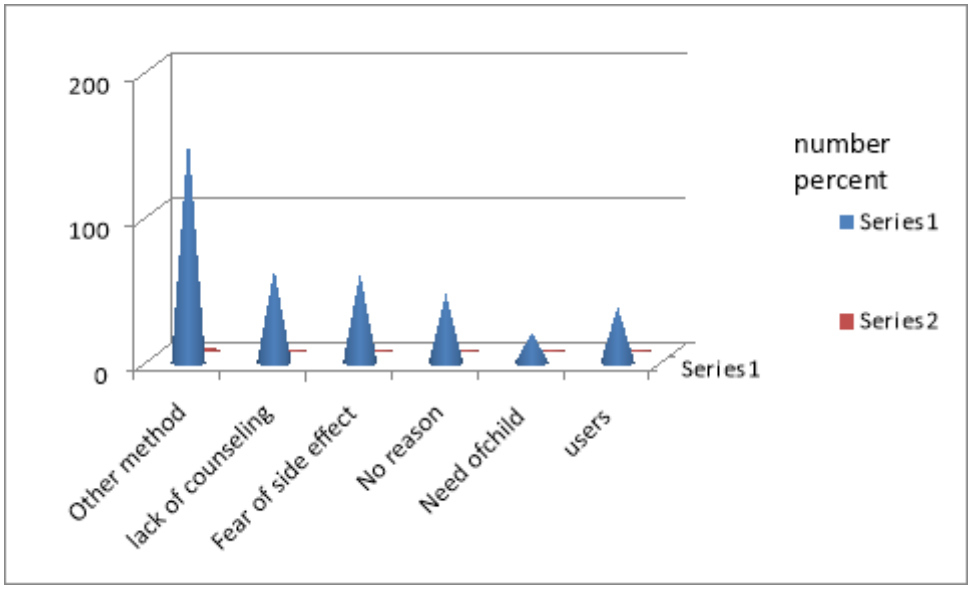

Figure 9 Reason for not accepting IPPIUCD among mothers who have given birth in public health facilities of Hawassa city administration, Sidama, Ethiopia, 2020

Binary logistic regression and multiple logistic regressions for factors associated with Acceptance and utilization of immediate post-partum IUCD

Acceptance

Binary logistic regression for acceptance of immediate post-partum intra uterine contraceptive device was done. In this model Age group , educational status of respondent and husband from the socio demographic factors and number of children, birth interval ,sexual resume, mode of delivery , future plane to give birth, future number of children, counseling about IPPIUCD , attitude and time of counseling were significantly associated with acceptance of immediate post-partum IUCD as a family planning method. When the confounder is controlled only Mode of delivery, receive counseling about IPPIUCD, Time of counseling, Attitude and future number of children were significantly associated at p value 0.05 and with 95% confidence interval.

Mothers whose mode of delivery were in caesarian section (c/s) were less likely to accept PPIUCD than delivered in spontaneous vaginal delivery (SVD) (AOR= 0.2857 with 95% CI, O.087, 0.935). Women who do not get counseling about immediate post-partum IUCD less likely to accept IPPIUCD (AOR= 0.04525 with 95% CI, 0.241, 0.893). Good attitude to IUCD have significant association with acceptance of IPPIUCD. Mothers who have good attitude towards IUCD 7.8 times more likely to accept immediate post-partum IUCD than who have poor attitude towards IUCD, (AOR= 7.8 with 95% CI, 2.7, 22.37). Women who had received counseling during the post-natal period 3 times more likely to accept IPPIUCD than women counseled during ANC

(AOR= 3.096, with 95% CI, 1.334, 7.1878). Mothers who have large number of children 3.7 times more likely to receive IPPIUCD than with small number of children (AOR= 3.7436, with 95% CI, 1.1959, 11.75) (see table 6)

Utilization IPPIUCD

In Binary logistic regression Utilization of immediate post-partum IUCDPrevious use of IUCD, Previous use of F/P, husband support, time of counseling, attitude, counseling about IPPIUCD, time to give future birth, mode of delivery, ANC visit, number of ANC visit, place of ANC, birth interval, number of children, husband educational status and respondent educational status have significant association with IPPIUCD.

In multiple logistic regressions only educational status of respondent, time of counseling about and spouse support were significantly associated with use of immediate post-partum IUCD.

Educational states of respondents were 81 % of mothers who have college level of education with AOR=.1919, 95% CI= (.043, .8554) were less likely to utilize IPPIUCD compared to mothers who have no formal education. Time of counseling for immediate post-partum IUCD, mothers who have counseling during postnatal period were 7.9 times more likely to use insertion of IPPIUCD than counseled during ANC time AOR=7.968293 95% CI, (3.293302, 19.27964). Spouse support for family planning use, 91% of mothers with no support from their partner for family planning AOR = .0974418 95% CI (.0117596, .8074172) were less likely to utilize IPPIUCD compared to those have spouse support for family planning use.(see table 7)

Table 22: Association of acceptance of immediate post-partum IUCD with Socio Demographic and Reproductive health related condition of mothers who give birth in public health facilities in Hawassa city administration 2020, Sidama, Ethiopia

Variable	COR	AOR	p value
Grouped Age			
Adolescent			
Youth	1.195592 (.3232804 4.421675)		0.789
Young	1.886957 (.528287 6.739907)		0.328
Adult	4.553672 (1.276622 16.24281)*		0.019
Education /hus			
No formal education			
Primary	.3052326(.1092652 .852668)		0.024
Secondary	.3181818(.1166565 .8678439)*		0.025
College	.2770833(.102509 .7489601)*		0.011
University	.875 (.0681308 11.23758)		0.918
Number of children			
No children			
1-2 children	2.738095 (1.365706 5.489589)*		0.005
3-4 children	5. 111(2.221 11.762)* *		0.000
Above 5 children	3.833333(.3697058 39.74632)		0.260
Birth interval			
Below 24 months			
24-36 months	2.738095(1.365706 5.489589)*		0.005
Above36 months	5.01282(2.207771 11.38178) **		0.000
Mode of delivery			
SVD			
Instrumental /del	1.975319 (.9087 4.293)		
C/S	.2992908(.1235467 .7250295)	.2857559(.0872766,.9356)*	
Future plan to give birth			
Yes			
No	2.05913(.8726605 4.858726)		0.099

Not decided yet	5.074286(1.637764 15.72166)*		0.005
Time to give birth future			
<24 months			
24- 36 months	.3712121(.0857472 1.607031)		0.185
>36 months	.377451(.0929287 1.533102)		0.173
Counseling about IPIUCD			
Yes			
No	.1874367(.0865671 .4058413)	.0452548 (.2411117.0893257)	0.000
Attitude			
Poor			
Good	5.472727 (2.80694 10.67025)	7.820163 (2.733036. 22.3762)	0.000
Time of counseling			
During ANC			
During delivery	1.819398 (.5454621 6.068632)	.9500491(.2285721 3.948834)	0.330
During PNC	4.927536 (2.557624 9.493426)	3.096799 (1.334219, 7.187848)	0.000
Future number of children			
Small (<=3)			
Medium(=4)	2.252824 .8625179 5.884189		
large (>=5)	4.447302 (1.437995 13.75421)*	3.743618 (1.195985, 11.7181)	0.010

Table 23: Association of utilization of immediate post-partumIUCD with socio demographic factors and reproductive history of mothers delivered in public health facilities of Hawassa city administration.

Variables	COR	AOR	P_ value
Education /respo			
No formal education	**r**		
Primary	.2200957 (.0890138, .5442)	.5078 (.15622, 1.6511) 0.260	0.001
Secondary	.1508903 (.0527488, .4316)**	.2830(.0755401, 1.0604)0.061	0.000
College	.1115152 (.0323983, .3838354)	.1919005(.0430482, .8554)	0.001
University	.3136364 (.0765531, 1.284961)	.3805211 (.0710603,2.0376)	0.107
Number of children			
No children	r		
1-2 children	1.536585 (.6868191, 3.437724)		0.296
3-4 children	3.333333(1.299608, 8.549584)*		0.012
Above 5 children	4.666667 (.4440134, 49.0475)		0.199
Birth interval			
Below 24 months	r		
24-36 months	.6666667(.2145646, 2.071378)		0.483
Above36 months	.1607143(.0436498, .5917348)*		0.006
ANC visit			
Yes	r		
No	3.532468 (1.068122,11.6825)*		0.039
Number of visit			
First visit			
Second visit	.2142857(.02843, 1.614901)		0.135
Third visit	.420354 (.0760032 2.32486)		0.321
Fourth and above visit	.1478495 (.0257188 .84993)*		0.032
Mode of delivery			
SVD			
Instrumental /del	4.1184 (1.813258 9.354001)*		0.001
C/S	.3052174 (.089965 1.035488)		0.057
Time to give birth future			

<24 months	r		
24- 36 months	.1458333(. 0299137, .7109572)*		0.017
>36 months	.227907(.0548244 .9474169)*		0.042
Counseling about IPPIUCD			
Yes			
No	.1183908 (.035773, .3918161)*		. 0.000
Attitude			
Poor	r		
Good	4.984375 (2.334507, 10.64207)		0.000
Time of counseling			
During ANC	r		
During delivery	8465911 .1025307 6.99026	.80876 (.0941021, 6.9509)0.847	. 0.877
During PNC	7.74026 3.507485 17.08108	7.9683 (3.293302, 19.2796) *0	0.000*
Husband support			
Yes	r		
No	.1874714 (.0435739 .80657)	.0974(.0117596, .8074)	
Don't know	1.19883 (.4636737 3.099581)	.5559(.1524, 2.0272)	
Previous use of F/P			
Yes			
No	.4227941 (.1812087 .9864584)		0.046
Previous method used			
Implant			
IUCD	10.63636 (3.7777, 29.9472)		0.000
Pills	1.859504 (.58565, 5.9041)		0.293
Condom	4.090909 (.34233, 48.887)		0.266
Injectable	.1722488 (.03715, .79864)		

DISCUSSION

In this study acceptance of immediate post-partum IUCD was 16.41%. Thisresult is in line with Balezone, Ethiopia 12.4%(Gonie *et al.*, 2018)and lowers than Sidama zone 38.1% (Tefera *et al.*, 2017)and intensive counseling 78% and routing counseling 66% in two level counseling studies in keneya(Ndegwa *et al.*, 2014). The difference may be time difference in the former in which it was done following training about IPPIUCD and the second study method difference may bring this much big difference.

In present study, the most common perceived reasons failing to accept immediate PPIUCD use reported by the study participant were 40% preference of other family planning method. Similarly study in in India(Kanhere, Pateriya and Jain, 2015)32% of participant declared not to accept PPIUCD due to inclination for other forms of contraception.

In this study, mothers who have not received counseling were less likely to accept IPPIUCD, likewise, in a study conducted in four countries women were more likely to accept PPIUCD if they had been counseled several times (Makins *et al.*, 2018). In other hand intensive or routine counseling did not have any impact on the acceptance of IPPIUCD(Ndegwa *et al.*, 2014).In this study most of mothers 65% did not acquired counseling about IPPIUCD.

In this study, those mothers who have caesarian section were less likely to accept IPPIUCD than mothers who have delivered vaginally. The finding is supported by study conducted in India (Rani *et al.*, 2018) in which 69.3% accepted PPIUCD followed vaginal deliver compared to 34.7 in following Caesarian section. This is due to the fact that those in caseation may be in emergency condition and/or surgery cause sort of frustration, so that; they may not be in good mind setup.

In this study, those mothers who have large number of children were more likely to accept IPPIUCD than mothers who have small children. This result is different with study done in a tertiary care center in Central India to assess acceptability and feasibility of immediate postpartum IUCD insertion was lower among grand multiparous (27%) compared to primiparous (48%) which is statistically significant(Kanhere, Pateriya and Jain, 2015). Possible explanation for those with small children may prefer a short acting family planning in our case and the later may prefer a permanent method of family planning.

In this study the utilization of IPPIUCD were 9.9% very low compared to 45% of mothers used IPPIUCD in study conducted to assess the effect of two levels of counseling on acceptance, uptake and early outcomes of post-placental intra-uterine contraceptive device in Kenya. The difference may be due to study design variation between the two(Ndegwa *et al.*, 2014).

In this study, the odds of time of counseling were 3 times more during postnatal period for acceptance of IPPIUCD than though counseled during antenatal care (ANC). With similar study in south East Ethiopia(Gonie *et al.*, 2018)the odds of accepting PPIUCD insertion was higher among women who attended 3 antenatal care visits than those who did not attend antenatal care visits for the current birth. It is believed that, those mothers who have more ANC visit will have a chance to be counseled about family planning, nevertheless, in this study counseling during postnatal period may result with short memory for acceptance of IPPIUCD.

Utilization

In this study, the actual use of immediate post-partum IUCD was 9.9% among mothers delivered in public health facilities of Hawassa city administration. This indicated that among accepted some rejected the actual insertion of the IPPIUCD. This finding is higher than 1.65 % finding of Debretabore general hospital(Hagos *et al.*, 2020), in line with 7.9% keneya (Wangari and Sc, 2015) and lower than 21.6%,28% and 36, in Sidama and Indiarespectively(Tefera *et al.*, 2017) _(Kanhere, Pateriya and Jain, 2015).. The difference explained by method, socio demographic and geographic variation.

In this study, college level education less likely to utilize IPPIUCD than mothers who have no formal education. Contrarily to this study higher education increased the likely hood of use of PPIUCD a health facilities in Adama and olenchit (Abebe and Mannekulih, 2020) . Either the educational quality may be poor or if it is not the higher the education the more they think critically about the method and refuse the use and those the lower educated may easily accept and decide to use the method.

In this study, lack of spouse support resulted with less likely to utilize IPPIUCD compared to mothers have spouse support for use of family planning. This finding were supported, adama and olenchiti, in which mutual decision making(Abebe and Mannekulih, 2020)and Gamo zone(Tsegaye, Mengistu and Shimeka, 2018) husband support has more likely to use PPIUCD. This is the fact that partner involvement increases the use of family planning method.

Unlike other study counseling during ANC increased the likelihood of utilization of PPIUCD In this study, counseling during post-natal period increased the likely hood of utilizing IPPIUCD compared to mothers counseled during ANC. This may be the fact that counseling during post-natal leads mothers for immediate decision and they consider the benefit of being safe for an intended pregnancy special those have short interval pregnancy. The other thing is that there is no recall problem the counseling and the action to use are in the same place and time,

CONCLUSION

In this study acceptance and utilization of immediate post-partum IUCD were low. Vaginal mode of delivery, good attitude towards IUCD, post-natal time of counseling and having large number of children were for acceptance of immediate post-partum IUCD. While caesarian section mode of delivery and lack of counseling about IPPIUCD were preventive for the acceptance of immediate post-partum IUCD.

For utilization of IPPIUCD counseling during postnatal period increased the utilization were as college education and lack of support from partner the less likely for utilization of PPIUCD

RECOMMENDATION

All mothers in addition to other methods of family planning should be counseled about IPPIUCD in respective of mode of delivery. Better to include spouse during counseling for family. Mothers may or may not receive counseling during ANC; health care providers should provide continuous counseling during postnatal period.

Fertility Awareness, Post Abortion Contraceptive Use and Associated Factors among Post Abortion Women in Hawassa City, Sidama, Ethiopia, 2019/20

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ABSTRACT

Post abortion contraception is the initiation and use of contraceptive methods immediately after an abortion, before fertility returns. In most women fertility returns on average about two weeks after an abortion; however, ovulation can occur as early as one-week post-abortion. To reduce rates of unplanned pregnancy and unsafe abortion, increased access to high-quality contraceptive care is needed. This study aimed to assess the level of fertility awareness, post abortion contraceptive utilization and associated factors among post abortion women in Hawassa city. Institutional based cross-sectional study was conducted among 410 mothers attending abortion clinics in Hawassa city from April 10 to May 10, 2020. Stratified sampling technique was used. Interviewer-administered pretested structured questionnaire was used for data collection. Data was entered into Epi Data version 3.1 and exported to SPSS version 23 for analysis. Bivariate and multivariable logistic regression analyses were computed. Statistical significance was considered for P < 0.05 at 95 % confidence interval. Majority, 289 (70.5%) of participants utilized contraceptives after abortion. Private health institutions, [AOR 0.50, 95% CI (0.28, 0.92)], history of contraceptive use, [AOR 1.85, 95% CI (1.00, 3.41)], Information on contraceptives, [AOR 2.60, 95% CI (1.17, 5.79)], Counseling on family planning, [AOR 6.49, 95% CI (2.62, 16.07)] and Counseling on fertility return, [AOR 2.0, 95% CI (1.22, 3.31)] were significantly associated with the post-abortion contraceptive utilization. Fertility awareness in this study is relatively poor. Post abortion family panning utilization is relatively good. Type of health facility, counseling on fertility return, history of family planning use, and counseled on family planning were statistically significant predictors of post abortion contraceptive use. Therefore, comprehensive post abortion family planning counseling and fertility return awareness creation was recommended.

Keywords*: Contraceptive use, Fertility awareness, Post abortion, Ethiopia*

INTRODUCTION

Globally, 8–11% of all maternal deaths are related to abortion. World Health Organization (WHO) estimates that every year, nearly 5.5 million African women have an unsafe abortion. As many as 36,000 of these women die from the procedure, while millions more experience short- or long-term illness and disabilities.

In several sub-Saharan cities, particularly where contraceptive use is low and access to clinical abortion is high (though largely illegal), abortion appears to be the method of choice for limiting or spacing births. Even in rural areas, women may regularly resort to abortion, often using extremely unsafe procedures, instead of contraception(Lauro, 2011).

A woman who has had an abortion is more likely to be faced with another unwanted pregnancy or repeat abortion than a woman who has never had an abortion(Marcel, 2008). For instance, 44% repeated abortion was reported in Mozambique. It was 26.5% in Tigray and 17% in Gurage zone, Ethiopia (Dgedge, Gebreselassie *et al.,* 2005, Seid, Gebremariam *et al.,* 2012, Tesfaye, Hambisa *et al.,* 2014). But WHO recommends a six months inter pregnancy interval following abortion to

ensure better maternal and fetal outcomes (WHO, 2006). Very short Inter Pregnancy Intervals (≤3 months) following a miscarriage are associated with a higher risk of late neonatal mortality for the infants born (DaVanzo, Hale *et al.,* 2012).

Therefore, family planning services need to be initiated immediately during post abortion as ovulation returns as early as day 8 and usually occurs before the first menstrual bleeding. (LARC) (Postlethwaite, Lee *et al.,* 2018). Repeat abortion was more likely with women who did not understand their fertility cycles (Mahmoud and Byomy 2013, Alemayehu, Yebyo *et al.,* 2017).

Because many women resume sexual activity shortly after an uncomplicated abortion and fertility may return as early as 10 days after a first-trimester abortion, it is crucial that women who are not seeking another pregnancy are offered effective methods of contraception immediately after the abortion process(Opoku, 2012). Hence, this study was aimed to assess the level of fertility awareness, post abortion contraceptive rate and factors associated with it among mothers attending abortion clinics in Hawassa city. As survey done by Bender show only 26% women knew correctly about return of fertility.(Bender and Geirsson, 2004)

MATERIALS AND METHODS

Study setting

An institution based cross-sectional study was conducted in Hawassa City, the political center of Southern Nation Nationalities and Peoples' and Sidama regional States from appril1-30, 2020. It is 273 km South of Addis Ababa, the capital of Ethiopia. It serves a total population of 343,175 of which 166,576 (48.54%) of them were females. The city has one comprehensive specialized hospital, one district hospital, three private hospitals, seven health centers and fifty-one private clinics.

Population

Source population

All reproductive age women (15-49) who received post abortion care service in selected health facility in Hawassa city was the source population.

Study population

Study population was all randomly selected reproductive age women who received abortion care service in selected health facility during the study period.

Inclusion and exclusion criteria

Inclusion criteria

Clients who came for abortion care services during the study period were included in the study.

Exclusion criteria

Clients with severe illness who were unable to communicate during the study period were excluded.

Sample size and sampling procedure

Sample size was determined using single population proportion formula considering the following assumptions.

Assumptions: A 95% confidence level, margin of error (0.05), 55.4% proportion of post abortion contraceptive use in Gondar.(Dejenie Seyoum and Gizaw 2014)

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

$$= (1.96)^2(0.554 * 0.446)/\ (0.05)^2$$

$$= 380$$

Considering 10% possible non-response rate the total sample size become 418.

Sampling Technique and procedure

Stratified sampling technique was employed. All health care institutions providing abortion and post abortion services in Hawassa city was grouped in to public and private. Both groups again grouped onto hospitals and health centers/clinics. Health facilities providing abortion care services in Hawassa city were 2 public hospitals, 3 private hospitals, 7 HCs, 8 clinics. Then 30% of the institutions from each group were selected randomly. Sample size was proportionally distributed to each selected institution based on recent quarter report. Finally, the study units were drawn using systematic sampling technique.

Study variable

Dependent variable:

Post abortion contraceptive use

Independent variables:

Socio-demographic variables: Age, marital status, residential area, Occupation, Educational status, family income

Obstetric history: Number of children, previous induced abortion, current contraceptive while pregnant, previous visit of this institution, source of information for FP

Family planning history: (Previous use of family planning methods, duration of use, cause of discontinuation)

Current abortion: (Type and method of abortion and the procedure done for management)

Present history: Desire of pregnancy, post abortion FP counseling, timing of fertility return awareness.

Operational definitions

Post abortion contraceptive utilization: Post abortion clients used any modern contraceptive methods following the abortion process.

Fertility awareness: Measured using thirteen awareness questions in which participants scored the mean and above were leveled to have good fertility awareness and the rest poor.

Data collection tools and procedures

A pretested, structured, interviewer-administered questionnaire was used for the data collection. Questionnaire was developed after reviewing different literatures. Clients exit interview was conducted at a point where the service users were ready to be discharged. The data related to current abortion such as type and method of abortion and the procedure done for management was collected from the patient's records. Four data collectors and 2 supervisors with BSc midwifery was used for data collection.

Data quality control

Before conducting the main study, pre-test was carried out on 5 % sample on similar clients in Yergalem hospital and necessary corrections was made accordingly. Three days training was prepared for data collectors and supervisors. Regular meetings were held among investigators, data collectors and supervisors. Every day after data collection, data was reviewed and checked for completeness, accuracy and clarity by the supervisors and the investigators.

Data Management and analysis

The data was checked for completeness, coded and entered into Epidata version 3.1 and exported to SPSS version 23.0 for analysis. Descriptive analysis results were presented in tables, figures and texts. Binary logistic regression used to determine the association of independent variables with the outcome variable. All predictor variables with $P < 0.2$ in the bivariate analysis included in the multivariable analysis. Finally, statistical significance was considered at P value less than 0.05 with 95% confidence interval.

Ethical considerations

Ethical approval was obtained from the Institutional Review Board of Hawassa University, College of Medicine and Health sciences. Next, Official letters was submitted to respective selected health facilities. Before interviewing of participants, verbal consent was obtained. Data collectors were informing about the purpose and objective of the study. They were also informed that, they have the right to discontinue or refuse to participate in the study. Confidentiality of information and privacy was maintained.

RESULTS

Out of 418 women estimated in sample size, a total of 410 abortion services users were interviewed with a response rate of 98.1%.

Socio-demographic characteristic

From the total participants, 376 (91.6%) came from urban area, whereas 139(33.9%) were in the age group of 20–24 with mean age of 23.5 (SD ±5.2) years. One hundred seventy (41.5%) of them were protestant religion followers. Nearly two third, 264 (64.4%) of the respondents were served in public health facility. One hundred forty (34.1%) of them belongs to Sidama ethnicity. The study participants with educational status of collage and above were 129 (31.5%), 204(49.8) of them were married and 147(35.9) were students in occupation (Table 1).

Table 24: Socio-demographic characteristic of study participants in Hawassa city, Sidama Regional State, Ethiopia 2020 (n= 410)

Variables		Frequency(n)	Percent (%)
Age (in complete years)	15-19	102	24.9
	20-24	139	33.9
	25-29	103	25.1
	30-34	52	12.7
	35-49	14	3.4
Educational status	Cannot read and write	17	4.1
	Can only read and write	75	18.3
	Primary school 1-8	88	21.5
	Secondary school 9-12	101	24.6
	Collage and higher	129	31.5
Occupational status	Student	147	35.9
	Merchant	56	13.7
	House wife	70	17.1
	Government employee	64	15.6
	Private employee	49	12.0
	Job seeker	24	5.8
Marital status	Married	204	49.8
	Single	193	47.1
	Widowed/divorced	13	3.2
Type of health facility	Hospital	167	40.7
	Health center	97	23.7
	Private clinic	146	35.6
Residence	Urban	376	91.7
	Rural	34	8.3

Reproductive and contraceptive history of the clients

More than half of the Participants, 237 (57.8%), were nulliparous. The majority, 293 (71.5%) of the current pregnancy which ended in abortion was unwanted and 289 (70.5%) terminations were made intentionally (induced) and 320(78.0%) were terminated during the 1st trimester. Sixty (14.6%) of the respondents had previous history of abortion, which was experienced once in 91.7%, and twice in 8.3%. Need to postpone childbearing, 81 (19.8%) and disagreement with partner, 63 (15.8%) were the main reasons for termination of pregnancy. Majority of the participants, 370(90.2%), knew at least one type of contraceptive method and 263 (64.1%) have used previously (Table 2).

Table 25: Reproductive history of study participants of Hawassa city, Sidama Regional State, Ethiopia, 2020 (n= 410)

Variables		Frequency(n)	Percentile (%)
Parity	0	237	57.8
	1	63	15.4
	2-4	96	23.4
	≥ 5	14	3.4
Number of alive children	0	239	58.3
	1-3	143	34.9
	≥ 4	28	6.8
Types of abortion	Spontaneous abortion	121	29.5
	Safe abortion	281	68.5
	Unsafe abortion	8	2.0
Was the pregnancy planned?	Yes	117	28.5
	No	293	71.5
Reason for unwanted pregnancy (293)	Contraceptive failure	62	15.1
	Forget to take contraceptives	91	22.2
	partner pressure	113	27.6
	do not know contraceptives	15	3.7
	Others	12	2.9
Previous abortion history	Yes	60	14.6
	No	350	85.4
Gestational age of current pregnancy	≤ 12 weeks	320	78.0
	>12 week	90	22.0
Number of previous abortions (n=60)	1	55	91.7
	2	5	8.3
Information on contraceptives	Yes	370	90.2
	No	40	9.8
Information on contraceptives methods	Oral pills	345	84.1
	Injectable contraceptive	294	71.7
	Intrauterine device	112	27.3
	Implants	199	48.5
History of f/p use before the current pregnancy	Yes	263	64.1
	No	147	35.9

Fertility awareness, post abortion contraceptive use

About one third, 267 (65.1%) of the participants, with 95% CI of (60.5, 69.8%) had good post abortion fertility awareness. Two hundred eighty (70.5%) of the total respondents start using post-abortion contraception, of which 123(42.6%) used implants. Majority, 376(91.7%) of them were counseled for family planning (Table 3).

Table 26: Fertility awareness, Post-abortion contraceptive use among post-abortion clients in Hawassa city, Sidama Regional State, Ethiopia 2020 (n= 410)

Variables		Frequency (n)	Percent (%)
Counseled for FP along with abortion services	Yes	376	91.7
	No	34	8.3
When was the FP Counseling provided?	Before the procedure	185	45.1
	During the procedure	91	22.2
	After the procedure	134	32.7
Received contraception after abortion	Yes	289	70.5
	No	121	29.5
Type of health facility served	hospital	40.7	167
	Health center	23.7	97
	Clinic	35.6	146
Patient opinion on fertility return time after abortion	Within two weeks	128	31.2
	One month	170	41.4
	Two to three months	90	22
	I don't know	22	5. 4
Future pregnancy plan	Till married	74	18.0
	Within three months	50	12.2
	Three months to two years	84	20.5
	Above two years	108	26.3
	Never	35	8.5
	Not sure	59	14.4
Fertility awareness	Good awareness	131	32.0
	Poor awareness	279	68.0

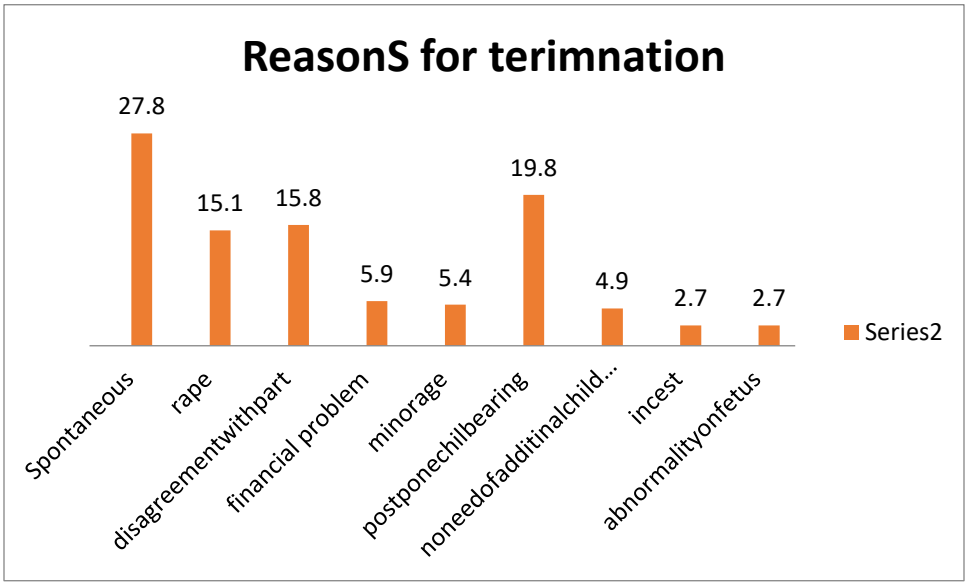

Figure 10: Reasons for termination of pregnancy among post abortion clients in Hawassa city, Sidama Regional State, Ethiopia, 2020

Factors associated with post-abortion contraceptive utilization

On bivariate analysis, age, type of facility, gestational age, counseling on fertility return, history of family planning use, knows about family planning methods, residence and counseled on family planning were found to have statistically significant association with post-abortion contraceptive utilization.

On multivariable analysis, type of facility, counseled for fertility return, history of family planning use, knowledge about family planning methods and counseled on family planning potential were predictors for post abortion contraceptive use.

Individuals served in private health facility were 0.49 times less likely to use post abortion contraceptives than individuals served in public facilities [AOR= 0.499, 95% CI (0.274, 0.911)]. Post abortion contraceptive use was 1.8 times higher among women who ever used contraceptive compared to who never used any contraception [AOR= 1.858, 95% CI (1.005, 3.438)]. Women who had received family planning counseling were 6.6 times more likely to utilize contraceptive as compared to women who did not obtain the counseling [AOR= 6.675, 95% CI (2.688,16.577).

In addition, the odds of using contraceptive were 3.3 times higher among clients knew about contraceptives than women who did not know about contraceptive. [AOR = 3.346, 95% CI (1.722, 6.50)]. Clients who counseled for fertility return after abortion were observed to use post abortion contraceptives 2 times than those who do not counseled [AOR = 2.188, 95% CI (1.236,3.351)] (Table 4).

Table 27: Multivariable analysis of factors associated with post-abortion contraceptive use, in Hawassa city, Sidama Regional State, Ethiopia 2020 (n= 410)

Variables		PAFP use		Odd ratio (95% CI)	
		Yes	No	Crude	Adjusted
Age (years)	15–19	61	41	2.24(1.11, 4.51)	0.96(0.52, 1.78)
	20–24	95	44	1	1
	25–29	82	21	1.53(0.78, 3.01)	0.60(0.30, 1.20)
	≥ 30	51	15	0.85(0.40, 1.81)	0.76(0.35, 1.66)
Type of facility	Public	175	89	1	1
	Private	114	32	0.55(0.35, 0.88)	0.50(0.28,.92)*
Residence	Urban	271	105	1	1
	Rural	18	16	2.29(1.13, 4.67)	1.61(0.72, 3.61)
Information on contraceptives	Yes	271	99	1	1
	No	18	22	3.35(1.72, 6.50)	2.60(1.17, 5.79) *
Counseled on family planning	Yes	281	95	1	1
	No	8	26	9.61(4.21, 21.96)	6.49(2.62, 16.07) **
History of family planning use	Yes	199	64	1	1
	No	90	57	1.97(1.27, 3.04)	1.85(1.00, 3.41)
Counseled on fertility return	Yes	171	45	1	1
	No	118	76	2.45(1.58, 3.79)	2.0(1.22, 3.31) **

* p value<0.05, ** p value <0.01

DISCUSSION

In this study post abortion contraceptive utilization rate was 70.5% with 95% CI of (65.9, 74.9%). This finding was comparable with the finding of the studies done in Tigray region (70.9%), Jimma (70.1%) and Pakistan (72.9%) (Azmat, Waqas *et al.,* 2012, Erko, Abera *et al.,* 2016, Hagos, Tura *et al.,* 2018). But this result was higher when compared with the study done in Dessie (47.5%), Gurage zone, (56.5%), (45.8%) Debrebrhan. (Seid, Gebremariam *et al.,* 2012, Tesfaye, Hambisa *et al.,* 2014, Muche, Bewket *et al.,* 2019) The disparity could be due to study year difference as there is health care improvement through time. The current finding is lower than study conducted in Addis Ababa (91%), Nepal (83%) and Brazil (97.4%) (Ferreira, Souza *et al.,* 2010, Khanal, Joshi *et al.,* 2011, Asrat, Bekele *et al.,* 2018)This variation of contraceptive utilization could be due to the respondents' level of awareness and educational level about contraceptive and family planning services deference among study settings.

Facility type that provides abortion services had a statistically significance association with utilization of post abortion contraceptive. Clients who received abortion care in private facilities had less likely to utilize post abortion contraceptives than their counter parts receiving abortion services in public health facilities. This is consistent with a study conducted in Tigray. (Hagos, Tura *et al.,* 2018) This could be due to private facilities primarily work for-profit and pocket fee compared to the Public who serve FP freely. These facilities may not counsel clients for family planning services other than providing the abortion care services.

Women who had previous history of contraceptive use were 1.9 times more likely to utilize post abortion contraceptive as compared to their counterparts who didn't use prior to the recent pregnancy. Similarly, a higher likelihood of using post abortion family planning was reported in studies conducted in Bahr Dar and Pakistan, which showed that the previous history of contraceptive usage was found to be significantly associated with post-abortion contraceptive utilization.(Azmat, Waqas *et al.,* 2012, Mekuria, Gutema *et al.,* 2019) The possible explanation could be the previous exposure to family planning services might influence the awareness of women towards post-abortion contraceptive utilization.

In this study, family planning counseling was found to be significantly associated with post-abortion contraceptive utilization. This finding was in line with the study conducted in Debre berhan and shire where an increased likely hood of using post abortion family planning services among women who received family planning counseling were observed.(Moges, Hailu *et al.,* 2018, Muche, Bewket *et al.,* 2019) This showed that post-abortion period is the right time to introduce contraceptive advice because women are more ready to receive messages.

Utilizing of post abortion contraceptive was also increased with knowledge of study participants on contraceptive methods which was also significantly associated. Study participants who had information about contraceptive methods were in a better position to us contraceptives after having abortion services. This might be due to the fact that those females who had information on family planning methods have better awareness on the methods and side effect of family planning method they choose.

In this study, fertility return counseling was found to be significantly associated with post-abortion contraceptive utilization. Participant who was counseled about fertility return were 2 times more likely to use post abortion contraceptives than those who did not counseled. Concerning counseling on fertility return our finding is higher than the study conducted in Dessie. (Seid,

Gebremariam *et al.,* 2012) .Our finding which seem improved as compared to the past evidence study some years before the current study bur still respondents are leaving the facility without properly counseled and knowing fertility return time. However, this implies that there is a need to improve provider's counselling skills in general and mainly on fertility return time after abortion.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Fertility awareness in this study is relatively poor. Post-abortion family panning utilization is relatively good. Type of health facility, counseling on fertility return, history of family planning use, and counseled on family planning were statistically significant predictors of post-abortion contraceptive use.

Recommendation

Comprehensive post abortion family planning counseling and fertility return awareness creation was recommended. Limitation

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Evidence-Based Pain Management Practice among Nurses Working In Hawassa University Comprehensive Specialized Hospital, 2019/20

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ABSTRACT

Pain is a universal experience and it is the most frequent reason for people seeking health care. After years of neglect, issues of pain assessment and management have captured the attention of both health care professionals and the public. However, in Ethiopia as well as in the study area there is a lack of data on the level of evidence-based pain management practice. The aim of this study to assess the level of evidence-based pain management practice and influencing factors among nurses working in Hawassa university comprehensive specialized hospital, 2019/20. Institution-based cross-sectional study was conducted in Hawassa University Comprehensive Specialized Hospital (HUCSH). A self-administered structured questionnaire was distributed to 187 nurses selected Systematic random sampling technique. Data gathered from study participants was cleaned & checked for its completeness then coded and entered into computer software using Epi-data version 3.1 and exported into statistical package for social sciences (SPSS) version 20. Descriptive statistics such as frequencies, proportions, Chi-square, Odds ratios with 95% confidence interval was computed and multiple regression methods were used. P-Value less than 0.05 have been considered as a level of significance. Those variables that show significant association with the evidence-based pain management practice were included in a single model and multiple logistic regressions were performed. Finally, only those independent variables that maintained their association with outcome variables in multiple regressions were used to construct the final models. About 180 nurses participated, yielding a 96% response rate. The Mean age of participants was 29 with age ranging from 21 to 55 year. About 73 (40.6%) had a low level of practice, about 35 (19.4%) had a moderate level of practice and about 8(4.4%) had a High level of practice. Respondent's age, marital status, knowledge about EBPM, religion, and working unit were significantly associated with Evidence-based Pain Management (AOR 5.95, CI 1.58-22.38, 63.03, CI=1.56-2547.00, 31.3, CI=2.46-399.55 and 0.011, CI=0.00-0.64) respectively. What is already known about this topic? There is a lack of information on evidence-based pain management. What this paper adds: there was low evidence-based pain management practice in the current study area. The implications of this paper: this finding will be applied for practice improvement.

Keywords*: evidence-based practice, evidence-based pain management*

INTRODUCTION

Background

Pain is an unpleasant sensory and emotional experience associated with actual or potential damage or described in terms of such damage. The self-report of pain is the gold standard of pain assessment because it is a subjective experience that can vary from person to person and from time to time inside an individual. Pain is the way the brain interprets information about a particular sensation that the body is experiencing. How the brain interprets these signals as "pain" can be

affected by many external factors, some of which can be controlled by special technique (Idang, 2014).

According to WHO 2011 pain management guideline, pain can be classified as mild, moderate and severe based on its intensity. By using a Numeric Rating Scale (NRS) patient is asked to rate his/her pain intensity on a scale of 0 (no pain) to 10 (the worst possible pain). Below 4 is mild pain, 4-6 is moderate pain and 7-10 is severe pain and treated accordingly based on the WHO pain ladder (WHO, 2011).

After years of neglect, issues of pain assessment and management have captured the attention of both health care professionals and the public. Factors that prompted such attention include the high prevalence of pain, continuing evidence that pain is undertreated, and a growing awareness of the adverse consequences of inadequately managed pain (American pain society, 2014).

In Africa including Ethiopia, the issue of pain, pain assessment and management have been explored largely about pain caused by HIV/AIDS and cancer. Studies show that there are gaps in pain assessment and management. For example, a report from Human Rights Watch's showed that only 10% of postoperative patients in Africa can receive optimal pain management (Woldehaimanot *et al.,* 2014).

Ineffective pain management can lead to a marked decrease in desirable clinical and psychological outcomes and patients' overall quality of life. On the other hand, Studies showed that Effective pain management is associated with patient satisfaction, earlier mobilization; shortened Hospitals stay, and reduced costs, therefore, an indirect contribution to the development of the nation in general and improved quality of life for an individual in particular (veterans, 2002).

Statement of the Problem

Pain is the most frequent reason for people seeking health care (Idang, 2014). Ineffective pain management can lead to a marked decrease in desirable clinical and psychological outcomes and patients' overall quality of life. Research evidences show that poorly managed acute pain may cause serious medical complications (e.g., pneumonia, deep venous thrombosis), impaired recovery from injury or procedures, and/or progress to chronic pain. Also, Individuals with poorly controlled pain may experience anxiety, fear, anger, or depression. Pain is also a major cause of work absenteeism, underemployment, and unemployment. Rising health care costs and disability compensation reflect, in part, poor care for pain-related conditions. Thus, undertreated pain has significant physical, psychological, and financial consequences (American pain society, 2014).

Despite the increased focus on pain management programs and the development of new standards for pain assessment, some types of pain like postoperative, cancer, fracture and labour pain remain a concern for patients (Grinstein-Cohen *et al*., 2009).

World Health Organization (WHO) uses morphine consumption statistics as a broad indicator of progress to improve pain relief. According to the WHO report of Ethiopia's morphine consumption, in 2003 Ethiopia had one of the lowest morphine /capita consumptions 0.0005mg compared with the global mean of 5.85mg. Again in 2006, the consumption was reported as 0.0002mg/capita; Uganda 0.3136mg/capita; Mali 0.0181mg /capita; Sudan 0.0230 Kenya;

0.1292mg/capita. Ethiopia's low consumption of morphine is indicative of the poor availability of pain control and palliative care (Palliative care and pain relief newsletter, 2011).

However, in the study area, there is a lack of Data on the level of evidence-based pain management practice. Therefore, this study aims to identify the level of pain management practice among nurses working in Hawassa university comprehensive specialized hospital.

Significance of the Study

Currently, it is believed that Effective Evidence-based pain management is an essential component for the quality of care. Proper pain management is included in the patients' rights, and insufficient pain management increases human suffering in addition to increased costs to the society as a consequence from long term care in which functional recovery fails. Accordingly improving quality of care is priority agenda in Ethiopia's ministry of health, for example, compassionated and respectful care is one of its concerns set in health sector transformation agenda. Therefore, knowing the level of Evidence based pain management practice and Identifying factors that influence it at the specific study area is key for improving quality of care. For instance, it can give clues for professionals to promote applying Evidence based pain management approaches like WHO analgesic ladder.

On the other hand, the finding of this research will be used as information source for organization like local government, hospitals and nongovernmental organization which are interested on improving the quality of care through practicing appropriate evidence-based pain management approach

In addition, the finding of this research will be used as evidence for those planners, managers of nursing services, further researchers, and policy and curriculum developers interested on improving the quality of care focusing on appropriate pain management strategies.

Objectives

General Objective

To assess the level evidence-based pain management practice and influencing factors among nurses working in Hawassa university comprehensive specialized hospital, 2019

Specific objectives

To determine the level of evidence-based pain management practices among nurses working in Hawassa University Comprehensive Specialized Hospital, 2019.

To identify factors that influence evidence-based pain management practices in Hawassa University Comprehensive Specialized Hospital 2019.

METHODS AND MATERIALS

Study Area and period

The study was conducted at Hawassa University Comprehensive Specialized Hospital, which is found in Hawassa City Administration, SNNPR, and Ethiopia. Hawassa University Comprehensive Specialized Hospital is a teaching Hospital for Medical and other health Sciences students. It is located 275 km south of Addis Ababa, in Hawassa town. The Hospital was established in 1996 E.C. It offers service at general and specialty levels including internal medicine, pediatrics and child health, general surgery, gynecology and obstetrics, ENT, neurology, neurosurgery, urology, psychiatric, ophthalmology, dermatology, dentistry, radiology, pathology, laboratory, anesthesia and pharmacy service. The study was conducted from November 01/2020 – December 20/ 2020

Study subjects

All nurses who were working in Hawassa University Comprehensive Specialized Hospital considered our Source Population. We have selected Nurses who were working in oncology unit, surgical ward, orthopedic ward, Intensive care unit (ICU), Operation rooms (OR), recovery rooms and gynecology/obstetrics wards in the HUCSH as our study population. Those who refused to participate in the study were left not selected.

Study design

Institutional based cross-sectional study was conducted.

Sample Size determination: the desired sample size was calculated by open Epi software for single population with the assumption of proportion of Evidence based pain management practice 12.7% (report from a study done in Addis Ababa by Mulugeta in 2015), marginal error of 5% and confidence level of 95%. After adding 10% nonresponse rate, the final sample size was187.

Sampling techniques: 187 study participants [nurses] were selected proportionately from each selected ward by Systematic random sampling.

Study methodology

Evidence based pain management practice was assessed by considering pain assessment using a Numeric Rating Scale (NRS) and pain management using WHO pain ladder as minimum criteria to be Evidence Based Pain Management. In current study Evidence Based Pain Management Practice was measured by using 15 practice items (questions). Proportion of respondents who correctly responded to practice questions Regarding Evidence Based Pain Management was codded as 1 and the remaining coded as zero (0). Then, the level of Evidence Based Pain Management Practice was expressed by sum of scores. It was classified in to three categories High (with a score of 80.00-100%), moderate (with a score of 60.00-79.99%) and low (with a score of <60.00). Knowledge: the score from the total 15 Knowledge assessment was summed up and classified in to three categories High (with a score of 80.00- 100%), moderate (with a score of 60.00-79.99%) and low (with a score of <60.00) (21). Correctly scored took the value of 1 and the incorrectly scored took the value of zero (0)(Hossain, 2014).

In current study Respondent's belief on Evidence Based Pain Management was measured by five-point Likert scale, ranging from Strongly Agree (1) to Strongly Disagree (5). The neutral point took the value of three (3) and finally removed for analysis, the favorable belief took the value of one (1) and the unfavorable belief took the value of 0 but it was converted to the value zero (0) for final analysis.

Socio-demographic Variables like sex, age, marital status, ethnicity, Religion, Educational status, Experience, and institutional aspects like working area, Training, Availability of standardized tools, Availability of pain drugs and knowledge of pain management was assessed by using Self-administered structured questionnaire which was developed by intense review of literatures by principal investigator. The questionnaire was prepared in English and pretested on 18 nurses working in Adare Hospital.

Data was collected by three professional nurses who were recruited from different nearby Health facilities. The data collectors took Training for 3 days by the principal investigator to make them familiar with the data collection tool. The data collectors were supervised by Principal investigator and co-investigators throughout the data collection period. Data was collected from nurses that are selected from each ward of HUCSH.

Ethical approval letter was obtained from Hawassa University, College of Medicine and Health Science Institutional Review Board (IRB). Consent from the study participants was obtained after explaining the purpose of the study and all the participants were reassured of privacy. After getting informed consent, the data collectors started the data collection by considering the norms, values, beliefs, cultures and confidentiality of the participants.

Data management and analysis

Data gathered from study participants was cleaned checked for its completeness then coded and entered into computer software using Epi-data version 3.1 and exported into statistical package for social sciences (SPSS) version 20. Descriptive statistics such as, frequencies, proportions, Chi-square, Odds ratios with 95% confidence interval was computed and multiple regression methods was used. P-Value less than 0.05 have been considered as a level of significance. Those variables that show significant association with the evidence-based pain management practice were included in a single model and multiple logistic regressions were performed. Finally, only those independent variables that maintained their association with outcome variables in multiple regressions were used to construct the final models.

RESULTS

Socio demographic characteristics of respondents

Out of 187 questionnaires distributed about 180(96%) respondents returned their questionnaire. Out of the total study participants about 94(52.2%) were females. The Mean age of respondents was 29 years with minimum age of 21 and maximum age of 55 years. About half of the respondents 90(50%) were orthodox Christian by religion. A significant number 156(87.6%) of the respondents were bachelor degree holders. Most of the respondents 110(61.1%) were married.

Table 28: Socio demographic characteristics of respondents in Hawassa University comprehensive specialized, Ethiopia from October to June 2019/2020.

Characteristic	Response	Frequency	Percent
Sex	Male	86	47.8
	Female	94	52.2
	Total	180	100.0
Age of respondents	Mean	29	
	Minimum	21	
	Maximum	55	
Marital status	Married	110	61.1
	Single	67	37.2
	Total	177	98.3
Religion	Orthodox	90	50.0
	Muslim	6	3.3
	Protestant	75	41.7
	Catholic	2	1.1
	Total	173	96.1
	System Missing	7	3.9
work Experience (in years)	Mean		7
	Minimum		1
	Maximum		34
Educational status	Diploma Nurse	15	8.3
	B.Sc. Nurse	156	86.7
	M.Sc. Nurse	6	3.3
Department (staff working unit)	surgical ward	20	11.1
	orthopedic ward	46	25.6
	medical ward	16	8.9
	Ophthalmic unit	26	14.4
	Oncology	24	13.3
	Gynecology and Obstetrics ward	22	12.2
	Pediatric unit	14	7.8
	palliative care unit	12	6.7
	Total	180	100.0

Respondent's Knowledge on Evidence Based Pain Management

The respondent's total knowledge score ranged from the minimum one (1) to thirteen (13) with mean knowledge score 6.7. The knowledge score was classified as low knowledge level 49(27.2%), moderate knowledge level 72(40%) and high knowledge level 59(32%) based on data driven classification.

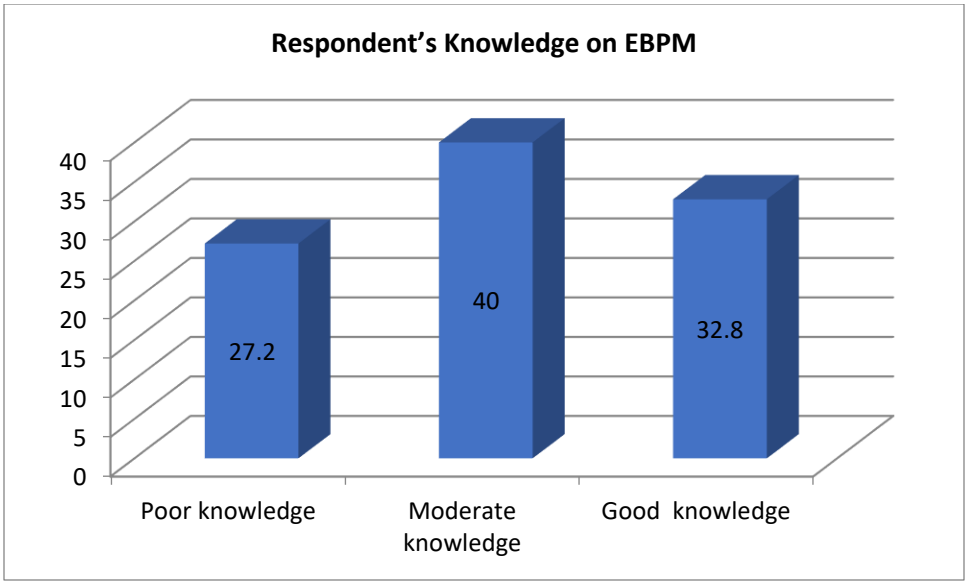

Figure 11: Respondent's dispersion of knowledge score on Evidence Based Pain Management at Hawassa University comprehensive specialized, Ethiopia from October to June 2019/2020.

Table 29: Proportion of respondents who correctly respond to Knowledge questions Regarding Evidence Based Pain Management of at Hawassa University comprehensive specialized, Ethiopia from October to June 2019/2020.

Variables [the knowledge questions]	Magnitude of correct response	
	no	%
Vital signs are always reliable indicators of the intensity of a patient's pain	58	32.2%
Because their nervous system is underdeveloped, children under 2 years of age have decreased pain sensitivity and limited memory of painful experiences	48	26.7%
Patients who can be distracted from pain usually do not have severe pain	88	48.9%
Patients may sleep in spite of severe pain	48	26.7%
Aspirin and other nonsteroidal anti-inflammatory agents are not effective analgesics for painful bone metastases	95	52.8%
Respiratory depression rarely occurs in patients who have been receiving stable doses of opioids over a period of months	120	66.7%
Combining analgesics that work by different mechanisms (e.g., combining an opioid with an NSAID) may result in better pain control with fewer side effects than using a single analgesic agent	139	77.2%
The usual duration of analgesia of 1-2 mg morphine IV is 4-5 h	111	61.7%
Research shows that promethazine (Phenergan) and hydroxyzine (Vistaril) are reliable potentiates of opioid analgesics	108	60.0%
Opioids should not be used in patients with a history of substance abuse	38	21.1%
Morphine has a dose ceiling (i.e., a dose above which no greater pain relief can be obtained)	61	33.9%
Elderly patients cannot tolerate opioids for pain relief	68	37.8%
Patients should be encouraged to endure as much pain as possible before using an opioid	54	30.0%
Children <11 years old cannot reliably report pain so nurses should rely solely on the parent's assessment of the child's pain intensity	70	38.9%
Patients' spiritual beliefs may lead them to think pain and suffering are necessary	108	60%

Respondent's belief on Evidence Based Pain Management

Out of 180 participants About 87(48.3%) respondents' belief was unfavorable that is below the mean score while about 93(51.7%) scored above the mean score that is favorable belief.

Respondent's level practice on Evidence Based Pain Management

Based on operational definition we have computed the score of Respondent's level practice on Evidence Based Pain Management. As a result, about 73 (40.6%) had low level of practice, about 35 (19.4%) had moderate level of practice and about 8(4.4%) had High level of practice.

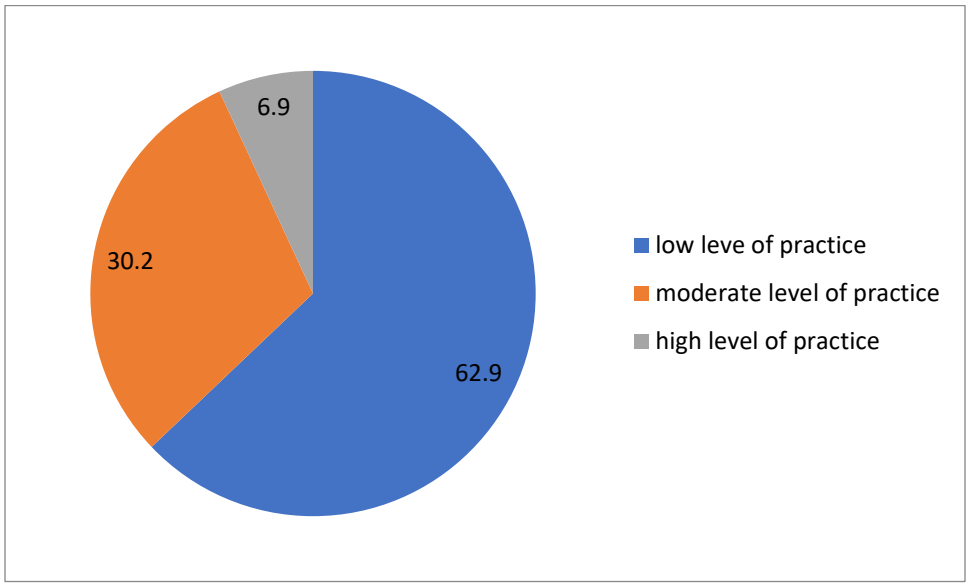

Figure 12: Respondent's level of practice on Evidence Based Pain Management at Hawassa University comprehensive specialized, Ethiopia from October to June 2019/2020.

Factors associated with Evidence Based Pain Management

According to current study the variable associated with Evidence Based Pain Management practice are Respondent's age, marital status, knowledge about EBPM, religion, and working unit were significantly associated with Evidence Based Pain Management (AOR 5.95, CI 1.58-22.38, 63.03, CI=1.56-2547.00, 31.3, CI=2.46-399.55 and 0.011, CI=0.00-0.64) respectively. Compared to young age, old age category was 5.9 times more likely to practice evidence-based pain management (AOR 5.95, CI 1.58-22.38). marital status (AOR 161.20, CI=1.34-19411.14) which means compared to single, married nurses was 161 times more likely to practice evidence-based pain management even though the estimation was not accurate. Being knowledgeable about EBPM was 63 times more likely to practice evidence-based pain management (AOR =63.03, CI=1.56-2547.00). Regarding to religion compared to protestant other religious followers was 31.3 times more likely to practice evidence-based pain management (AOR= 31.3, CI=2.46-399.55). Working in surgical ward was 99 times more likely to practice evidence-based pain management (AOR=0.011, CI=0.00-0.64).

Table 30: bivariate and multivariate model of dependent and independent variables.

Variables	Category	EBPM practice		COR (95% CI)	AOR (95% CI)
		poor	good		
Age category	Young age	29	13	1	1
	Middle age	12	20	1.16(0.44-3.10)	2.12(0.46-9.70)
	Old age	26	10	4.33(1.56-12.04) *	5.95(1.58-22.38) *
Marital status	Single	40	5	1	1
	Married	33	38	9.1(3.2-26.0) **	161.20(1.34-19411.14)
Knowledge of the respondents	Poor knowledge	24	7	1	1
	Moderate knowledge	25	24	0.5+8(0.19-1.74)	48.53(0.48-4873.32)
	good knowledge	24	12	1.92(.79-4.68) *	63.03(1.56-2547.00)
Religion	Protestant	32	38	1	1
	Others	41	5	9.74(3.44-27.57) **	31.3(2.46-399.55)
Current working unit	Surgical ward	43	37	1	1
	Medical ward	30	6	0.23(0.08-0.62) *	0.011(0.00-0.64)

EBPM= Evidence based pain management, *=<0.05-0.01, **=<0.01-0.001

DISCUSSION

This study has tried to assess Evidence Based Pain Management practice and associated factors among nurses in Hawassa university comprehensive specialized hospitals. Accordingly, it revealed that about 73 (40.6%) had low of EBPM practice, about 35 (19.4%) had moderate of EBPM practice and about 8(4.4%) had High EBPM practice. This indicates that the overall level of evidence-based pain management practice was low as compared to a study in Bangladesh which showed that practice of nurses is at moderate level (Hossain, 2014). This might be due to nursing workload, lack of analgesia, knowledge deficit, lack of pain guidelines and lack of interest toward the profession. Also, the finding of this study is much lesser as compared to a study done at an oncology unit of an academic medical center in the Pacific Northwest where about 90% of participating nurses documented of the recommended evidence-based pain management indicators. This difference may be due to the variation in set-up and the level of preparation of professionals to practice evidence-based pain management practice.

According to this study the variable significantly associated with Evidence Based Pain Management practice is respondent's age, marital status, knowledge about EBPM, religion, and current working unit. Compared to young age, old age category was 5.9 times more likely to practice evidence-based pain management (AOR 5.95, CI 1.58-22.38). marital status (AOR 161.20, CI=1.34-19411.14) which means compared to single, married nurses was 161 times more likely to practice evidence-based pain management even though the estimation was not accurate. Being knowledgeable about EBPM was 63 times more likely to practice evidence-based pain management (AOR =63.03, CI=1.56-2547.00). Regarding to religion compared to protestant other

religious followers was 31.3 times more likely to practice evidence-based pain management (AOR= 31.3, CI=2.46-399.55). Working in surgical ward was 99 times more likely to practice evidence-based pain management (AOR=0.011, CI=0.00-0.64).

In this study the majority i.e. about 131(72%) of the respondents have knowledge on evidence-based pain management including both moderate knowledge level 72(40%) and high knowledge level 59(32%) based on data driven classification. The remaining knowledge score was classified as low knowledge level 49(27.2%). It was consistent with a study done in Uganda which showed that 71.8% of nurses were good, Nigeria (60%) good (6, 9, 11, 27, 30, and 31). But it was inconsistent with similar studies in western Ethiopia (49.8%) poor. This might be due to difference availability of on-the-job training and it might also be due to pre-service curriculum difference.

In the present study marital status showed significant association with evidence-based pain management practice. Compared to single, married respondents were 8.22(CI [2.178-31.027]) times more likely to practice evidence-based pain management. As to the researcher knowledge this variable not well investigated, and the association is not revealed.

In this study about 48.9% of respondents agreed that distraction, for example, by the use of music or relaxation, can decrease the perception of pain and this figure was found to be lesser than similar studies done in Addis Ababa, western Ethiopia and Nigeria showed 68.2%, 78.1% and 92.6% respectively (Mulugeta, 2015; Wessman, 1999; Idang, 2014).

CONCLUSIONS

Current study revealed that the overall level of Evidence Based Pain Management practice was low. Some Sociodemographic characteristics like age, marital status, religion, Knowledge on evidence-based pain management and current working unit showed significant association with evidence-based pain management practice.

Recommendations

The researcher recommends improving the level of participant's knowledge through continuous professional development. Improving the quality of care through application of evidence-based pain management practice during patient's care is essential. Therefore, continues on job training on evidence based patient care and evidence-based pain management are recommended.

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Women Empowerment and Nutritional Status of their Children in Hawella District Sidama Regional State, Southern Ethiopia

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ABSTRACT

Malnutrition is a universal issue holding back development with unacceptable human consequences. Yet the opportunity to end malnutrition has never been greater. Malnutrition is responsible for more ill health than any other cause. Children under five years of age face multiple burdens. Women's empowerment is considered crucial for improving nutrition outcomes. Since women are often primary caregivers, they can influence their children's nutrition indirectly through their own nutritional status as well as directly through childcare practices. The main objective of this study is to assess women's empowerment and nutritional status of their children aged 6 to 59 months children in Hawela district, Sidama regional state from September, 2019 through 2020. A community based cross-sectional study was conducted. Mothers and their children aged from 6-59 months live in Hawela district were source population of the study. The data collection tool was using, pre-tested, structured questionnaire and anthropometric measurement was taken for children to assess their nutritional status. Besides, women empowerment status was assessed by using Abbreviated women empowerment in agriculture index (A-WEAI). A total of 338 mothers with children aged 6-59 month were included with response rate of 100%. The 5 domains of empowerment showed that, about 38.2% of women were empowered. 61.8% of women who were not yet empowered had, on average inadequate achievements in 64.7 percent of domains. Thus, women's Mo 0.647 x 0.382 = 0.247 and 5DE is 1 - 0.247 = 0.753 percent. The prevalence of underweight, stunted and wasted among children were 10.1 %, 40.5 % and 12.1%, respectively. The age of the mother, marital status, place of delivery and maternal educational status were factors associated with wasting. Whereas, heads of the house hold, number of under five children in the house hold, sex of the index child and practice of exclusive breast feeding were factors associated with underweight. The factors associated with stunting were maternal age and women empowerment.

Key words: *Women empowerment, child nutrition, Hawella district*

INTRODUCTION

Background

Malnutrition is a universal issue holding back development with unacceptable human consequences. Yet the opportunity to end malnutrition has never been greater. The burden of malnutrition across the world remains unacceptably high, and progress unacceptably slow. Malnutrition is responsible for more ill health than any other cause. Children under five years of age face multiple burdens: 150.8 million are stunted, 50.5 million are wasted. Stunting is most prevalent in low and lower middle-income countries: 37.8 million children affected are in low-income countries another 101.1 million children are in lower-middle-income countries. Both the number of people affected (37.0 million) and highest prevalence of wasting (11.5%) occur in lower-middle-income countries and are lowest (0.5 million and 0.7% respectively) in high-income countries (Akombi *et al.*, 2017)**.**

Malnutrition is the underlying cause of more than 2.6 million child deaths each year. Around 27 percent of all children globally are stunted, meaning their bodies and minds have suffered

permanent, bodies and minds, irreversible damage due to malnutrition it affects physical growth, morbidity, mortality, cognitive development, reproduction, and physical work capacity, and it consequently impacts on human performance, health and survival Adults who were malnourished as children can earn an estimated 20 percent less on average than those who weren't. The effects of malnutrition in developing countries can translate into losses in GDP of up to 2-3 percent annually. Globally, the direct cost of malnutrition is estimated at $20 to $30 billion per year (Yimer and Tadesse, 2015).

Undernutrition is still persistent in African with major implications for health, particularly among poor and vulnerable population groups. 47 countries have high (>30%) or very high (>40%) rates of stunting. In fact, analysis of trends shows that these rates are rising, instead of falling so as to meet the target of reducing the number of stunted children by 40% (WHO, 2017).The prevalence of malnutrition was highest within countries in East Africa and West Africa countries within sub-regions in SSA with the highest rates of stunting, wasting and underweight (Akombi *et al.*, 2017). Achieving improved mother and child nutritional outcomes is one of the major goals of developing countries like Ethiopia. This challenge is particularly pronounced in rural areas where access to improved food sources, health facilities, and other infrastructure is very limited. It is generally thought that providing sufficient food through increasing agricultural productivity leads to better nutritional outcomes (Yimer and Tadesse, 2015). In Ethiopia Thirty-eight percent of children under age 5 are stunted 10% are wasted 24% are underweight (Yimer and Tadesse, 2015). Results from the 2019 EMDHS show that 37% of children under 5 are short for their age or stunted, 7% of children are wasted and 21% of children are underweight.

The various risk factors for child under-nutrition are identified, which are related to the child, mother and their environment (Abera, Dejene and Laelago, 2017; Gezahegn, 2017; Solomon, Aderaw and Tegegne, 2017). As part of the quest to achieve gender equality, women's empowerment has increasingly been the focus of many development interventions. In addition to being an end goal in itself, women's empowerment is also considered as a means by which to achieve other important development outcomes, such as improvements in child nutritional status. As women are often the primary caretakers in a household, intra-household dynamics that determine allocation of resources and their impact on individuals' well-being are increasingly a subject of analysis (Chipili *et al.*, 2018).

According to FAO 2012, Gender inequality can be a cause as well as an effect of hunger and malnutrition. Not surprisingly, higher levels of gender inequality are associated with higher levels of under nutrition, both acute and chronic under nutrition. Women empowerment is considered crucial for improving nutrition outcomes. Since women are often primary caregivers, they can influence their children's nutrition indirectly through their own nutritional status as well as directly through childcare practices.

Very few studies (using direct and indirect measures of female empowerment) have demonstrated the important associations between women's empowerment dimensions and their own nutrition as well as that of their children(Shiwakoti and Paudel, 2017; Egata and Deressa, 2018; G *et al.*, 2018). Today, empowering women is slogan of the World. Likewise, Ethiopia has put different policies, legal framework, rules and regulations to enhance gender parity., the study found that Policies and legal frameworks constitute some inherent problems while at the same time their implementation

is not as it was expected (Moreda *et al.*, 2018). There is a strong and positive influence of the active participation of women in making decisions in the household on their children's health status (Ibrahim, Tripathi and Kumar, 2015).

Although improvement in women's status is a key factor in child nutrition, its relative importance is not clearly understood as many researchers use proxy indictors such as education, employment or wealth status. None of them simultaneously examine the role women empowerment in agriculture and nutritional status of their children. Women empowerment is contextual and multidimensional in nature, so it is important to study these relationships in the local context. This study is an attempt to fill the information and knowledge gap in this area and potential use of it will be policy and program design to appropriately address child nutrition in a sustainable way through women's empowerment.

Significance of the research

Policies to ensure women empowerment in all child nutrition interventions are much needed. The finding of this study provides information on women empowerment and child nutritional status and its associated factors that are vital for the district health and agriculture office program planners so as to improve child nutrition status. Identification of the gender role within the household is a means of assuring good nutrition. The output of this study could be used for different development projects in the area and it can serve as a baseline figures to monitor and revise their plan of action to intervene the problem. Moreover, the knowledge generated from this study could enrich literatures available on the issue and may trigger other researchers to conduct similar study in various parts of the country.

Objectives

General objectives

- To assess women's empowerment and nutritional status of their children aged 6 to 59 months children in rural districts of Hawela district, Sidama region during September 1, 2019 through June 30, 2020

Specific objectives

- To assess empowerment level of women's having children aged 6 to 59 months children in rural districts of Hawela district, Sidama Region during September 1, 2019 through June 30, 2020
- To determine the nutritional status of children aged 6 to 59 months children in rural districts of Hawela district, Sidama region during September 1, 2019 through June 30, 2020
- To see the association between women empowerment and nutritional status of children aged 6 to 59 months in rural districts of Hawela district, Sidama region during September 1, 2019 through June 30, 2020

MATERIALS AND METHODS

Description of the study area

The study was conducted in Hawella districts found in the technology villages of Hawassa University in Sidama Regional state. Sidama regional state is one of the administrative regions of

Ethiopia with a population of more than 4 million, where more than 90% lives in the rural part of the region. It has got a total of 30 district and 6 town administrations. It is located 272 km to the south east of Addis Ababa. Zone has total area of 6,981.8 square kilometers. According to 2018 estimate, the total population of zone is 4,294,730 of which 2,104,418 are females and 2,190,312 are males. Currently there are 15 public hospitals, 126 health centers, 531 health posts, 24 medium and 83 primary private and 7 NGO clinics.

Study subject

Women and their children aged 6-59 month live in the study area was the study participant

Study design

Community based cross-sectional study design was used

Sample size determination and Sampling technique

The required sample size for the study was calculated by using single population proportion formula through assumption of 95% confidence internal (CI), 5% margin of error, and prevalence of underweight is 27.6% from the study done in Damot Gale district south Ethiopia (Abera, Dejene and Laelago, 2017). The study area has 12 kebeles. A total of 338 mothers with their children were selected using systematic sampling techniques after 3 kebeles had been identified by the lottery method. The study mothers and their children were allocated proportionally for each kebeles.

Thus, $n = \frac{Z^2 pq}{d^2}$

$$n = \frac{z^2 pq}{d^2} = \frac{(1.96)^2 (0.276)(0.724)}{(0.05)^2}$$

n=308 so by considering 10% non-response rate the sample size was 338

Data collection instrument and procedure

Women empowerment was assessed by using abbreviated women empowerment in agriculture index (A-WEAI) which is a shorter, streamlined version the former (WEAI). A-WEAI has five domain and six indicators. Mothers were interviewed by using questionnaire adapted from abbreviated women's empowerment in agriculture index module. These questions covered five domains related to household agricultural activities: production, resources, income, leadership and time use.

The A-WEAI is an aggregate weighted sum of two sub- indices: The Five Domains of Empowerment (5DE) index accounts for 90% of the full A- WEAI and the Gender Parity Index (GPI) accounts for the remaining 10%. The 5DE aggregate index is comprised of six component binary indicators. In the present study, only the 5DE will be used in instead of the full A- WEAI (5DE + GPI) because constructing the GPI requires dual-adult (male–female) households. Anthropometric data collection was collected by using Seca digital weighing scale, height board of UNICEF, stature meter. Weighing equipment was standardized with standard weights before taking every measurement. The precision of the Seca digital weighing scale was 100 gm. The

height was recorded to the nearest 0.1 cm. The height was recorded after checking by two persons. The weight was taken on barefoot and minimal cloths. For child less than 1 year of age, the "mother-and-baby function" were used that enabled determination of the body weight of child while being held in the arms of the mother. The height board and was used to measure length/height of children. Recumbent length in children younger than 24 months of age and standing height for 24 months onwards was measured. Z-score was used to determine underweight, stunting and wasting based on WHO Growth Standard. Individual face-to-face interview of mothers having children aged 6-59 months was taken using pre-designed, pre-tested, structured questionnaire to asses factors associated with nutritional status of children. Questionnaire was translated into local language after consulting with experts and pretest was done with 10 percent of sample size.

Data Management and Analysis

Data were checked for completeness and consistency by cross checking and then were coded and double entered into Epi Data version 3.1 computer software packages. Data were exported to SPSS version 20.0 statistical package program for further analysis. The distribution of the variables was explored and data cleaning was performed to identify outliers/inconsistence, errors and missing. Descriptive analysis was done using numerical summary measures and the data were present using frequency tables, figures and graphs.

The 5DE aggregate index was comprised of six component binary indicators. For each indicator, a woman was classified as empowered or not based on a minimum threshold specific to that dimension of the index. The 5DE then uses a nested weighting structure in which each of the six indicators is weighted equally within its domain and, in turn, the five domains are weighted equally. The aggregate 5DE uses the weighted indicators and classifies an individual as empowered overall or not if the individual has adequate achievements in 80% of the weighted component indicator. Each component indicator is defined in the same way as in the original 5DE. WHO anthros software was used to compute Z-score (weight-for-age, height-for-age and weight-for-height) according to WHO reference standard taking -2SD as cut-off points.

Bivariate and multivariable logistic regression analyses were carried out and those predictor variables which were significantly associated with the outcome variable at p-value 0.2 during bivariate analyses were entered into the multivariable logistic regression model to control for all possible confounders. The model fitness for multivariable analysis will be checked with Hosmer and Lemes how goodness of fit test. Multi co linearity between the independent variables was checked using variance inflation factor. P-value ≤ 0.05 was consider as statistically significant level. Crude Odd Ratio (COR) and Adjusted Odd Ratio (AOR) with 95% Confidence interval (CI) was calculated to measure the strength of association between dependent and independent variables, Finally, variables which showed statistical significance (at p-value ≤ 0.05 cut point) in multivariable analysis was considered as important predictors of the outcome variable.

Variables

Dependent variable

Child nutritional status interims of wasting, underweight, and stunting

Independent variables

- Women empowerment status
- Socio-demographic and socio-economic variables such as:
- Age, Sex, Marital status, Ethnicity, Religion, Educational status, HH headship, Occupation (HHH/spouse employment).
- Health service-related variables

Data quality management

Data collectors and supervisors were trained for two days on the objective of the study, method of data collection, interview technique and content of questionnaire. The tool was pretested in one of the districts kebele 1, a week prior to the main data collection period on 5% of total sample size households to check for consistency, clarity and sequence of questions, and also to familiarize the data collectors with instruments and then all necessary corrections were made. Data collectors were trained to give sufficient time to interviewees to recall during interview since they were asked what happened in past. Data was checked for completeness, accuracy, and consistency by supervisors and principal investigator after the data collection on daily basis. Finally, data was entered in to Epi-data software by two data entry clerks (persons) by two computers independently and then validation of duplicated data files were made to ensure data quality.

Ethical consideration

Ethical approval for the study was granted by the Institutional Review Board (IRB) of Hawassa University, College of Medicine and Health Science and permission letter (Formal letter of cooperation) was obtained. Anonymity of the participants was kept by informing them that their name and personal identifiers were not to be written on the questioner and verbal informed consent was obtained from each study subject. Participants were told that they have full right to participate or refuse participation in the study and the right to stop in the meantime while administering questioners if not feeling comfortable, keeping in mind the rationale of the study and benefit of his/her response.

RESULTS

Socio demographic and child and mother conditions

A total of 338 mothers with children aged 6-59 month were included with response rate of 100%. The mean age of mother and children were 29.25years and 25.86 months, respectively. Majority 319(91.7%) of head of the household were male and majority of mothers 293 (86.7%) were protestant in religion. 195 (57.7%) % of mother had one under five children. 182 (53.8%) children were male and 217 (64.2%) were delivered at health facility. 253 (74.9%) of mother initiate breast feeding 1hour after delivery and 237 (70.1%) of mothers did not practice exclusive breast feeding (Table 1).

Table 31: Socio demographic characteristics of mother with children in the study area n=338

Characteristics	Proportion N (%)
Maternal age	
16-31	200(59.2)
>31	138(40.8)
Head of household	
Male	310(91.7)
Female	28(8.3)
Maternal education	
Informal education	172(50.9)
Formal education	166(49.1)
Maternal occupation	
House wife	290 (85.8)
Employed	48(14.2)
Marital status	
Married	317(93.8)
Single	21 (6.2)
Religion	
Protestant	293 (86.7)
Muslim	23 (6.8)
Orthodox	17 (5.0)
Other	5 (1.5)
Family size	
≤ 5	171 (50.6)
>5	167 (94.4)
Number of under five children	
1	195 (57.7)
≥ 2	143 (42.3)
Age of index child	
6-11	61(18)
12-23	97 (28.7)
24-35	79 (23.4)
36-47	69 (20.4)
48-59	32 (9.5)
Sex of index child	
Male	182 (53.8)
Female	156 (46.2)
Birth interval (Month)	
<24	50 (14.8)
25-47	232 (68.6)
>47	56 (16.6)
Place of delivery	
Health facility	217 (64.2)
Elsewhere	121(35.8)
Initiation of breast feed	
Immediately after delivery	85 (25.1)
1hr after delivery	253 (74.9)
Exclusive breast feeding	
Practiced	101 (29.9)
Non practiced	237 (70.1)

Nutritional status of children

The prevalence of underweight, stunted and wasted among children were 10.1 % (95 percent CI: 7.1, 13.3), 40.5 percent (95 percent CI: 34.9, 45.6) and 12.1 percent (95 percent CI: 8.9, 16), respectively (Table 2).

Table 32: Nutritional status of children in the study area n=338

Nutritional status	Number (percent)
Stunted (HAZ < -2)	137 (40.5)
Wasted (WHZ < -2)	41 (12.1)
Under weight (WAZ <-2	34 (10.1)

Women empowerment status

The 5DE shows that 38.2 percent of women are empowered. 61.8 percent of women who are not yet empowered have, on average, inadequate achievements in 64.7 percent of domains. Thus, women's M0 0.647 x 0.382 = 0.247 and 5DE is 1 - 0.247 = 0.753 percent (Table 3).

Table 33: Women empowerment status in the study area n=338

5DE=(1-Mo)	0.753
Disempowerment score (Mo)	0.247
women achieving empowerment	209 (61.8)
Women not achieving empowerment	129(38.2)
Average inadequacy score	0.647
Mean 5DE score fore not yet empowered	0.353

Factors associated with nutritional status of children

The result of multivariable logistic regression analysis showed that age of the mother AOR= 2.58, 95% CI= (1.07, 6.25) marital status of mothers AOR=6.4595% CI= (2.01, 2.71) place of delivery AOR=4.48 95% CI= (2.12, 9.49) and maternal educational status AOR=2.83 95% CI= (1.29, 6.23) were factors independently associated with wasted children. Heads of the household AOR=1.68,95% CI= (1.55, 5.12), number of under five children in the house hold AOR=2.23 95% CI=1.02,4.98), sex of the index child AOR=0.43 CI= (0.19, 0.89), and practice of exclusive breast feeding AOR=0.27 CI (=0.24, 0.58) were factors associated with underweight children in multivariable logistic regression. Whereas factors associated with stunting were maternal age AOR=0.20 95% CI= (0.11, 0.36) and women empowerment AOR=0.32 95% CI = (0.19, 0.54) (Table 4, 5 and 6).

Table 34: Factors associated with underweight children in the study area n=338

Variables	Wasted		COR 95%CI	AOR	P value
	Yes	No			
Maternal age					
16-31	31(15.5)	169(84.5)	2.348 (1.11,4.965)	2.583(1.068,6.248)	0.035
>31	10(7.2)	128(92.8)	1	1	
Head of household					
Male	37(11.7)	279(88.3)	1.234 (0.4404,3.742)		
Female	4(18.2)	18(81.8)	1		
Maternal education					
Informal education	29(16.9)	143(83.1)	2.603(1.279,5.295)	2.839(1.293,6.235)	0.009
Formal education	12(7.2)	154(92.8)	1	1	
Maternal occupation					
House wife	34(11.7)	256(88.3)	0.778 (0.323,1.871)		
Employed	7(14.6)	41(85.4)	1		
Marital status					
Married	34(10.7)	283(89.3)	1	1	
Single	7(33.3)	14(66.7)	4.162(1.571,11.028)	6.451(2.009,2.711)	0.002
Family size					
≤ 5	28(15.5)	153(84.5)	1	1	
>5	13(8.3)	144(91.7)	0.493 (0.246,0.989)	2.269(0.985,5.225)	0.054
Number of under five children					
1	23(11.4)	179(88.6)	1		
≥ 2	18(13.2)	118(86.8)	1.167(0.614,2.295)		
Age of index child					
6-11	10(16.4)	51(83.6)	1.059(0.328,3.413)		
12-23	5(5.2)	92(94.8)	0.293(0.79,1.090)		
24-35	13(16.5)	66(83.5)	1.064(0.346,3.274)		
36-47	8(11.6)	61(88.4)	0.708(0.212,2.36)		
48-60	5(15.6)	27(84.4)	1		
Sex of index child					
Male	37(11.7)	279(88.3)	1		
Female	4(18.2)	18(81.8)	1.235(0.640,2.384)		
Place of birth					
Health facility	14(6.5)	203(93.5)	1	1	
Elsewhere	27(22.3)	94(77.7)	4.165(2.088,8.306)	4.484(2.119,9.488)	
Birth interval (Month)					
<24	7(14.0)	43(8.0)	1.357(0.424,4.345)		
25-47	28(12.1)	204(87.9)	1.144(0.449,2.912)		
>47	6(10.7)	50(89.3)	1		
Initiation of breast feed					
Immediately after delivery	12(14.1)	73(85.9)	1		
1hr after delivery	29(11.5)	224(88.5)	1.270(0.616,2.616)		
Exclusive breast feeding					
Practice	15(16.5)	76(83.5)	1		
Nonpractice	26(10.5)	221(89.5)	0.596(0.300,1.185)		
Woman empowerment					

Empowered	26(12.4)	183(87.6)	1
Non empowered	15(11.6)	114(88.4)	0.926(0.471,1.823)

Table 35: Factors associated with child underweight in the study area n=338

Variables	Under weight				
	Yes	No	COR 95%CI	AOR	P
Maternal age					
16-31	20(10.0)	180(90.0)	0.984(0.479,2.022)		
>31	14(10.1)	124(89.9)	1		
Head of household					
Male	28(9.0)	282(91.0)	1	1	.
Female	6(21.4)	22(78.6)	2.747(1.028,7.338)	1.683(1.552,5.128)	0.0360
Maternal education					
Informal education	16(10.3)	140(89.7)	1.041(0.512,2.118)		
Formal education	18(9.9)	164(90.1)	1		
Maternal occupation					
House wife	31(10.7)	259(89.3)	1.795(0.527,6.122)		
Employed	3(6.3)	45(93.8)	1		
Marital status					
Married	32(10.1)	285(89.9)	1		
Single	2(9.5)	19(90.5)	0.938(0.209,4.211)		
Family size					
≤ 5	10(5.8)	161(94.2)	1	1	
>5	24(14.4)	143(85.6)	2.702(1.249,5.844)	2.282 (0.986,5.278)	0.054
Number of under five children					
1	21(10.4)	181(89.6)	1	1	
≥ 2	13(9.6)	123(90.4)	2.773(1.323,5.811)	2.233(1.002,4.979)	0.005
Age of index child					
6-11	10(16.4)	51(83.6)	1.059(0.328,3.413)		
12-23	5(5.2)	92(94.8)	0.293(0.079,1.090)		
24-35	8(10.1)	71(89.9)	0.608(0.183,2.024)		
36-47	6(8.7)	63(91.3)	0.514(0.144,1.830		
48-60	5(15.6)	27(84.6)	1		
Sex of index child					
Male	24(13.2)	158(86.8)	1		
Female	10(6.4)	146(93.6)	0.451(0.209,0.975)	0.431(0.188, 0.891)	0.047
Place of birth					
Health facility	19(8.3)	210(91.7)	1		
Elsewhere	15(13.8)	94(86.2)	1.764(0.859,3.621)		
Birth interval (Month)					
<24	7(14.0)	43(86.0)	1.660(0.492,5.609)		
25-47	22(9.5)	210(90.5)	1.069(0.386,2.958)		
>47	5(8.9)	51(91.1)	1		
Initiation of breast feed					
Immediately after delivery	9(10.6)	76(89.4)	1		

1hr after delivery	25(9.9)	228(90.1)	0.926(0.414,2.071)		
Exclusive breast feeding					
Practiced	21(20.8)	80(79.2)	1	1	
Non practiced	13(5.5)	224(94.5)	0.221(0.106,0.462)	0.268(0.241,0.578)	0.001
Woman empowerment					
Empowered	20(9.6)	189(90.4)	1		
Non empowered	141(10.9)	115(89.1)	1.150(0.559,2.366)		

Table 36: Factors associated with stunting in the study area n=338

	Stunted				
Variables	Yes	No	COR 95% CI	AOR	P
Maternal age					
16-31	52(26.0)	148(74.0)	0.219(0.137,0.349)	0.200(0.112,0.357)	0.000
>31	85(61.6)	53(38.4)	1	1	
Head of household					
Male	126(40.6)	184(59.4)	1		
Female	11(39.3)	17(60.7)	1.058(0.480,2.335)		
Maternal education					
Informal education	78(50.0)	78(50.0)	2.085(1.341,3.242)	1.404(0.844,2.337)	0.191
Formal education	59(32.4)	123(67.6)	1	1	
Maternal occupation					
House wife	121(41.7)	169(58.3)	1.432(0.752,2.726)		
Employed	16(33.3)	32(66.7)	1		
Marital status					
Married	131(41.3)	186(58.7)	1		
Single	6(28.6)	15(71.4	0.568(0.215,1.502)		
Family size					
≤ 5	58(32.0)	123(68.0)	1	1	
>5	79(50.3)	78(49.7)	0.466(0.299,0.724)	0.918(0.513,1.644)	0.774
Number of under five children					
1	80(39.6)	122(60.4)	1		
≥ 2	57(41.9)	79(58.1)	1.100(0.707,1.712		
Age of index child					
6-11	26(42.6)	35(57.4)	1.238(0.515,2.977)		
12-23	44(45.4)	53(54.6)	1.384(0.610,3.141)		
24-35	31(39.2)	48(60.8)	1.076(0.462,2.509)		
36-47	24(34.8)	45(65.2)	0.889(0.372,2.123)		
48-60	12(37.5)	20(62.5)	1		
Sex of index child					
Male	71(40.8)	103(59.2)	1		
Female	66(40.2)	98(59.8)	1.024(0.663,1.581)		
Place of birth					
Health facility	94(41.0)	135(59.0)	1		
Elsewhere	43(39.4)	66(60.6)	1.069(0.671,1.703)		
Birth interval (Month)					
<24	26(52.0)	24(48.0)	2.110(0.964,4.618)		
25-47	92(39.7)	140(60.3)	1.280(0.694,2.361)		
>47	19(33.9)	37(66.1)	1		
Initiation of breast feed					

	Immediately after delivery	36(42.4)	49(57.6)	1		
	1hr after delivery	101(39.9)	152(60.1)	0.904(0.549,1.489)		
Exclusive breast feeding						
	Practice	39(42.9)	52(57.1)	1		
	Non practiced	98(39.7)	149(60.3)	0.877(0.5391.427)		
Woman empowerment						
	Empowered	70(33.5)	139(66.5)	1	1	
	Non empowered	7(51.9)	62(59.5)	0.466(0.297,0.730)	0.322(0.192,0.541)	0.0001

DISCUSSION

This study is one of the few studies that have examined the association between women empowerment in abbreviated agricultural index and child nutritional status in Ethiopia**.** Key findings indicate that those 129 (38.2) percent of women were not empowered and 209(61.8) percent women were empowered in the study area. The prevalence of underweight, stunted and wasted among children were 10.1 % (95 percent CI: 7.1, 13.3), 40.5 percent (95 percent CI: 34.9, 45.6) and 12.1 percent (95 percent CI: 8.9, 16) respectively. Age of the mother, marital status of mothers, place of delivery and maternal educational status were factors independently associated with wasted children. Heads of the household, number of under-five children in the house hold, sex of the index child, and practice of exclusive breastfeeding were factors associated with underweight children in multivariable logistic regression. Whereas factors associated with stunting were maternal age and women empowerment. The 5DE shows that 61.8 percent of women are empowered and this is result is greater than stud done in Bangladesh 53.6 percent and study done in Uganda 59.7(Malapit *et al.*, 2015)

The prevalence of underweight in the study area were 10.1% this result is almost in line with study done in Nepal 11% (Pravana *et al.*, 2017) and this is lower than study done in Shashemene which is 29% (Kassa *et al.*, 2017) and study done in Damogale district 26.2 percent (Abera, Dejene and Laelago, 2017).This might be difference also due to study period, socioeconomic characteristics, health service delivery. The prevalence of stunted were 40.5 percent and this is higher than study done in Tigray 37% (Amare, Ahmed and Mehari, 2019)and lower than study done in Afar 43.1% (17). This might be difference also due to study period, socioeconomic characteristics, and health service delivery. The prevalence of Wasted among children were 12.1 percent and this is higher than study done in Damogale district (Abera, et al, 2017) and lower than study done in Hidabu Abote district 16.7% (Kassahun, 2013).This might be difference also due to study period, socioeconomic characteristics, and health service delivery.

Regarding associated factors of malnutrition, multivariable logistic analysis of this study indicated that head of the household, number of under-five children in the household, sex of the child and practicing exclusive breast feeding were found to be significantly associated with underweight. Children belonging to the female head of the household were 1.68 times more likely to be underweight compered to children belonging to the male head of the household.

Number of under-five children from households who had more than one child was about 2.77 times more likely to be affected by underweight than number of under five children from households

who had only one child. This was in agreement with study done in Lalibela (Yalew, 2013).This suggests that there is increased competition for household food in households with a number of number of children. Female children were 0.45 times less likely to be underweight compered to male children. Maternal age, maternal educational status, marital status, family size and place of delivery were factors associated with wasting. Younger Mothers were 2.58 times more likely to had wasted children compered to older mother. Mothers who were not attend formal education had 4.16 times more likely to had wasted children. Single mothers were 4.16 times more likely to had wasted mother than married mothers. Women empowerment, family size, maternal education and maternal education were factors associated with stunting

CONCLUSION AND RECOMMENDATION

High proportion of women was not empowered in 5DE in the study area and women empowerment has a great effect on child nutritional status specifically on chronic malnutrition which is stunting. The prevalence of child under nutrition among under five children is still a public health problem. Age, marital status, place of delivery and educational status were factors associated with wasting. Heads of the house hold, number of under-five children in the house hold, sex and practice of exclusive breastfeeding were factors associated with underweight children in multivariable logistic regression. Whereas factors associated with stunting were maternal age and women empowerment. It is recommended that child nutrition status can be improved through women empowerment.

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Predictors of under nutrition and pregnancy outcome among young pregnant women (10-24) attending public health institutions in Hawassa city, Southern Ethiopia

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ABSTRACT

Under-nutrition is very high among young pregnant women, which is the major public health concern especially in Ethiopia. Nevertheless, little is known about predictors of young age pregnancy under-nutrition and their outcome in order to break the cycle of under nutrition. To assess predictors of under nutrition and pregnancy outcome among young pregnant women (10-24) attending public health institutions in Hawassa city, Southern Ethiopia from December, 2019 up to April 30, 2020. Institution based case control study design and comparative cross-sectional study design was employed on 473 (158 cases and 315 controls) pregnant women. Mid Upper arm circumference <23 cm defined maternal malnutrition. Data was entered to epi-data and exported to STATA version 14. Adolescent age (15-19), formal educational status, greater than four family size, poor husband support and unplanned pregnancy were predictors of maternal under-nutrition. Under-nutrition were the underling factor for increasing maternal and perinatal adverse outcome and, respectively. Induction of labor, c/s delivery and history of illness were additional risk factors for adverse maternal outcome. Socio demographic and health service utilization factors were founded to be risk factors for maternal under nutrition, adverse maternal and perinatal outcome. Therefore, Multi-sectorial collaboration is very important to address these predicting variables and to improve maternal and child welling.

Keywords: *Young, under nutrition, pregnancy, Ethiopia, Hawassa*

INTRODUCTION

Background

Maternal malnutrition is the underlying cause of mortality and morbidity in children. The concentration of some micronutrients (vitamin A, iodine, thiamin, riboflavin, pyridoxine, and cobalamin) in breast milk is dependent on maternal status and intake, so the risk of infant depletion is increased by maternal deficiency(Black *et al.*, 2008).

During pregnancy a woman needs safe, adequate and balanced diet for her and her baby's wellbeing(Angela, 2016). Poor or under nutrition at conception contributes high maternal morbidity and mortality. It exacerbates maternal morbidity like malaria, HIV infection and gastrointestinal parasite infestation. It also increases poor pregnancy outcomes including obstructed labor, post-partum hemorrhage. Additionally pregnant mother under nutrition cause low birth weight or intrauterine growth restriction(Safaa, 2016).

Different nutrition specific interventions employed before conception and at conception like family planning provision, health education in order to delay age of first pregnancy for adolescents, micronutrient supplementation, fortified food

supplementation and antenatal care (ANC) including HIV testing(Unicef, 2013). However, the burden of pregnant mother under nutrition is still high especially among adolescents.

Statement of the problem

Adolescent young women pregnancy is a major public health concern because it is an underline cause of morbidity and mortality among mother and the child(Central Statistical Agency (CSA), 2001).Globally about 16 million adolescents become pregnant every year, a serious problem of maternal under nutrition is evident in low- and middle-income countries (Johnson and Moore, 2016).

In Ethiopia 13% of teenagers have begun childbearing and 29% are most likely to be thin (BMI below 18.5). This has an association with increment of low birth weight(Central Statistical Agency (CSA), 2001). Additionally smallest maternal age (<20years) associated with high burden of under-five mortality whereas compared to women age greater than 18 years children from adolescents become stunted(Central Statistical Agency (CSA), 2001; Johnson and Moore, 2016). These infants in turn may never recoup from their early disadvantage.

Significance of the study

Adolescent and young age pregnancy is strongly associated with maternal under nutrition and child malnutrition(Bhan, 2019). Nevertheless, little is known about predictors of young pregnancy under-nutrition in order to break the cycle of under nutrition and their pregnancy outcome. In addition, knowing major predictors of under nutrition and their pregnancy outcome among young age pregnant mother help the researchers to intervene the problem and also designing policies.

Objective

General objective

- To assess predictors of under nutrition and pregnancy outcome among young pregnant women (10-24) attending public health institutions in Hawassa city, Southern Ethiopia from December, 2019 up to April 30, 2020.

Specific objective

- To identify factors associated with under-nutrition among young pregnant (10-24) attending public health institutions in Hawassa city, Southern Ethiopia from December, 2019 up to April 30, 2020.
- To compare adverse pregnancy outcome among undernourished and well-nourished young pregnant women in Hawassa city, Southern Ethiopia from December, 2019 up to April 30, 2020.

MATERIALS AND METHODS

Study area

The study was conducted in selected governmental health institutions found in Hawassa town. According to Hawassa town 2011 E.C report there are a total of 376,541 population in the town and from this 50.2% are females. The City administration has a total of 13 public health facilities providing health services for the respective community. These are 3 hospitals (one referral, one general and one primary hospital) and10 primary health care units' (health centers).

Study period

The study was conducted from December 2019 up to April 30, 2020.

Study design

A case-control study design was employed to address the first objective. The second objective of the study was addressed using a comparative cross-sectional study design.

Source population

All young pregnant women age from 10-24 years admitted for delivery service in Hawassa governmental institutions.

Study population

All young pregnant women admitted for delivery service in selected health facilities of Hawassa town and fulfill the inclusion and exclusion criteria of this study.

Study unit

Young pregnant woman admitted for delivery service in selected health facilities of Hawassa town and fulfill the inclusion and exclusion criteria of this study.

Inclusion and exclusion criteria

Inclusion criteria

Pregnant women (10-24 year) who come to the health institution for delivery service was included in this study.

Exclusion Criteria

Mothers who couldn't take anthropometric measurement due to disability, mothers with repeated history of illness (TB, HIV/AIDS) during the current pregnancy, mentally ill clients and women admitted to the participating hospitals for reasons of abortion or ectopic pregnancy were excluded from the study.

Variables

Dependent variable

- Young woman under Nutrition for first objective
- Adverse prenatal outcome for second objective
- Adverse maternal outcome for second objective

Independent variable

- Socio demographic factor: age, educational status, Marital status
- Maternal characteristics: number of parity, illness during pregnancy, wanted pregnancy
- Health service: antenatal care follow up, deworming, iron and folic acid supplementation, family planning utilization.
- Adverse pregnancy outcome: anemia, induced hypertension, gestational DM, hemorrhage, low birth weight

Sample Size

The sample size is calculated using EPI-Info 7 statistical software. The assumption for sample size calculation were proportion of unprotected water source 43% among cases and 57% among controls (Workicho and Kolsteren, Patrick, Tefera Belachew, Shibani Ghosh, 2018), 80% power, 95% confidence interval, 5% non-response rate and a case: control ratio of 1:2. The total sample size was 473 (158 cases and 315 controls).

Whereas two population proportions formula using EPI-Info Version 7.0 statistical software was used to calculate the sample size for second and objective of this study. The following assumptions were considered to reach the final samples required for the study: 95% confidence interval, 80% power and a 18.3% P1 values for the adverse birth outcome from study done at Hawassa, governmental institutions (Tsegaye and Kassa, 2018). For control group prevalence with standard 10% difference was considered (P2). The ratio between comparison groups was considered to be 1:2, adding 5% non-response rate then the final sample size became 453(151 cases and 302 controls).

Therefore, the final binding sample size for this study is 473 (158 cases and 315 controls).

Sampling procedure

Two stage sampling procedure was used in order to include 473 participants to our study. First stratification of health facilities it to homogeneous group was done then by using simple random sampling method one referral hospital, one general hospital and four primary health care units (PHCUs) was selected. Finally, the sample size for both cases and controls were distributed proportionally. In order to identify cases and control group Mid Upper Arm Circumference (MUAC) measurement employed for mothers who came for delivery. After identifying cases and controls participants the sample were included until the required sample obtained. A diagrammatic description of the sampling procedure is given at figure 1 bellow.

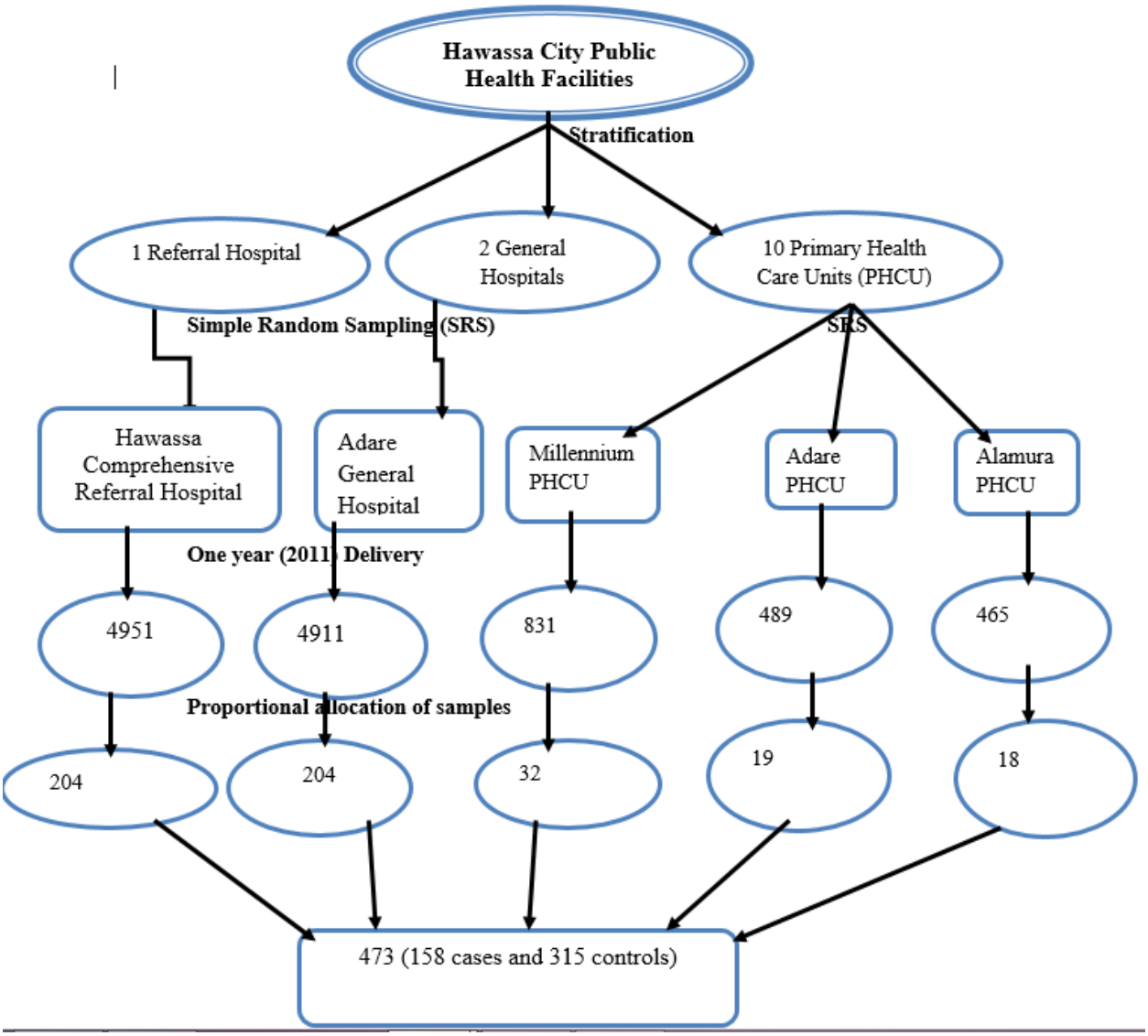

Figure 1: Schematic Presentation of Sampling Procedure

Measurement

Maternal nutrition was assessed using a Mid Upper Arm Circumference (MUAC) (Dadi and Desyibelew, 2019).

Data Collection procedure

Data collection used to interview mothers or care takers in local language (Amharic). Before using the questionnaire, pre-taste was conducted in Leku district. The questionnaire was prepared in English and then translated to Amharic to English to maintain consistency.

Two supervisors (health officers) and fourteen trained nurses were employed for collecting data and he/she also gather vital information from the medical records.

Operational definition

MUAC: a pregnant other is below 22 cm considered undernourished mother.

Cases: Undernourished pregnant mother whose MUAC is less than 22cm.

Controls: well-nourished pregnant mother whose MUAC is greater and equal to 22cm.

Anemia: Those pregnant women with hematocret level <11 g/dl.

Adverse prenatal outcome: if a prenatal have at list one of listed adverse birth outcome, like Low birth weight (LBW), prenatal mortality, congenital anomaly or other.

Maternal adverse outcome: at list one of this; pregnancy induced hypertension, anemia, obstructed labor, sepsis and hemorrhage.

Data Analysis

The data was entered into EPI-Data version 7 and was exported to STATA 14 for cleaning and analysis. X^2 test was done for comparison of groups. For case control design those independent variables that are statistically significant with p-value < 0.25 at bivariate level was included in multivariable logistic regression model for outcome variable.

Data quality control

Data quality was confirmed during collection, coding, entry, and analysis. Training and orientation were given for data collectors and supervisors before data collection. Prior to data collection the questionnaire was pretested adjacent to the study area (Leku).

Ethical consideration

The study was done after receiving ethical approval from Hawassa University College of medicine and health science institutional review board. Based on this and explaining the importance and intention of the study an official letter of co-

operation was taken from Sidama zone health office and Hawassa health office. Finally, data was collected after assuring confidentiality (anonymity and not writing their address) and receiving consent of the pregnant mother. Health information about nutrition was given for all participants.

RESULTS

The response rate of this study is 99.2%. Maternal mean age is 21.24 (SD± 1.9). About 412(87.85%) young girls were between 20-24 years of age and two out of four of them were attended primary school.

Table 37: Socio demographic and economic characteristics of the pregnant women in Hawassa city, Sidama region, Southern Ethiopia, 2020.

Variables	Total (%)	Nutritional status		X^2	P-value
		Normal	Under-nutrition		
Maternal age					
15-19	57(12.15)	23(7.37)	34(21.66)	19.96	<0.0001
20-24	412(87.85)	289(92.63)	123(78.34)		
Maternal education					
No formal education	14(2.99)	3 (0.96)	11 (7.01)		
Formal education	455(97.01)	309(99.04)	146(92.99)	13.17	<0.0001
Maternal Occupation					
Governmental employee	47(10.02)	31(9.94)	16(10.19)		
Student	66(14.07)	41(13.14)	25(15.92)	2.73	0.44
Housewife	294(62.69)	203(65.06)	91(57.96)		
Self-employee	62(13.22)	37(11.86)	25(15.92)		
Marital status					
Single	52(11.09)	32(10.26)	20(12.74)	0.65	0.42
Married	417(88.91)	280(89.74)	137(87.26)		
Family size					
≤3	333(71.00)	210(67.31)	123(78.34)	6.17	0.013
≥4	136(29.00)	102(32.69)	34(21.66)		
Husband Support					
Good support	252(53.73)	191(61.22)	61(38.85)	21.01	<0.0001
Poor support	217(46.27)	121(38.78)	96(61.15)		
Maternal autonomy					
Yes	367(78.25)	247(79.17)	120(76.43)	0.46	0.49
No	102(21.75)	65(20.83)	37(23.57)		
Coffee drink					
Always	171(36.46)	112(35.9)	59(37.58)		
Sometimes (1-3/week)	258(55.01)	176(56.41)	82(52.23)	1.17	0.55
Never	40 (8.53)	24(7.69)	16(10.19)		
Sex of the baby					
Male	274(58.42)	186(59.62)	88(56.05)	0.55	0.46
Female	195(41.58)	126(40.38)	69(43.95)		
Monthly income					
≤4000	295(62.9)	186(59.62)	109(69.43)		
>4000	174(37.1)	126(40.38)	48(30.57)	20.88	<0.001*

Maternal and child health characteristics

More than half of the respondents 250(53.3%) had more than four times ANC visit and three out of five young women who gave birth within two years of the first baby (Table 2).

Table 38: Maternal and child characteristics among pregnant young women among selected health facilities in Hawasa city, Southern Ethiopia.

Variables	Total (%)	Nutritional status		X^2	P-value
		Normal	Under-nutrition		
History of ANC visit					
None	27(5.76)	12(3.85)	15(9.55)		
<4 times	192(40.94)	135(43.27)	57(36.31)	7.18	0.03*
≥4 times	250(53.30)	165(52.88)	85(54.14)		
Parity					
Primigravida	264(54.29)	178(57.05)	86(54.78)	0.22	0.64
Multigravida	205(43.71)	134(42.95)	71(45.22)		
Plan for pregnancy					
Planned	429(91.47)	301(96.47)	128(81.53)	29.9	<0.001*
Unplanned	40(8.53)	11(3.53)	29(18.47)		
GA of current pregnancy					
Preterm	46(9.81)	19(6.09)	27(17.2)		
Post term	24(5.12)	11(3.53)	13(8.28)	20.84	<0.001*
Term	399(85.07)	282(90.38)	117(74.52)		
Mode of delivery					
SVD	371(79.10)	247(79.17)	124(78.98)		
Instrumental	15(3.20)	3(0.96)	12(7.64)	17.07	<0.001*
C/S	83(17.7)	62(19.87)	21(13.38)		
History of illness					
Yes	61(13.01)	46(14.74)	15(9.55)		
No	408(86.99)	266(85.26)	142(90.45)	2.49	0.12

Maternal and fetal outcome

Adverse Perinatal Outcome

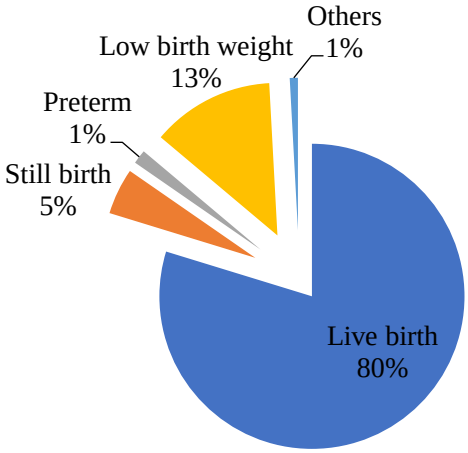

Figure 13: Adverse perinatal outcome among mothers who gave birth among selected health facilities at Hawasa city, Southern Ethiopia.

In this study, 374 (79.74%) live births were identified. About 23(4.9%) and 61(13.01%) of newborns were died and delivered with low birth weight, respectively. Whereas, 32(6.82%) of newborns delivered with poor APGAR score at 5 minutes (Figure 1).

Adverse maternal outcome

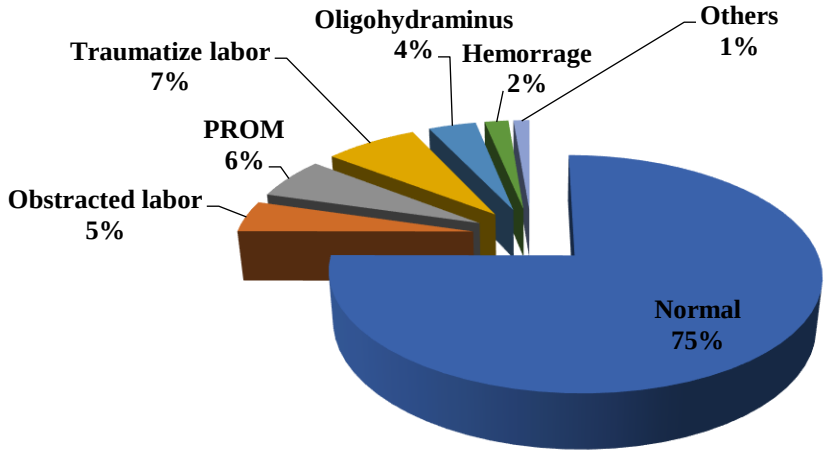

Figure 14: Adverse perinatal outcome among mothers who gave birth among selected health facilities at Hawasa city, Southern Ethiopia.

From 469 sampled pregnant women 352(75.05%) were gave birth without any complication while 117(24.95%) women faced complicated birth outcome. (Figure 2).

Factors associated with maternal under nutrition

Young pregnant women at adolescent age (15-19) were 3.22 times more likely to be undernourished than those mothers age 20-24 [AOR=3.22, 95% CI (1.73, 5.99)]. Mothers who attended any formal education were 87% less likely to be undernourished than their counter parts [AOR=0.13 ,95% CI(0.03, 0.54)] Those young pregnant women who had greater than and equal to four were 41% less likely to be undernourished than young pregnant women less than three family size [AOR=0.58 ,95% CI(0.36,0.97)]. Young pregnant women with poor husband support 2.21 times were more likely to be undernourished than those who had good husband support [AOR=2.21,95% CI (1.41,3.47)]. Unplanned pregnancy increases the odds of maternal under nutrition by almost 6 times [AOR=5.91, 95% CI (2.67, 13.12)].

Table 39: Predictors of maternal under nutrition in Hawasa city, Sidama region, Southern Ethiopia.

Variable	**Nutritional status**		**COR95%CI**	**AOR95%CI**
	Normal	**Under-nutrition**		
Age				
15-19	23(7.37)	34(21.66)	3.47(1.96,6.14)* 1	**3.22(1.73, 5.99)***
20-24	289(92.63)	123(78.34)		1
Maternal education				
No formal education	3 (0.96)	11 (7.01)	1	1
Formal education	309(99.04)	146(92.99)	0.77(0.60,0.99)*	**0.13(0.03, 0.54)***
Parity				
Primigravida	178(57.05)	86(54.78)	1	-
Multigravida	134(42.95)	71(45.22)	1.09(0.75, 1.61)*	
Family size				
≤3	210(67.31)	123(78.34)	1	1
≥4	102(32.69)	34(21.66)	0.57(0.36, 0.89)*	**0.59(0.36,0.97)***
Husband Support				
Good support	191(61.22)	61(38.85)	1	1
Poor support	121(38.78)	96(61.15)	2.48(1.67, 3.68)*	**2.21(1.41,3.47)***
Monthly income				
≤4000	186(59.62)	109(69.43)	1.53(1.02, 2.31)*	1.06(0.66, 1.69)
>4000	126(40.38)	48(30.57)	1	1
History of ANC visit				
None	12(3.85)	15(9.55)	1	1
<4 times	135(43.27)	57(36.31)	2.42(1.08, 5.41)*	0.73(0.26, 2.01)
≥4 times	165(52.88)	85(54.14)	0.82(0.55, 1.23)*	1.47(0.52, 4.15)
Plan for pregnancy				
Planned	301(96.47)	128(81.53)	1	1
Unplanned	11(3.53)	29(18.47)	6.19(3.01, 12.79)*	**5.91(2.67, 13.12)***
History of illness				
Yes	46(14.74)	15(9.55)	1	1
No	266(85.26)	142(90.45)	1.64(0.88, 3.05)*	1.20(0.61,2.36)

Comparison of nutritional status with maternal and perinatal outcome

Proportion of adverse perinatal outcome and maternal outcome is 36.9% and 35.7%, respectively in undernourished mother as compared with 11.9% and 19.6%, among those well-nourished mother (X^2=40.7, P=<0.0001) and (X^2=14.5 ,P=<0.0001) , respectively.

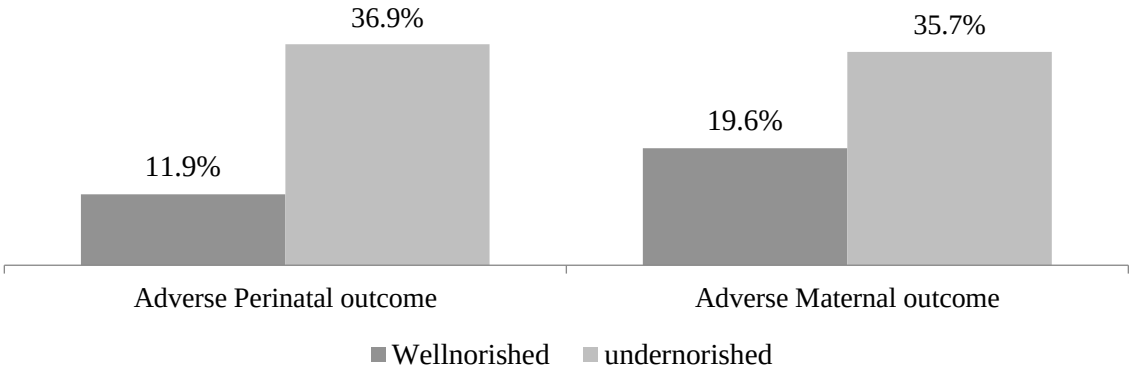

Figure 15: Perinatal and maternal outcome based on nutritional status of young mother in Hawassa city, Sidama region, southern Ethiopia, 2020.

Factors associated with perinatal outcome

The odds of giving APO birth is 4.5 times higher among undernourished mothers than their counterparts [AOR=4.49, 95% CI (2.59, 7.78)]. The chance of giving birth with APO were decreased by 65% among mothers who had greater and equal to four antenatal visits [AOR=0.35, 95% CI (0.12, 0.98)]. The likely hood of giving birth with APO was increased by 3.35 times in those hypertensive mothers than their counterparts [AOR=3.31, 95% CI (1.57, 6.99)]. The odds of giving APO birth were 2.14 times higher among mothers with complicated maternal outcome [AOR=2.14, 95% CI (1.23, 3.74)].

Table 40: Comparison of adverse perinatal outcome and maternal nutrition and other factors associated with adverse maternal outcome in Sidama region, Southern Ethiopia, 2020.

Variable	Adverse perinatal outcome		X^2 (p-value)	COR95%CI	AOR95%CI
	Normal	Complicated			
Maternal nutrition					
Normal	275(73.53)	37(38.95)	40.7(<0.001)	1	1
Under-nutrition	99(26.47)	58(61.05)		4.35(2.72, 6.98)*	**4.49(2.59,7.78)***
ANC visit					
None	17(4.55)	10(10.53)		1	1
<4 times	137(36.63)	55(57.89)	23.6(<0.001)	0.68(0.29,1.58)	1.17(0.43,3.17)
≥4 times	220(58.82)	30(31.58)		0.23(0.27, 1.28)*	**0.35(0.12,0.98)**
Maternal HTN					
Not hypertensive	348(93.05)	76(80.0)	14.9(<0.001)	1	1
Hypertensive	26(6.95)	19(20.00)		3.35(1.76, 6.36)*	**3.31(1.57,6.99)***
Maternal autonomy					
Yes	301(80.48)	66(69.47)	5.39(0.02)	1	1
No	73(19.52)	29(30.53)		1.81(1.09,3.01)*	1.59(0.87,2.91)
Maternal outcome					
Normal	297(79.41)	55(57.89)	18.7(<0.001)	1	1
Complicated	77(20.59)	40(42.11)		2.81(1.74,4.53)*	**2.14(1.23,3.74)***
Mode of delivery					
SVD	293(78.34)	78(82.11)		1	1
Instrumental	10(2.67)	5(5.26)	3.45(0.18)	1.88(0.62,5.65)	0.67(0.16,2.74)
C/S	71(18.98)	12(12.63)		0.63(0.33,1.23)*	0.61(0.35,1.49)
Plan for pregnancy					
Planned	345(92.25)	84(88.42)	1.42(0.23)	1	1
Unplanned	29(7.75)	11(11.58)		1.56(0.75, 3.25)*	0.71(0.29,1.65)
Monthly income					
≤4000	221(59.09)	74(77.89)	11.48(0.001)	2.44(1.44, 4.13)*	1.61(0.88,2.96)
>4000	153(40.91)	21(22.11)		1	1

Factor associated with adverse maternal outcome (AMO)

Compared to well-nourished mothers the odds of AMO were 2.4 times higher among under nutrition mothers than their counterparts [AOR=2.38, 95%CI (1.44, 3.94)]. Mothers who were induced were 3.37 times more likely to develop AMO [AOR=3.37, 95%CI (1.94, 5.85)]. Mothers who gave birth through C/S were 2.8 times more likely to develop AMO as compared to mothers who deliver by SVD [AOR=2.86, 95%CI (1.58, 5.17)]. Those mothers who had history of illness three month prior to data collection period were 2.5 times more likely to develop AMO [AOR=2.49, 95%CI (1.24, 5.00)].

Table 41: comparison of adverse maternal outcome and maternal nutrition and other factors associated with adverse maternal outcome in Sidama region, Southern Ethiopia, 2020.

Variable	Adverse maternal outcome		X^2 (p-value)	COR95%CI	AOR95%CI
	Normal	Complicated			
Maternal nutrition					
Normal	251(71.31)	61(52.14)	14.5(<0.001)	1	1
Under-nutrition	101(28.69)	56(47.86)		2.28(1.48, 3.51)*	**2.38(1.44,3.94)***
Maternal education					
No formal education	8(2.27)	6(5.13)	2.47(0.12)	1	1
Formal education	344(97.73)	11(94.87)		0.43(0.15, 1.27)*	1.21(0.34,4.33)
Husband support					
Good	196(55.68)	56(47.86)	2.16(0.14)	1	1
Poor	156(44.32)	61(52.14)		1.37(0.89, 2.08)*	1.41(0.34,2.35)
Onset of labor					
Spontaneous	301(85.51)	72(61.54)	31.0(<0.001)	1	**1**
Induced	51(14.49)	45(38.46)		3.69(2.29,5.94)*	**3.37(1.94, 5.85)***
GA of current pregnancy					
Preterm	24(6.82)	22(18.80)		3.19(1.71,5.96)*	1.78(0.83, 3.87)
Post term	18(5.11)	6(5.13)	14.35(0.001)	1.16(0.45,3.01)	0.97(0.34, 2.81)
Term	310(88.07)	89(76.07)		1	1
Mode of delivery					
SVD	298(84.66)	73(62.39)		1	1
Instrumental	8(2.27)	7(5.98)	26.4(<0.001)	3.57(1.25, 10.17)*	1.61(0.46,5.59)
C/S	46(13.07)	37(31.62)		3.28(1.98, 5.43)*	**2.86(1.58,5.17)***
Residence					
Urban	314(89.2)	83(70.94)	22.5(<0.001)	1	1
Rural	38(10.80)	34(29.06)		3.38(2.01, 5.71)*	1.76(0.89, 3.45)
History of illness					
Yes	39(11.08)	22(18.80)	4.63(0.03)	1.86(1.05,3.29)*	**2.49(1.24, 5.00)***
No	313(88.92)	95(81.20)		1	**1**
Monthly income					
≤4000	212(60.23)	83(70.94)	4.32(0.04)	1.61(1.02,2.53)*	1.49(0.88,2.52)
>4000	140(39.77)	34(29.06)		1	1

DISCUSSION

Maternal under-nutrition

Bing at adolescent age (15-19), formal educational status, greater than four family size, poor husband support, unplanned pregnancy was found to be predictors of young pregnant women under nutrition. Young pregnant mothers age 15-19 were more likely to be undernourished. This finding is in line with study done other place in Ethiopia (Dadi and Desyibelew, 2019). This might be due to in addition to their growth need; pregnancy by itself may place an additional metabolic burden on adolescents which in general cause high rate of maternal under-nutrition(WHO, 2011).

Formal educational status of the mother was negatively associated with young pregnant mother under nutrition. This was consistent with study done in Shashemene Ethiopia that identified literate women were protected from under nutrition(Y, 2016). This may be due to educated young pregnant women may have adequate knowledge about their health, nutritional requirements and development.

Young pregnant women who have no good husband support during their pregnancy were more likely to be undernourished. This finding is also in line with study done in other place of Ethiopia(Y, 2016). This might be due to the fact pregnancy by itself create stress especially among young age pregnant women. Which can be improve adolescent pregnancy nutritional status(Hobel and Culhane, 2003).

This study also demonstrated that unplanned pregnancy was a great potential predictor of young pregnant mother under nutrition. This may be due to adolescents who do not need the pregnancy were decreased health service utilization. This finding is in line with the study done in other places(Ayele *et al.*, 2020).

Adverse perinatal outcome

In multivariable analysis maternal nutrition, ANC visit, maternal HTN status and maternal pregnancy outcome were significantly associated with adverse perinatal outcome while maternal decision-making autonomy, mode of delivery and monthly income were not.

Improved maternal nutrition is very crucial for fetal growth, birth weight and infant morbidity; poor nutrition often leads to long-term, irreversible and detrimental consequences to the fetus(WHO, 2011). In agreement with this fact this study also showed that undernourished mothers were higher odds of having birth with APO.

In the present study mothers who had greater than and equal to four visits had less risk of having APO than those mothers have no ANC visit. This finding is parallel with study done in Tigray(Ayele *et al.*, 2020). This can be explained that during ANC visit mothers took continuous health education about feeding, hygiene, birth preparedness and they also provided by supplementary tablets like iron and folic acid, which has a great impact of their birth outcome.

Increases adverse perinatal outcome such as intra uterine growth retardation, low birth weight, or premature birth(NICE, 2019). Concomitant to this fact our study also

demonstrated that the odds of APO were higher among mothers with hypertension. This finding is in line with study done in northern Tanzania(Mitao *et al.*, 2016).

Mothers who experienced pregnancy complication during birth were more likely to have APO. This is consistent with the study done in Debretabore which states that mothers with PROM, APH and PIH were risk factors for poor neonatal health outcome(Tassew, Kassie and Mihret, 2020). This can be explained the fact that maternal pregnancy complication has a great effect on fetal blood perfusion, utero-placental insufficiency, and vital organ damage.

Adverse Maternal outcome

During pregnancy a woman needs good nutritional status for a healthy outcome but poor nutritional status at conception are at higher risk of morbidity and mortality in general. Maternal health depends greatly on the availability of food, and they are therefore unlikely to be able to cope with their increased nutrient needs during pregnancy(WHO, 2011).

Mothers who deliver their baby by induction were more likely to develop AMO as compared to SVD delivery. Other studies which was done in different places also revealed that induction of labor increases maternal and fetal complication (Grivell *et al.*, 2012; Lemi *et al.*, 2020). This is because this procedure needs strict follow up and must be provided based on the indication, which are expected from the health professionals.

Caesarian session (C/S) increases the odds of maternal complication almost by three-fold. This finding is in line with studies done in different parts of the world(Litorp *et al.*, 2014; Maria *et al.*, 2016). This is because C/S delivery is the cause for increased risk of hemorrhage, maternal death and infection(Maria *et al.*, 2016).

Young mothers who were sick three months prior to the data collection were 2.5 times more likely to develop maternal complication. Infections such as malaria and HIV and infestation with gastrointestinal parasites can exacerbate such women's micro or macro under nutrition which is an underling factor for adverse maternal complication. Consistent with this finding study done in Ethiopia (Dessalegn et al, 2020).

CONCLUSIONS AND RECOMMENDATIONS

Socio demographic and health service utilization factors were founded to be risk factors for maternal under nutrition, adverse maternal and perinatal outcome. Therefore, Multi-sectorial collaboration is very important to increase educational status of young women. Consequently, the concerned governmental and the existing non-governmental bodies shall strengthen their coordinated effort towards improving maternal nutrition by giving due consideration to pregnant mothers in younger age and those having a problem with their partner through increasing FP utilization, in order to plan their future pregnancy, encouraging husband's involvement in health services.

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Criteria-based clinical audit of diagnosis and management for the five leading maternal obstetric complications at Hawassa referral and Adare general hospital, 2020: a prospective observational study

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ABSTRACT

The prevalence of avertible maternal death can be reduced by quality care. Despite important progress that has been made in the last few years, the performance of quality care in reducing avoidable maternal death is yet substandard, especially in underdeveloped countries. The study was aimed at prospectively assessing the diagnosis and management of life-threatening Obstetric conditions at Hawassa Referral and Adare General Hospitals using Criteria-Based Clinical Audit. Institutional based prospective operational study was done to evaluate the actual practices of diagnosis and management of the five leading causes of maternal obstetric conditions at Hawassa Referral and Adare general Hospital using a standardized Criteria-Based Clinical Audit checklist. Out of 367 mothers, 73.3% (280) were in the age group of 28-37 years. The gestational age of most of the participants was between 28 – 37 weeks, which accounts for 76.3 % (280). In our study obstetric hemorrhage 186(49.6%), eclampsia 112(30.5%), obstructed labour 35(9.5%), Uterine rupture 15(4.1%), and septic abortion 23(6.3%) were admitted during the study period. The standard care that the women received were, 100 % in genital tract sepsis, 69.8 % in eclampsia, 46.8 % in hemorrhage, and 38.2 % in obstructed labour in decreasing order. The top causes of maternal morbidity are invariably preventable when standard procedures are applied. Of concern is the majority of care are substandard. Clinical audit has a paramount role in minimizing the avertible causes of maternal death. We, therefore, would kindly recommend the health facilities to have a functional clinical audit system, and necessary correction to be taken as deemed important.

Keywords: *Criteria based, Clinical Audit, obstetric complications*

INTRODUCTION

Maternal death is a death of a mother while pregnant or within 42 days of post-pregnancy , nevertheless of the duration and the site of the pregnancy, from any reason associated to or intensified by the pregnancy or its management, but not from inadvertent or incidental reasons(Assefa, 2017; Carine , 2006; Leontine , 2015; Organization, 2011, 2014). The etiologies of maternal death could either resulted directly from direct causes where complications are directly linked to the pregnancy it selves like during childbirth or could also be from indirect causes that basically resulted from a preexisting illness which may be pronounced by pregnancy(Assefa , 2017; Organization, 2014). Findings showed that the majority of maternal death are from preventable causes, if diagnosed and intervened early (Hurt, 2002; Stacie, 2018).

Despite considerable declines in maternal mortalities from 1990 to 2015, maternal death nonetheless is continued to be a major apprehension globally, and in Sub-Saharan Africa, particularly. By 2015, 303 000 maternal deaths were ensued universally, where 99% of the deaths being from sub- Saharan Africa and South East Asia, with a further 66% of the global maternal

death took place in sub- Saharan Africa. At that time, the highest average (546 per 100 000 live births/LB) Maternal Mortality ratio **(**MMR**)** occurred in sub-Saharan Africa and the lowest average (12 deaths per 100 000 LB) in developed regions of the world**.** Due to pregnancy-related issues**,** South Africa, for instances, is losing about 1600 mother annually (Leontine, 2015; Organization, 2015; Stacie, 2018).

According to the 2016 Ethiopian Demographic Health Survey (EDHS) report, there were 412 maternal deaths per 100000 live births in Ethiopia, and findings of a locally made Maternal Death Surveillance and Response (MDSR) carried out by 2013 year, indicated the presence of 430 maternal deaths across the entire nation in 2013 with the majority being from Tigray region**.** Late in 1990s, Ethiopia was one of the countries of the world worth of extremely high MMR, but over the last two decades noteworthy attainments have been made in the country with a success rate of 69% maternal mortality reduction from1990 the baseline and there has been an estimation of continues annual reduction rate of 5% or more in the country as well (Health., 2015; Leontine A, 2015)**.**

Even though the jobs that have been done by federal ministry of health of Ethiopia is appreciable in reducing Obstetric complications related to maternal death (from 871 in 2000 G.C. to 412 per 100,000 live births in 2016 G.C.), still the country has one of the horrible preventable maternal deaths. Studies showed countries with 300-499 MMR are categorized as having high MMR (Assefa, 2017; Health., 2015; Reichenheim, 2009).

A high maternal death in a certain country could be regarded as the indicator of poor health care services. Global data showed maternal death audit and intervention are important tools to narrow the gaps related to maternal death and health care services**.** The proportion of maternal death due to Obstetric complications has been a top priority for the evaluation of the qualities of Obstetric care services (Bailey, 2002; WJ., 2009)**.**

Auditing of the health care services helps us to detect disparity between what is being done, and what standard services should have been practiced as per the criteria with the final goal of maximizing health care services. Institutional quality health care services can be measured by several tools, of which clinical auditing is the one (Catherine , 2011)**.**

To our knowledge, there is the inadequacy of data regarding the Diagnosis and Management of Life-Threatening Obstetric Conditions in the study area, and the study was aimed at assessing the Diagnosis and Management of Life-Threatening Obstetric Conditions at Hawassa Referral and Adare General Hospitals using Criteria-Based Clinical Audit with subsequent interventions on identified problems.

METHODS AND MATERIALS

Study Design and Period

The study was an institution based observational prospective study which was carried out among admitted obstetric patients in two hospitals: Hawassa referral hospital and Adare General Hospital. The study was conducted for consecutive of a period of 2 (two) months**.** All patients with specific obstetric complications within the study period, who satisfy the working definition of obstetric complications were included. The selected major obstetric complications were hemorrhage, eclampsia, obstructed labour, uterine rupture and genital tract sepsis.

The assessment was to evaluate the data level of obstetric care at both specified Hospitals throughout the study period. In the meantime, level of obstetric care would be compared with a sets of best practices (criteria) adopted from different literatures being localized by senior experts in the field. The criteria for each of these obstetric complications would be supposed to identify poor quality management to one or all of the five leading obstetric complications, and identify ways to change gaps as well as maximize quality of obstetric care in the specified hospitals. The set criteria was commented by three senior obstetricians before being applied to evaluate the clinical practice. This study was conducted from January 2020 to March 2020 G.C.

Study area

The study area was Hawassa City, which was located in Sidama region on the Shore of Lake Hawassa in Great Rift Valle 273 km South of Addis Ababa. The City lays on the Trans-Africa High way, between 703 Latitude North. Hawassa city was bounded by Lake Hawassa in East, Oromia in West, Wondogenet woreda in North, East, and Shebadeno in South. The city administration has157.2sq km this is divided in to 8 sub cities and 32 Kebeles. The city administration also has 2 Public Hospitals and 9 public health centers.

Our research was conducted at Hawassa city Healthy facilities, Hawassa university comprehensive specialized hospital was established before 20 years back by the Regional Health Bureau. The hospital was intended to serve 3.5-5 million total population at the beginning and now serving the whole Sidama region, SNNPR and part of Oromia region. (HUSCH human recourse office)

Adare General Hospital is one of the youngest government hospitals found in Hawassa providing both preventive and curative services since February 2011.The hospital provides health care service to the self-referred patients, referred from other health centers, hospitals and clinics in the region. In the year 2017/18 the hospital provided for 106,168 and 5103 clients in outpatients and inpatients health care services, respectively. (AGH human resource office)

Source Population

All women who admitted both at Hawassa referral Hospital and Adare general hospital for ANC, labour and delivery purpose.

Study Population

All labouring women with life threatening obstetric conditions during pregnancy, labour and post-partum period

Study unit

All labouring women with life threatening obstetric conditions during pregnancy, labour and post-partum period and who was participated during study period.

Inclusion and Exclusion Criteria

Inclusion Criteria

All women in delivery, postnatal room and gynecologic ward who would be eligible for specific obstetric complications and met the working definitions assigned for each obstetric complication within the study periods were included. Additionally, after case reviewing of all files, case notes and registers were being made, all cards having the diagnosis and management of the five leading causes of maternal obstetric conditions were included.

Exclusion Criteria

All women in delivery, postnatal room and gynecologic room which doesn't have life threatening obstetric and gynecological conditions associated with pregnancy were excluded. And in case of review of files, case notes and registers all cards with normal diagnosis or diagnosed and managed for obstetric and gynecologic conditions other than the mentioned (life threatening conditions) were excluded.

Sample Size Determination

To meet the first objective of this study, single proportion population formula was used and sample size was calculated using the following assumption**:** 95% confidence level, 5% margin of error, and since the proportion of clinical audit for the leading five maternal obstetric complications is not yet known nationally, both p and q (1-P) was taken as 50% and taking in to account a 10% non-response rate was added to the final sample size.

$$(Z\_/2)^2 \; P \; (1- P) / D^2$$

Where

p = Expected proportion of practices which may be done up to the standardized

q= Expected proportion of substandard practices which may not be carried at all or done sub-optimally

Z= the standard normal value of confidence desired which in this study was (95% confidence level) which in turn corresponds to the value 1.96 at z table

w = proportion of sampling error tolerated at 5% or desired degree of precision.

Hence, the sample calculation result will be as follows

$$n = (Z\alpha/2)^2 p\,(1-p)/\,d^2$$

$$= (1.96)^2(0.5 * 0.5)/\,(0.05)^2$$

$$= 384$$

Since the study population (labouring women with life threatening obstetric conditions) is less than 10,000, it has to calculated and rearranged using correction formula, which is**:**

$$nf = n*N/\,(N+n-1)$$

Where, **nf**= the final sample size calculated and N (annual delivery rat at Adare general hospital =4,526 and at HURH= 5,263 where a total of 9,789 deliveries annually) 2386 per 2 months totally is total source population and by taking in to account a 10% for non-response rate= 31 cards were added to the final samples and finally= 367 cases were observed using the agreed set criteria during the study period.

Study Variables

Dependent Variables

Diagnosis and Management of the leading cause of maternal morbidity and mortality:

- Obstetric Hemorrhage
- Severe preeclampsia or Eclampsia
- Obstructed Labour
- Abortion
- Genital tract Sepsis

Independent Variables

- Availability of necessary resources such as drug, imaging scans, and monitoring charts
- Maternal parity,
- time of pregnancy during the complication
- time and condition (vital sign) of the mother at arrival at the hospital
- experience and qualification of the provider
- source of referral
- type of obstetric complication

Sampling procedure

The research was institution-based research which focused on quality of Care service, and hence, at least two health institutions were included from which high burden of deliveries were occurring. Thus, the number of women who receive obstetric care service included between these hospitals was proportionally allocated. Using the formula**:**

PSS, n'= N' x n/N

where n'= sample size of certain health institution, N' = population size of certain institution, n = total sample size and N = total population size. Eventually, samples was selected purposively as they satisfy the definitions and was evaluated for quality of care of diagnosis and management of

the five leading causes of maternal mortality and morbidity at Hawassa referral = 199 and Adare general Hospital =168

Operational Definition

A maximum score of two 2 and a minimum of zero would be assigned for answers of each questions. The scoring system was as follows:

- **A score of two:** was awarded if everything is done according to the standard and so that **optimal care** is deemed to be provided
- **A score of zero:** was assigned when only some set criteria were fulfilled and the quality care was meant to be **sub-standardized care** and when none of the criteria was carried out and would be deemed to be **poor quality of care,** & also regarded as if it may have a high likely hood of erroneous maternal health outcome.

Data Quality Assurance

To assure the validity of the checklist, after it was reviewed by three senior obstetrician/ gynecologists who have been actively working in the field it was pre-tested in 19 cards at Tula hospital. In addition to this, data collectors were trained on how to properly fill the checklist before the actual training was commenced and would also be closely supervised in the meantime, they collect actual data. The daily activity was being supervised by the principal investigator, and necessary amendments were being made as deemed important.

Data processing analysis

Data would be carefully entered into the computer and then cleaned by software (EPI-INFO 6.04) and analyzed using SPSS version 23.0. Any logical and consistency error identified during data entry was corrected after revising the original completed checklist. The cleaned and edited data was made ready for appropriate statistical analysis.

Frequency, percentage and summery figures were used to describe both categorical & continuous variables.

Ethical Clearance

The approval to undertake this research proposal was granted by Hawassa University College of medicine and health science institutional review committee. After purpose and importance of the study was explained to the authorized bodies at both hospitals, Hawassa Referral and Adare General Hospital, written consent was obtained from either medical director of both Hospitals. To ensure confidentiality of participants, information, anonymous typing or identifier was not used whereby the name of either health care providers who involved in the care provision or the study subjects won't be written on the checklist at any phase of the investigation.

Dissemination of results

The final research report was submitted to Hawassa University, College of Health Sciences and Research Committees. A copy of it was offered to both Hospitals.

Data Collection Instrument

Standardized checklist was utilized to evaluate Clinical practice of the specified hospitals. This standardized checklist was of entirely of quantitative type to be applied similarly at both Hospitals. Furthermore, different data collectors were considered to enhance the quality and credibility of the collected data.

RESULTS

Out of 367 mothers, 73.3% (280) were in the age group of 28-37 years. 41.7% (153) and 35.1% (129) of participants were housewife and run their own businesses respectively. Sidama ethnicity accounts for more than sixty percent of the study participants, 64.6% (237). The gestational age of most of the participants, 76.3% (280), was between 28 – 37 weeks, and their pregnancy stages were in antepartum 54.8% (201) and in intrapartum 27.5% (101) respectively. Most of the mothers have a 1- 4 pregnancy history, which accounts for 88.6 % (325). Table1

Table 1: General information on maternal characteristics and outcomes at Hawassa and Adare Hospitals January 2020

	Variable	Options	Frequency	Percent
Detail history	Age(yr.)			
		28-37	280	76.3
		38-42	87	23.7
		Total	367	100.0
	Occupation			
		House wife	153	41.7
		Governmental employee	85	23.2
		Own business	129	35.1
		Total	367	100.0
	Ethnicity			
		Sidama	237	64.6
		Amhara	14	3.8
		Oromo	61	16.6
		Wolyita	41	11.2
		Others	14	3.8
		Total	367	100.0
	Gestational stage			
		28-37	280	76.3
		38-42	87	23.7
		Total	367	100.0
	Pregnancy stage			
		antepartum	201	54.8
		intra-partum	101	27.5
		post-partum	65	17.7
		Total	367	100.0

Source of referral of the mother			
	self	214	58.3
	private health institution	26	7.1
	health center	127	34.6
	Total	367	100.0
number of live births			
	no child	143	39.0
	1-6	224	61.0
	Total	367	100.0
number of pregnancies			
	1-4	325	88.6
	>=5	42	11.4
	Total	367	100.0

The Vital sign for the mothers was recorded more than 80%, but the Rh factors recorded only for 61% (224). Other routine laboratory investigations which were performed for the patients were Hepatitis B antigen test, HIV test, and syphilis test accounts for 61.3%, 74.7%, and 52.3% respectively. Physical examination during monitoring of childbirth that documented were membrane status of the mother, fetal heartbeat and cervical dilatation with 69.2 %, 71.1% and 78.2% respectively. Table 2

Table 2: Documentation of standard criteria for management of obstetric complication at Hawassa and Adare Hospitals January 2020 G.C.

	Variables	options	Frequency	Percent
General condition and clinical examination on admission should be recorded:	blood pressure recorded	Not documented	4	1.1
		documented	363	98.9
		Total	367	100.0
	pulse of the mother	Not documented	19	5.2
		documented	348	94.8
		Total	367	100.0
	respirator rate	not documented	21	5.7
		documented	346	94.3
		Total	367	100.0
	Temperature of the mother	Not documented	73	19.9
		documented	294	80.1
		Total	367	100.0
	Number of ANC visit included in history	Not completed	29	7.9
		completed	338	92.1
		Total	367	100.0
	Condition of the mother at arrival	Not completed	9	2.5
		completed	358	97.5

		Total	367	100.0
	Time the mother arrived	Not completed	6	1.6
		completed	361	98.4
		Total	367	100.0
	uterine size of the mother	Not documented	76	20.7
		documented	291	79.3
		Total	367	100.0
	Fetal presentation	Not documented	71	19.3
		documented	296	80.7
		Total	367	100.0
	Membrane status of the mother	Not documented	113	30.8
		documented	254	69.2
		Total	367	100.0
	fetal heart beat	Not documented	80	21.8
		documented	287	78.2
		Total	367	100.0
	cervical dilation	Not documented	106	28.9
		documented	261	71.1
		Total	367	100.0
Drug administration	drug chart available	Not documented	100	27.2
		documented	267	72.8
		Total	367	100.0
	Completeness of the chart	Not documented	159	43.3
		documented	208	56.7
		Total	367	100.0
	signature of health care providers	Not documented	173	47.1
		documented	194	52.9
		Total	367	100.0
Laboratory analysis	blood type	Not documented	38	10.4
		documented	329	89.6
		Total	367	100.0
	Hepatitis B antigen test done	Not documented	131	35.7
		documented	236	64.3
		Total	367	100.0
	RH factors	Not documented	143	39.0
		documented	224	61.0
		Total	367	100.0
	HIV test	Not documented	93	25.3
		documented	274	74.7
		Total	367	100.0
	syphilis test	Not documented	175	47.7
		documented	192	52.3
		Total	367	100.0
Monitoring during child birth	time of placenta expulsion	Not documented	73	19.9
		documented	294	80.1
		Total	367	100.0

	Time of oxytocin given	Not documented	129	35.1
		documented	238	64.9
		Total	367	100.0

When we look specifically at PPH, the performances of services being given to the women were above 90% except for two variables. These were Genital tract exploration to alleviate PPH, and bimanual uterus compression for bleeding that persisted after the expulsion of the placenta with the performance rate of 85.5 % and 68.3 % respectively (Table 3).

Table 3: Shows Criteria of PPH management that were being performed at Hawassa and Adare Hospitals January 2020 G.C.

PPH			
Variable	Option	Frequency	Percent
Iv line	documented	186	100.0
	Not documented	0	0
	Total	367	100.0
Patient hemoglobin/hematocrit established	documented	186	100.0
	Not documented	0	0
	Total	367	100.0
Cross matching and typing should be performed	Not documented	4	2.2
	documented	182	97.8
	Total	186	100.0
Coagulation time documented	Not document	10	5.4
	documented	176	94.6
	Total	186	100.0
Crystalloid infused untill cross matched blood available	Not documented	1	.5
	documented	185	99.5
	Total	186	100.0
Vital sign monitoring every 15 minute for 2 hours	Not documented	1	.5
	documented	185	99.5
	Total	186	100.0
Urinary out put measured hourly	Not documented	3	1.6
	documented	183	98.4
	Total	186	100.0
20 IU oxytocin should run at 60 drops in minute to treat PPH	Not documented	4	2.2
	documented	182	97.8
	Total	186	100.0
Genital tract exploration should be monitored to cease PPH	Not documented	27	14.5
	documented	159	85.5
	Total	186	100.0
	Not documented	2	1.1

Pv should not be done unless placenta praevia has been excluded	documented	184	98.9
	Total	186	100.0
If ectpicpregenacy emergency surgery should be performed	Not documented	13	7.0
	documented	173	93.0
	Total	186	100.0
Women with APH decision on time and type of delivery depends on diagnosis	No documented	14	7.5
	documented	172	92.5
	Total	186	100.0
Type of APH , severity and period of gestation	Not documented	7	3.8
	documented	179	96.2
	Total	186	100.0
Women utreus should be massaged	Not documented	4	2.2
	documented	182	97.8
	Total	186	100.0
Bladder should be emptied	Not documented	3	1.6
	documented	183	98.4
	Total	186	100.0
Bladder should be emptied	Not documented	3	1.6
	documented	183	98.4
	Total	186	100.0
Placenta not delivered try to deliver by CCT	Not documented	12	6.5
	documented	174	93.5
	Total	186	100.0
bleeding is not stop despite placenta expelled out bimanuall compression of the uterus should be done	Not documented	59	31.7
	documented	127	68.3
	Total	186	100.0

Almost all components were fully recorded for Preeclampsia/Eclampsia and Uterine rupture, but on laboratory investigation blood taken for culture accounts for 55.9 % (19) out of 34 cases. This is probably related to the availability of culture as a means of diagnostic evaluation. It could also be related to the rampant use of broad-spectrum antibiotics empirically, which will affect the trends of culture use. So, the low performance probably is not merely due to poor documentation, rather due to limited utilization of culture because of either cause. Putting it in another word, there is limited need of doing culture if you haphazardly use broad-spectrum antibiotics for the treatments of like genital tract infections. Table 4 and 5 respectively below.

Table .4; Shows criteria for the management of Preeclampsia/Eclampsia that were being done at Hawassa and Adare Hospitals, January 2020 G.C.

HTN			
Variable	Option	Frequency	Percent
anti-hypertensive treatment should be given to patient with severe hypertension	documented	106	100.0
	Not documented	0	0
	Total	106	100.0
Treatment with magnesium sulphate	Not documented	4	3.8
	documented	102	96.2
	Total	106	100.0
Respiratory , urine output, tendon reflex is monitored when magnesium sulphate given	Not documented	10	9.4
	documented	96	90.6
	Total	106	100.0
Antepartum/intrapartum fluid balance checked	Not documented	2	1.9
	completed	104	98.1
	Total	106	100.0
Hemoglobin and renal investigation should be done at least one....	Not documented	9	8.5
	documented	97	91.5
	Total	106	100.0
Delivery achieved within 12 hours of first convulsion	Not documented	7	6.6
	documented	99	93.4
	Total	106	100.0
BP and urine output should continue for at least 48 hrs	Not documented	3	2.8
	documented	103	97.2
	Total	106	100.0
rate fetal heart and vital sign taken and recorded at least hourly	documented	106	100.0
	Not documented	0	0
	Total	106	100.0

Table 5; Shows criteria for the management of Uterine rupture that were being done at Hawassa and Adare Hospitals, January 2020 G.C.

UTERINE RUPTURE			
suspected or diagnosis uterine rupture surgery performed	completed	12	100.0
	Not documented	0	0
	Total	12	100.0
bladder drained	completed	12	100.0
	Not documented	0	*0*
	Total		**100.0**
observation chart shown	completed	12	100.0
	Not documented	0	0
	Total	12	100.0
Obstructed labour			
prompt delivery within 2 hour of diagnosis	completed	34	100.0
	Not documented	0	0
	Total	34	100.0
bladder drained	Not documented	4	11.8
	completed	30	88.2
	Total	34	100.0
observational chart filled every 15-30 minute	No documented	1	2.9
	completed	33	97.1
	Total	34	100.0
IV and hydration should be achieved	no	1	2.9
	completed	33	97.1
	Total	34	100.0
broad spectrum antibiotics given	completed	34	100.0
	not documented	0	100.0
	Total	34	100.0
Cross-maching and typing done	no	1	2.9
	completed	33	97.1
	Total	34	100.0
reason for route of delivery recorded to fetus and patient condition	completed	34	100.0

	Not documented	0	0
	Total	34	100.0
Choriaminoties	completed	34	100.0
	Not completed	0	0
	Total	34	100.0
blood taken for culture	No completed	19	55.9
	completed	15	44.1
	Total	34	100.0
treatmet with broad spectrum for gential sepsis	completed	34	100.0
	Not documenmted	0	0
	Total	34	100.0
metrodazole included in antibiotics regimen	completed	34	100.0
	Not documented	0	0
	Total	34	100.0
observation chart	completed	34	100.0
	Not documented	0	0
	Total	34	100.0
exploration and evacuation	completed	34	100.0
	Not documented	0	0
	Total	34	100.0

Out of 12 criteria of abortion cases, 10 criteria were recorded 100 %. But the rest two which were women's TT status and the indication for abortion were recorded only in about 53.6% and 35.7% respectively. This is a huge gap, especially not recording the indication for abortion, as the indications for doing abortion are yet largely a great controversy. The TT status of women should also be recorded meticulously to either offer her the vaccination or to know the coverage, at least. Table 6

Table 6; Shows criteria for the management of Abortion that were being done at Hawassa and Adare Hospitals, January 2020 G.C.

ABORTION			
Variable	**Option**	**Frequency**	**Percent**
Treated with septic abortion	completed	28	100.0
	Not documented	0	0
	Total	28	100.0
Woman with TT	completed	15	53.6
	Not documented	13	46.4
	Total	28	100.0
MVA	completed	28	100.0
	No documented	0	0
	Total	28	100.0
HCT level and blood transfusion	completed	28	100.0
	No documented	0	0
	Total	28	100.0
Indication recorded	completed	10	35.7.3
	Not documented	18	64
	Total	28	100.0

Regarding the proportions of complications of mothers at admission, PPH constitutes the largest percentage followed by Eclampsia, whereas the uterine rupture and septic abortion constitute the smallest percentage, with absolute numbers of 15 and 23 respectively.

SVD is the largest proportion of the mode of delivery of the mothers at health facilities (57.7 %), followed by Cesarean Section (35.69 %).

As far as the care that the women's received at the health institutions, obstructed labour was the least in meeting the standard (38.2 %) followed by PPH (46.8%) whereas care for Uterine rupture and Septic abortions have met 100 % (Table 7)

Table 7; Shows the care that the women's received as per the standard at Hawassa and Adare Hospitals, January 2020 G.C.

Obstetric cases	Standardized	frequency	percent
PPH	Standard	87	46.8
	Not standard	99	53.2
	total	186	100
Eclampsia	Standard	74	69.8
	Not standard	32	30.2
	Total	106	100
Obstructed	Standard	13	38.2
	Not standard	21	61.8
	Total	34	100
Septic abortion	Standard	12	100
	Not standard	0	0
	Total	12	100
Uterine rupture	Standard	6	100
	Not standard	0	0
	Total	6	100

DISCUSSION

This study was based on internationally developed criteria of best practice to assess the quality of emergency obstetric care through regular clinical death audit (Catherine, 2011). The study showed shortages in the management of obstetric hemorrhage, eclampsia, and obstructed labour as per the standards. Regardless of the availability of guidelines and protocols, gaps between recommended care and clinical practice often exist.

When we look at the major obstetric causes of admission, PPH constitutes the largest percentage followed by Eclampsia, whereas uterine rupture and septic abortion constitute the smallest percentage, with absolute numbers of 15 and 23 respectively. This contradicts the earlier study that had been done in Ghana, Malawi, and Ethiopia (Danel , 2011; Hasan, 2014; Hunyinbo , 2008; Van den, 2011), in all cases, where complications arising from obstructed labour and abortion respectively were the major causes. This might be due to the advances in prompt diagnosis of obstructed labour and early intervention on the route of delivery, and wide availability of broad-spectrum antibiotics that could have prevented abortion-related sepsis, in the latter case. In fact, the finding in this study has been backed by the study that has been done in Nigeria and Thailand, in which cases, complications from obstetric hemorrhage were the leading cause of admission (Catherine, 2011; Pattarawalai, 2012). This finding needs to be interpreted cautiously as most of the studies done so far are focusing on both maternal morbidity and mortality, unlike ours, which primarily focused on maternal morbidity.

The low prevalence of sepsis as top maternal morbidity in this study can partly tell us the undue use of antibiotics, because, in most similar studies, sepsis is the leading cause of maternal morbidity and mortality (Bauer, 2019; Gaieski, 2010).

In the study that has been conducted in Nigeria, the standard care that the women received in baseline assessment were; obstructed labour (81.7%), genital tract sepsis (66%), hemorrhage (61%), and eclampsia (54.3%). In our study, the standard care that the women were given was obstructed labour (38.2%), genital tract sepsis (100%), hemorrhage (46.8%), and eclampsia (69.8%). In this study, there was dissimilarity in the care that was given for the women which might be due to the health care provider's responsiveness, considering some standards as simple and giving less attention to those which have would have a significant effect on care. The encouraging aspect of clinical audit is that the substandard care has been improved universally after the first feedback on the finding, with full staff commitments as justified by the study that has been done in the UK, Netherlands, and other countries (Catherine, 2011;Hasan SM, 2014; Knight M, 2018; Organization, 2011; Schutte JM, 2010).

We, therefore, are optimistic, despite the low performances of some variables like care for obstructed labour which we will do the follow-up study to look at the impacts of post-intervention.

Among the good aspect of our study is that it has done in two different health facilities. It is also the first of its kind in the region and pave a way for future studies, especially on post-intervention. Of concern is that it didn't include maternal mortality. Basically, there was no recorded maternal death at the time of this study.

CONCLUSIONS

The provision of clinical care in the study areas are far below the standard, and needs to be improved. Majority of maternal morbidity are still avertible at early stages, if noticed and intervened. Regular clinical audit, proper documentation, staff commitments and timely interventions are demanding in deterring obstetric related maternal morbidities.

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Carbapenem Resistance of Gram-Negative Bacteria from Clinical Specimens at Hawassa University Comprehensive Specialized Hospital, Southern Ethiopia

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ABSTRACT

Carbapenem's-resistant gram-negative bacteria are an emerging cause of both community-acquired and healthcare-associated infection that poses a significant threat to public health. This study aimed to determine the magnitude of carbapenem's resistance gram-negative bacteria from a clinical specimen at Hawassa University Comprehensive Specialized Hospital. A hospital-based cross-sectional study design was conducted from February 13- June 7, 2020, in which consecutive gram-negative bacteria were included until the sample size was achieved. A semi-structured questionnaire was used to collect both clinical and laboratory data for patients who accepted the consent. The standard microbiology technique was used for the identification of bacteria and antibiotics susceptibility testing. Besides this, a modified carbapenem inactivation method was used to determine carbapenem resistance. Statistical package for social science software version 21 was used for data entry and analysis. A total of 111-gram negative bacteria were identified from 103 patients. Of 111 isolates, thirteen isolates, nine resistance, and four intermediates identified in disk diffusion testing for meropenem. Of this, 10 isolates were carbapenemases producer with an overall rate of 9 % in the Modified carbapenem inactivation method. Pseudomonas spp 3(30.0%), E. coli, K. pneumonia, Acinetobacter spp each two (20.0%), and K. oxytoca 1(10.0%) were identified as carbapenemases positive. The rates of the multidrug, extensive, pan drug were 86.5, 43.3, and 1.8, respectively. Ampicillin 94(97.9 %), followed by cefuroxime 52(91.2 %), cefotaxime 94(88.7 %), cotrimoxazole 58(88.1 %), ceftazidime 40(83.3%), ciprofloxacin 47 (77.1%), nitrofurantoin 35 (70.0 %), gentamycin 71(65.7%), with high level of resistance. However, piperacillin-tazobactam 41 (48.8%), chloramphenicol 25(47.2 %), meropenem 13(11.7%), and amikacin 9(8.5%) were with low rates of resistance. In this study, there were no variables statically associated with carbapenem resistance. Our study showed that a high carbapenem resistance gram-negative bacilli. It indicates that ampicillin, cefuroxime, cefotaxime, cotrimoxazole, ceftazidime, ciprofloxacin, nitrofurantoin, and gentamycin with a high rate of resistance >50%. However, piperacillin-tazobactam, chloramphenicol, meropenem, and amikacin were at low rates of resistance. Therefore, a measure should be taken to decrease carbapenem resistance. Besides, the clinician should follow strictly the guideline for treating patients as we are running out of effective antibiotics.

***Keywords**: Carbapenem resistance, gram-negative bacilli, clinical specimen, multidrug resistance, Hawassa, Ethiopia*

INTRODUCTION

Background

Carbapenem-resistant gram-negative bacteria are an emerging cause of both community-acquired and healthcare-associated infection (HCAI) that poses a significant threat to public health (WHO, 2017). It is bactericidal β-lactam antimicrobial with a proven efficacy for treating severe infections caused by extended-spectrum β-lactamase (ESBL) producing bacteria (Codjoe and Donkor, 2018). Drugs like meropenem, ertapenem and imipenem used to treat most of the infection caused by multidrug-resistant bacteria and can be used for screening of carbapenem resistance in the bacteriology laboratory (Hu *et al*., 2012).

Carbapenem resistance can be intrinsic or acquired by mutational events or gene acquisition via horizontal gene transfer (Meletis, 2016). Gram-negative bacteria, specifically *Enterobacteriaceae*, are common causes of both community-acquired and hospital-acquired infections, including urinary tract, bloodstream, and lower respiratory tract infections. These bacteria can acquire genes encoding multiple antibiotic resistance mechanisms, including ESBLs, AmpCs, and carbapenemases. B-Lactam drugs are often the primary therapeutic option for serious infections, and carbapenem, in particular, are often considered agents of last resort (Lutgring and Limbago, 2016). However, the emergence of novel b-lactamases with direct carbapenem-hydrolysing activity has contributed to an increased prevalence of carbapenem-resistant *Enterobacteriaceae* (CRE). CRE is particularly problematic given the frequency with which *Enterobacteriaceae* cause infections (Gupta *et al*., 2011).

Klebsiella species and *Escherichia coli* are examples of *Enterobacteriaceae*, a normal part of the human gut bacteria that can become carbapenem-resistant. Patients whose care requires devices like ventilators (breathing machines), urinary (bladder) catheters, or intravenous (vein) catheters, and patients who are taking long courses of certain antibiotics are most at risk for CRE infections (Ling *et al*., 2015, Kalam *et al*., 2014).

The prevalence of CRE varies widely between different species and different geographical regions. In the USA, carbapenem-resistance rates are mentioned as 0.1% and 5.3% for *E. coli* and *K. pneumoniae*, respectively, while in Europe, most countries report resistance rates below 1% for both pathogens (Kruse *et al*. 2014). As far as our knowledge is concerned, there are a few data on carbapenem resistance in Africa (Okoche *et al*., 2015). Ethiopia is among these countries that lack data including the study site Hawassa. Therefore, this study will determine the carbapenem resistance of gram-negative bacteria isolated from clinical samples at Hawassa University Comprehensive Specialized hospital (HUCSH).

Statement of the problem

The prevalence of multidrug-resistant organisms (MDROs), a major public health threat, continues to increase on a global level (Logan and Weinstein, 2017). CRE is responsible for hospital outbreaks worldwide and is associated with significant morbidity and mortality, especially in patients with serious underlying disorders or patients admitted to the intensive care unit (ICU) (van Loon *et al*., 2018). Infections caused by carbapenemases-producing bacteria are associated with mortality rates as high as 67%, depending on the type of enzyme (Manenzhe *et al*., 2014). Carbapenem resistance can be due to several different mechanisms, possession of a β-lactamase, when combined with porin mutations can render an organism's susceptibility to carbapenem. Some possess a carbapenemases that directly breaks down carbapenem that often contained on mobile genetic elements that facilitate the transfer of resistance among *Enterobacteriaceae* and other gram-negative organisms (CDC, 2015).

Epidemics of carbapenem resistance *Klebsiella pneumoniae* were reported from the USA and other parts of the world hospitals at the different period (Gupta *et al*., 2011). The emergence of resistance to carbapenem's in gram-negative bacteria is an important and growing threat to public health in Africa. Gram-negative bacteria cause most of the common clinical infections such as urinary tract infection (UTI), septicaemia, pneumonia, meningitis, and peritonitis. Decades of poor medical antibiotic prescribing and non-implementation of infection, prevention and control (IPC) policies in African hospitals have put patients at risk of acquiring these difficult to treat bacterial infections. The scourge of fake and substandard drug has only made the problem worse (Gupta *et al*., 2011). Previous antibiotic therapy, underlying systemic illness, and prolonged hospital stays have been identified as risk factors for colonization of patients with carbapenem-resistant strains. The use of catheters and mechanical ventilation is also associated with an increased risk of CRE colonization

(Gupta *et al*., 2011). Therefore, our study aims to determine the prevalence of carbapenem resistance among gram-negative isolates at HUCSH.

The significance of the study

Antimicrobial resistance is one of the top priorities that posed a global threat nowadays (Gupta *et al*., 2011). Reliable detection of CP-CRE is important for several reasons. Foremost is to guide infection control resources and interventions. Nearly all CRE are multi-drug resistant. Generally, justify the implementation of infection control measures, as hand hygiene and the use of contact precautions are important. Many facilities and regions will reserve the most aggressive interventions, such as screening contacts, for CP-CRE. CP-CRE possess a more stable and transferable form of resistance with a lower fitness cost than, for example, porin mutations, and this resistance can spread through either clonal expansion or transfer of carbapenemases genes to naive bacteria. Following the transfer of resistance, newly created CP-CRE can also go on to expand through either mode, thus creating a potential changing target of organisms and resistance profiles. The ability to detect CP-CRE is an important component of outbreak investigations and in the evaluation of potential colonization. Although antimicrobial susceptibility testing results alone are typically required for the selection of appropriate therapy, the addition of new antibiotics, like ceftazidime-avibactam, which has activity against some carbapenemases (i.e., *K. pneumoniae* carbapenemases (KPC)) but not others (i.e., New Delhi Metallo-beta - lactamase (NDM)), may make detection of specific CP-CRE mechanisms important if these compounds cannot be tested directly. Unfortunately, there is already are port of a KPC-producing isolate that is ceftazidime-avibactam resistant. This case illustrates that although knowledge of a specific CP-CRE mechanism may be able to rule out some therapeutic options for patient care, mechanism knowledge cannot reliably predict susceptibility. Specific characteristics of various CP-CRE detection methods may be important to a greater or lesser extent, depending on the situation.

OBJECTIVES

General Objectives

- The aim of this study is to determine carbapenem resistance of gram-negative bacteria from the clinical specimen at HUCSH from October 2019 to March 2020.

Specific Objectives

- To identify potential gram-negative isolates from the clinical specimen at HUCSH.
- To determine the prevalence of carbapenem resistance from clinical isolates at HUCSH.

MATERIALS AND METHODS

Study design, area and period

A hospital-based cross-sectional study was conducted at HUCSH from February 13- June 7, 2020. The hospital is located in the capital city of Southern Nation and Nationalities People's Region (SNNPR) at Hawassa, 275 kilometres (KMs) far from Addis Ababa, the capital city of Ethiopia. The altitude of the town is 1697m above sea level with a mean annual temperature and rainfall of 20.9 o C and 997.6 ml respectively. Hawassa University Comprehensive specialized hospital was established in November 2005 and it serves about 12 million peoples. Patients seeking medical care receive services at different outpatient and inpatient units (surgery, gynaecology, and obstetrics, internal medicine, paediatrics, ophthalmology, psychiatry, radiology, pathology). The laboratory in the hospital analyses arrays of tests including microbiological.

Population

All patients that visited the microbiology laboratory for routine culture and sensitivity testing during the study period were the source population. All patients confirmed with gram-negative isolates were the study population.

Eligibility

All patients that requested for culture and those were agreeing to participate in the study included for the study. Patients who refuse to participate in the study and patients with gram-positive isolates excluded from the study.

Variable of the study

carbapenem resistance is dependent variable whereas, age, sex, residence, malnutrition, chronic disease, previous antibiotics use, external device use, prophylaxis, surgery, types of surgery, cancer, pregnancy, ward type was an independent variable.

Sampling technique

Convenient sampling technique employed to collect 103-gram negative isolates in which consecutive patients with gram-negative isolates enrolled. The patient's result and data were included if they are volunteer to participate in the study.

Data Collection

Demographic and clinical data collection

Trained data collectors were used a structured questionnaire to collect sociodemographic as well as clinical data.

Sample collection

Samples collected for routine culture purposes were included if gram-negative bacteria were isolated.

Laboratory Diagnosis

Culturing

The samples were inoculated based on the essentiality of the samples. Blood culture collected with the sterile procedure and immediately inoculated to Tryptone soy broth (TSB) at the site of collection. Then the bottle was transported for incubation in the microbiology laboratory. It is incubated at 37 C0 for five days. The bottle checked daily for the presence of growth indicators i.e. gas, pellicles, clot, and haemolysis. The sample subcultured (blood agar plate (BAP), Chocolate agar plate (CAP), and MacConkey agar (MAC) and gram stain were conducted at 24 hours incubation even if there were no growth indicators. If there were growth in solid media, identification performed based on their gram staining characteristics. Gram-negative organisms were included in this study. Finally, on day five, the bottle subcultured solid media if there were no growth reported as negative. Urine and puss were inoculated BAP and MAC. Chocolate agar was included for Ear discharge and Nasal swab. Colony characteristics and gram staining were used as preliminary identification of isolates.

Biochemical testing

Once the organism was identified as gram-negative in gram staining, serial biochemical testing that prepared routinely performed to identify the isolates. Triple sugar iron agar, urea, citrate, mannitol fermentation, lysine iron agar, sulphur indole motility testing, and oxidase used to identify the isolates to species level.

Antibiotic's susceptibility testing

Kirby disk diffusion technique was used to perform the susceptibility testing on Muller Hinton agar (MHA) (CLSI, 2019). Twelve different antibacterial performed including cotrimoxazole - COT (1.25/23.75µg), ceftazidime- CAZ (30µg), meropenem- MER (10µg), gentamycin- GEN (10µg), chloramphenicol – CAF (30µg), ampicillin - AMP (10µg), ciprofloxacin - CIP (5µg), cefotaxime - CTX (30µg) cefuroxime – CRX (30µg), nitrofurantoin – NIT (5 µg), piperacillin-tazobactam – PIT (100/10 µg) and amikacin – AMK (30 µg). The current clinical laboratory standard institute guideline as sensitive, intermediate, and resistant will interpret the result by measuring the zone of inhibition. Carbapenem resistance was determined by modified inactivation of carbapenem in which meropenem disk is used.

Modified carbapenem inactivation method (mCIM)

Sterile inoculating loop, 1 µL for *Enterobacteriaceae*, and 10 µL for *Pseudomonas* and *Acinetobacter* spp of test organisms were added into a tube containing 2 mL of tryptic soy broth (TSB). The bacterial suspension was vortexed for 10 - 15 seconds. Next, a 10-µg MER disk aseptically added into the bacterial suspension. The tube was then incubated for 4 hours ± 15 minutes at 35oC ± 2oC in ambient air. Just before completion of the 4-hour carbapenem inactivation step, a suspension of the mCIM indicator organism (*E. coli* ATCC 25922) with turbidity equivalent to a 0.5 McFarland standard was prepared and the surface of an MHA plate inoculated using the procedure for standard disk diffusion susceptibility testing. The meropenem disk then removed from the TSB bacterial suspension using a 10-µl inoculating loop disk placed onto the inoculated MHA plate, which then incubated in an inverted position for 18-24 hours at 35oC ± 2oC in ambient air.

mCIM result interpretation

The diameter of the zone of inhibition around each MEM disk was measured a zone diameter of 6-10 mm was considered to be a positive result (i.e., carbapenemases production detected), 11-19 mm an indeterminate result and ≥ 20 mm a negative result (i.e., no carbapenemases production detected). A narrow ring of growth abutting the MEM disk, representing the carryover of the test organism from the TSB, was ignored (Pierce *et al.*, 2017, CLSI, 2019) (**Figure 1**).

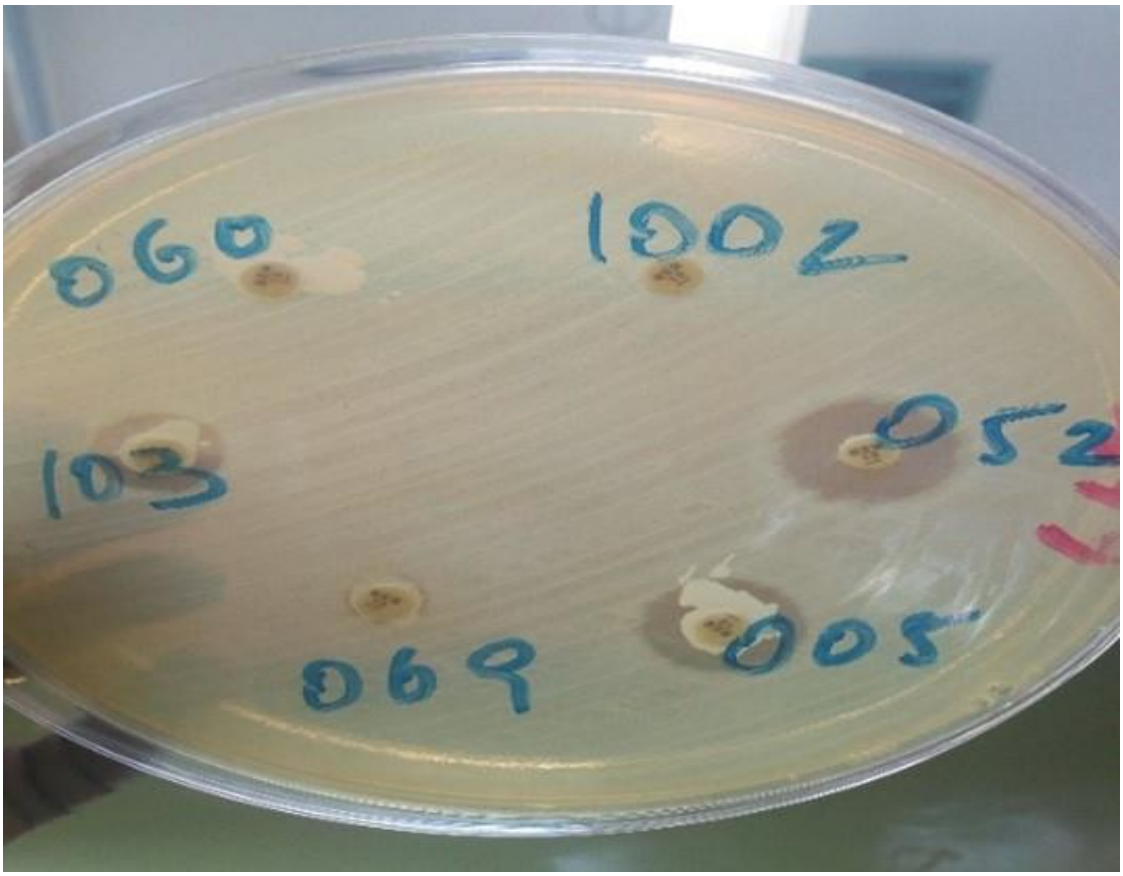


Figure 1: shows the modified carbapenem inactivation method (mCIM) to determine carbapenem resistance of gram-negative bacteria from clinical specimens at Tertiary care hospital, southern Ethiopia

Quality control

Data quality ensured using standardized data collection materials, pretesting of the questionnaires, proper training of the data collector before the start of data collection, and intensive supervision during data collection by the authors. Quality control strains such as *E. coli* (ATCC-25922), and *P. aeruginosa* (ATCC-27853) obtained from the Ethiopian public health institute (EPHI) to check the characteristic of the colony while growing of respective media and biochemical tests.

Data processing and analysis

Data were coded, entered, and processed using SPSS statistical software version 21 and presented by table and graph. The bivariate and multivariate logistic regression model used to check the predictors of a dependent variable. The odds ratio at 95% confidence level and p-value < 0.05 was used for statistical significance.

Ethical Consideration

The institutional review board (IRB) of Hawassa University College of Medicine and Health Science has approved the proposal. Then support letter obtained from the hospital administration. Socio-demographic data and samples were collected after written and/informed consent obtained from each child's parents and patients. All information kept secret using codes and locking on the board. The result of the patient-reported to the clinician within three or four days and those who are culture positive treated accordingly.

RESULTS

Socio-demographic characteristics

One hundred three (103) patients with gram-negative isolates were included for the study, of these 54(52.4%) them were male. Regarding age 62(60.2%) was <5 years and the rest 40(38.8%) was > 6 years age group. The mean and standard deviation of the age for the study subject was 11.52 ± 16.2 years that range from 1 day to 70 years. Fifty-five (53.4%) of them were from urban and the rest 48(46.6%) was a rural resident (**Table 1**).

Clinical features and associated risk factors

Patients enrolled for this study was from eight different wards that include paediatrics 38(36.9%), surgical 16(15.5%) neonatal intensive care units (NICU) 27(26.2%), and others (medical, intensive care unit (ICU), ENT) 22(21.4%). Thirty-two (31.1%) patients had another hospital stay and the rest 711 (68.9%) have no history of hospital stay. The length of hospital stay for < 10 days was 64(62.1%) and the rest 39 (37.9%) stay for >11 days that ranged (0-40 days). The mean and standard deviation of hospital stay was 11.6 ± 9.12 days. The sites of infection identified from this study were 54(52.4%) was urinary tract infection and the rest 49(47.6%) was from other sites of infection (bloodstream, surgical site, intestinal, respiratory, nervous system, soft tissue, otitis). Most of the study subjects 85(82.5%) used one or more external devices during a hospital stay in which the mean and standard deviation of length of device usage was 14.7 ± 10.8 in days that ranged from 1-60 days. Antibiotics were used by 92(89.3%) of patients as treatment or prophylaxis before sample collection and the rest 11(10.7%) of them was not taking on antibiotics. Of this was 70(76.1%) used a single class of antibiotics and the rest 22(23.9%) taken a combined class of antibiotics (**Table 1**).

Table 1: shows the socio-demographic and clinical characteristics of patients for the study of carbapenem resistance of gram-negative bacteria from clinical specimens at Tertiary care hospital, southern Ethiopia February 13 - June 7, 2020

Variables	Frequency (%)	Carbapenemases (%)		COR (95 % CI)	p-value
		Yes	No		
Age group (in years)					
<5	62(60.2)	6(9.7)	56(90.3)	.500(.096-2.609)	.411
>6	40(38.8)	2(5.0)	38(95.0)	1	
Sex					
Male	54(52.4)	3(5.6)	51(94.4)	1.93(.437-8.547)	.385
Female	49(47.6)	5(10.2)	44(898)	1	
Residence					
Urban	55(53.4)	5(9.1)	50(90.9)	.667(.151-2.949)	.593
Rural	48(46.6)	3(6.3)	45(93.8)	1	
Wards					
Paediatrics	38(36.9)	3(7.9)	35(92.1)	1.167(.180-7.582)	.872
Surgical	16(15.5)	2(12.5)	14(87.5)	.700(.088-5.578)	.736
NICU	27(26.2)	1(3.7)	26(96.3)	2.600(.220-30.745)	.448
Others	22(21.4)	2(9.1)	20(90.9)	1	
Another Hospital stays					
Yes	32(31.1)	3(9.4)	29(90.6)	1	
No	71(68.9)	5(7.0)	66(93.0)	.732(.164-3.271)	.683
Length of hospital stay (days)					
< 10					
>11	64(62.1)	5(7.8)	59(92.2)	.983(.222-4.364)	.982
	39(37.9)	3(7.7)	36(92.3)	1	
Sites of infection					
	54(52.4)	5(9.5)	49(90.7)	.639(.144-2.827)	.555

UTI	49(47.6)	3(6.1)	46(93.9)	1	
Others					
External device used					
Yes	85(82.5)	7(8.2)	78(91.8)	.655(.076-5.683)	.701
No	18(17.5)	1(5.6)	17(94.4)	1	
Length of device indwelled (days) <5	22(21.4)	2(9.1)	20(90.9)	1	
>6	61(59.2)	5(8.2)	56(91.8)	.893(.160-4.974)	.897
Previous antibiotics usage					
Yes	92(89.3)	7(7.6)	85(92.4)	1.21(.135-10.908)	.862
No	11(10.7)	1(9.1)	10(90.9)	1	
Class of antibiotics					
Single	70(76.1)	6(8.6)	64(91.4)	.508(.058-4.465)	.541
Combined	22(23.9)	1(4.5)	21(95.5)	1	
Underlined disease					
Yes	36(35.0)	4(11.1)	32(88.9)	.508(.119-2.165)	.360
No	6765.0)	4(6.0)	63(94.0)	1	

Specimen type

Of total 103 specimen, 54(48.6%) was urine, 17 (15.3%) blood, 17(15.3%) puss, 4(3.6%) cerebrospinal fluid (CSF), 3(2.7%) aspirates, 3(2.7%) effusion, 2(1.8%) stool, 2(1.8%) ear discharge, and 1(0.9%) nasal swab (**Figure 2**).

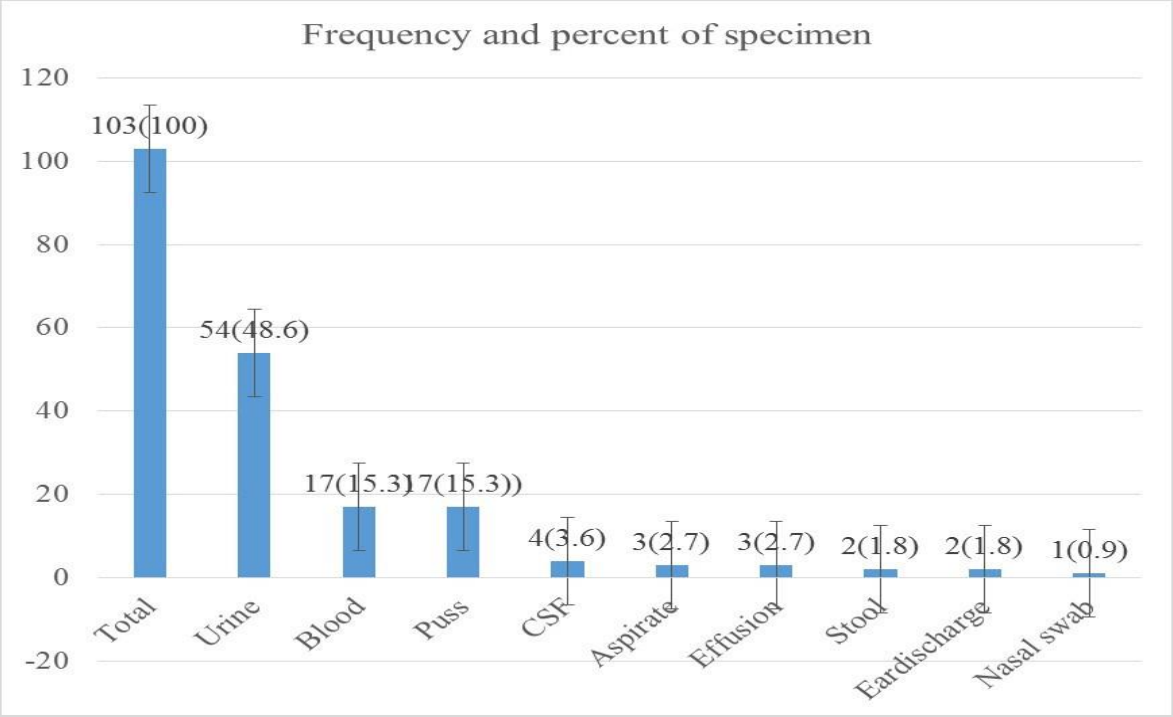


Figure 2: shows the frequency of specimens included for the study of carbapenem resistance of gram-negative bacteria from clinical specimens at Tertiary care hospital, southern Ethiopia February 13- June 7, 2020

Frequency of Isolated bacteria

Of 103 patients enrolled on the study, a total of 111-gram negative bacteria were isolated. The predominant isolate was E. coli 34(30.6%). Followed by *K. pneumoniae* 31(27.9%), *Acinetobacter* spp 11(9.9%), *Klebsiella oxytoca* (*K. oxytoca*) 9(8.1%), *Pseudomonas* spp 8 (7.2%), *Klebsiella*

ozaenae (*K. ozaenae*) 6 (5.4%), *Morganella morganii* (*M. morganii*) 5 (4.5%), *Klebsiella rhinoscolaris* (*K. rhinoscolaris*), *Citrobacter diversus* (*C. diversus*) and *Proteus mirabilis* (*P. mirabilis*) 2(1.8%) each, and *Enterobacter agglomerus* (*E. agglomerus*) 1(0.9%)(**Figure 3**).

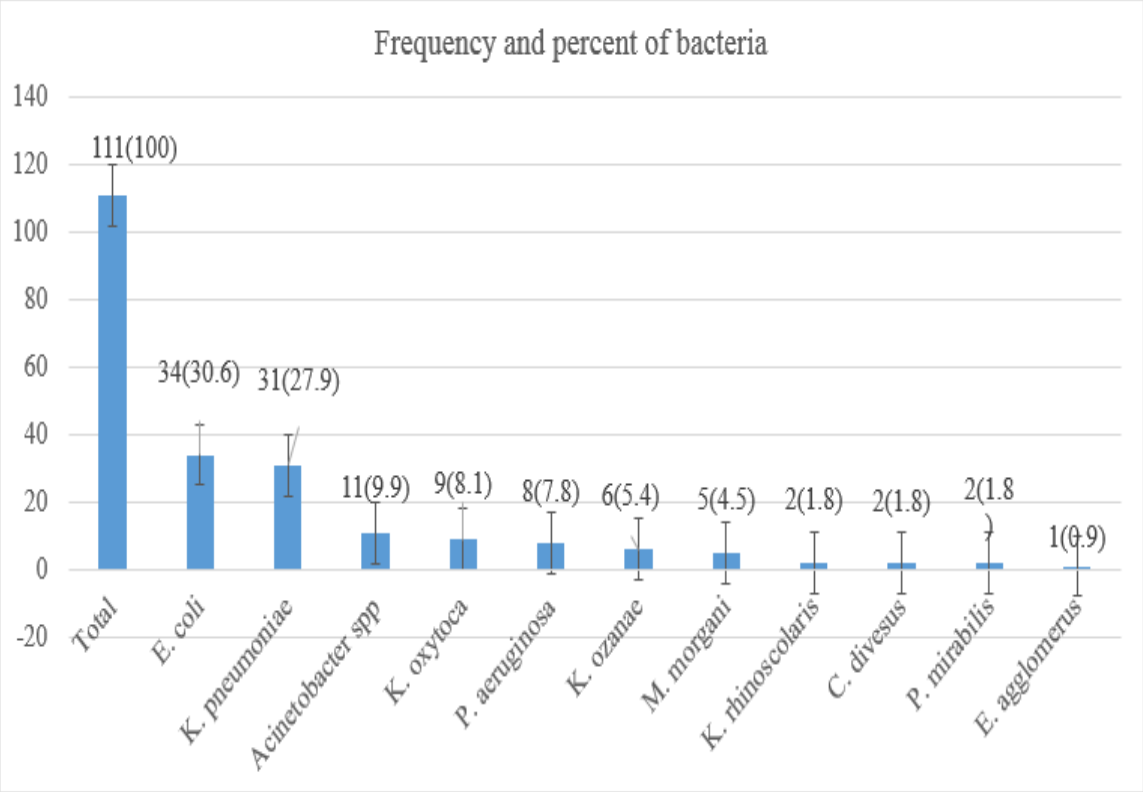


Figure 3: shows the frequency of bacteria isolated for the study of carbapenem resistance of gram-negative bacteria from clinical specimens at Tertiary care hospital, southern Ethiopia February 13-June 7, 2020.

Antibiotics resistance patterns

The resistance patterns of antibiotics for each bacteria were determined accordingly, the most resisted antibiotic were ampicillin 94(97.9 %), followed by cefuroxime 52(91.2 %), cefotaxime 94(88.7 %), cotrimoxazole 58(88.1 %), ceftazidime 40(83.3%), ciprofloxacin 47 (77.1%), nitrofurantoin 35 (70.0 %), gentamycin 71(65.7%), piperacillin - tazobactam 41 (48.8%), chloramphenicol 25(47.2 %), meropenem 13(11.7%) and amikacin 9(8.5%) (**Table 2**).

Table 2: shows the antibiotics resistance patterns of isolates for the study of carbapenem resistance of gram-negative bacteria from clinical specimens at Tertiary care hospital, southern Ethiopia February 13- June 7, 2020

Isolates tested	Antibiotics tested											
	Cot (67) R	CAZ (48) R	MER (111) R	GEN (108) R	CAF (53) R	AMP (96) R	CIP (61) R	CTX (106) R	CXR (57) R	AMK (106) R	NIT (50) R	PIT (84) R
K. pneumoniae	14 (100)	11 (91.7)	3 (9.7)	26 (86.7)	11 (64.7)	28 (100)	10 (66.7)	29 (96.7)	21 (100)	4 (12.9)	11 (100)	11 (52.4)
E. coli	23 (88.5)	16 (84.2)	3 (8.8)	18 (52.9)	0 (0.0)	25 (100)	22 (84.6)	26 (83.9)	16 (84.2)	2 (6.2)	11 (47.8)	15 (50)
P. aeruginosa	4 (100)	1 (100)	3 (37.5)	2 (28.6)	4 (100)	7 (100)	2 (100)	7 (87.5)	2 (100)	2 (25.0)	4 (100)	2 (33.3)
Acinetobacter spp	4 (66.7)	1 (33.3)	3 (27.3)	7 (63.6)	6 (85.7)	10 (90.9)	2 (50.0)	9 (81.8)	2 (50)	1 (9.1)	3 (100)	5 (62.5)
K. ozaenae	3 (100)	3 (100)	0 (0.0)	5 (83.3)	3 (75.0)	6 (100)	3 (100)	6 (100)	3 (100)	0 (0.0)	1 (50)	2 (40)
K. oxytoca	5 (71.4)	4 (100)	1 (11.1)	7 (77.8)	0 (0.0)	7 (100)	5 (100)	9 (100)	4 (100)	0 (0.0)	2 (66.7)	3 (42.9)
K. rhinoscolaris	2 (100)	1 (100)	0 (0.0)	1 (100)	0 (0.0)	2 (100)	0 (0.0)	1 (100)	NT	0 (0.0)	1 (100)	1 (100)
C. diversus	1 (100)	1 (100)	0 (0.0)	1 (50.0)	0 (0.0)	2 (100)	1 (100)	2 (100)	2 (100)	0 (0.0)	1 (100)	NT
M. morganii	3 (100	2 (100)	0 (0.0)	4 (80.0)	0 (0.0)	5 (100)	2 (100)	5 (100)	2 (100)	0 (0.0)	1 (50)	2 (66.7)
P. mirabilis	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (50)	0 (0.0)	0 (0.0)	NT	0 (0.0)	NT	0 (0.0)
E. agglomerus	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (100)	0 (0.0)	0 (0.0)	NT	0 (0.0)	NT	0 (0.0)
Total	58 (88.1)	40 (83.3)	13 (11.7)	71 (65.7)	25 (47.2)	94 (97.9)	47 (77.1)	94 (88.7)	52 (91.2)	9 (8.5)	35 (70.0)	41 (48.8)

Key terms: R- resistance, NT- not tested, COT - cotrimoxazole, CAZ - ceftazidime, MER - meropenem, GEN - gentamycin, CAF -chloramphenicol, AMP - ampicillin, CIP - ciprofloxacin, CTX - cefotaxime, CXR - cefuroxime, AMK –amikacin, NIT – nitrofurantoin, PIT – piperacillin-tazobactam

The magnitude of multidrug resistance

The level of multidrug resistance (MDR) checked for each isolate considering that bacteria that was resistant to three or more class of antibiotics as MDR. Based on this definition the level of MDR ranges from (0 - 100%). *Pseudomonas* spp, *K. ozaenae*, *K. oxytoca* was 100% MDR followed by *K. pneumoniae* 96.8%, *E. coli* 82.4 %, *Acinetobacter* spp 81.8%, *M. morganii* 80%, *K. rhinoscolaris* & *C. diversus* 50%, and the rest *P. mirabilis* & *E. agglomerus* with 0 %. The overall MDR, XDR and PDR were 86.5%, 43.2%, 1.8 %, respectively (**Table 3**).

Table 3: shows multidrug resistance isolates from the study of carbapenem resistance of gram-negative bacteria from clinical specimens at Tertiary care hospital, southern Ethiopia from February 13- June 7, 2020.

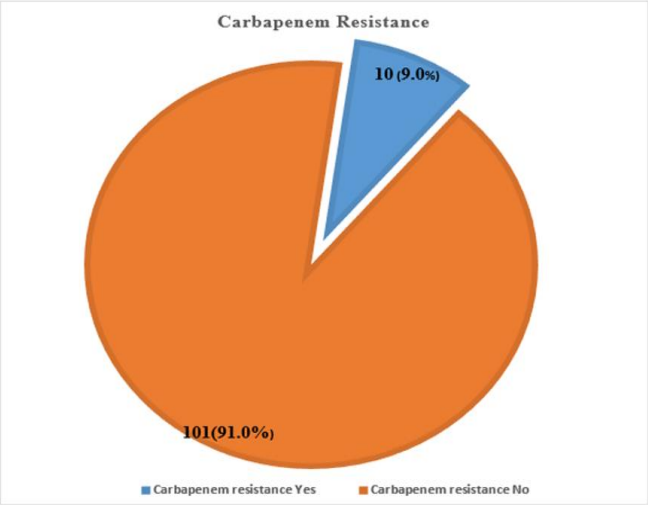
R1- 9 - resistance to 1- classes, 2-classes, 3- classes… 9-classes, MDR - multidrug resistance

Bacteria	Class of antibiotics									MDR
	R1	R2	R3	R4	R5	R6	R7	R8	R9	≥ R3
K. pneumoniae (31)	0 (0.0)	1 (3.2)	7 (22.6)	9 (29.0)	1 (3.2)	8 (25.8)	4 (12.9)	1 (3.2)	0 (0.0)	30 (96.8)
E. coli (34)	1 (2.9)	5 (14.7)	5 (14.7)	9 (26.5)	3 (8.8)	5 (14.7)	5 (14.7)	1 (2.9)	0 (0.0)	28 (82.4)
P. aeruginosa (8)	0 (0.0)	0 (0.0)	3 (37.5)	2 (25.0)	0 (0.0)	2 (25.0)	0 (0.0)	1 (12.5)	0 (0.0)	8 (100)
Acinetobacter spp (11)	2 (18.2)	0 (0.0)	2 (18.2)	1 (9.1)	1 (9.1)	4 (36.4)	0 (0.0)	0 (0.0)	1 (9.1)	9 (81.8)
K. ozaenae (6)	0 (0.0)	0 (0.0)	0 (0.0)	3 (50.0)	1 (16.7)	1 (16.7)	1 (16.7)	0 (0.0)	0 (0.0)	6 (100)
K. oxytoca (9)	0 (0.0)	0 (0.0)	3 (33.3)	1 (11.1)	3 (33.3)	1 (11.1)	0 (0.0)	1 (11.1)	0 (0.0)	9 (100)
K. rhinoscolaris (2)	0 (0.0)	1 (50.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (50.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (50)
C. diversus (2)	0 (0.0)	1 (50.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (50.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (50)
M. morganii (5)	0 (0.0)	1 (20.0)	1 (20.0)	1 (20.0)	1 (20.0)	1 (20.0)	0 (0.0)	0 (0.0)	0 (0.0)	4 (80)
P. mirabilis (2)	2 (100)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
E. agglomerus (1)	1 (100)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Total	6(5.4)	9(8.1)	21(18.9)	26(23.4)	10(9.0)	24(21.6)	10(9.0)	4(3.6)	1(0.9)	96(86.5)

The magnitude of Carbapenem Resistance

In Kirby-disc diffusion techniques, 111 isolates were tested against meropenem disk, of these 13 isolates (nine bacteria were resistant and four isolates were intermediate). In modified carbapenem inactivation techniques 10 out of the 13, confirmed as carbapenem resistance with overall carbapenem resistance was 9.0 %(3.6-14.6 %) (**Figure 4**), of this, isolates the predominant was *Pseudomonas* spp 3(30.0%), followed by *E. coli*, *K. pneumonia*e, *Acinetobacter* spp each two (20.0%) and *K. oxytoca* 1(10.0%). All CR bacteria showed MDR, XDR. & 50% of the isolates were PDR.

Figure 4: shows the magnitude of carbapenem resistance of gram-negative bacteria from clinical specimens at Tertiary care hospital, southern Ethiopia from February 13- June 7, 2020



DISCUSSION

Our study indicates that the overall carbapenem resistance was 9.0% (3.6% -14.6%). This is comparable with a study reported from India 14.6% (Kaur *et al.*, 2016). In contrast to our study, a higher rate was reported from India 65% (Devi, 2017), 30% (Mate, 2014), Ethiopia 27.1% (Tadesse *et al.*, 2019), and 25% (Gashaw *et al.*, 2018), however, a lower rates reported from Ghana 2.9% (Codjoe *et al*., 2019), Addis Ababa, Ethiopia 2% (Beyene *et al*., 2019), Germany 0.22 % (Katchanov *et al*., 2018). This difference might be due to the study period, area, and laboratory method employed. Carbapenem is the last chance of treatment used in serious infectious, however, due to the increment of carbapenem resistance bacteria, it is challenging for treating MDR, XDR, and PDR bacteria (Rodríguez-Baño *et al*., 2018). In our study, all the isolates that are carbapenem resistance showed (100%) MDR, XDR, and 50 % PDR in which the other one isolate is indeterminate for carbapenemases.

In this finding, bacteria, which are carbapenem resistant, were Pseudomonas spp, *Klebsiella* app, *E. coli*, and *Acinetobacter* spp. This is in agreement with studies reported in a systematic review from East Africa (Kenneth *et al*., 2018), India (Sriram, 2018, Henkhoneng *et al*., 2014). This study identified as CR, three out of four gram-negative organisms considered as ESKAPE, which are recognized as the most important emerging threats of this century that is *Pseudomonas*, *Klebsiella*, *Acinetobacter*, and *Enterobacter* (Peterson, 2009, Souha *et al*., 2011).

In this finding, the overall MDR was 86.5 % (79.1 - 91.0 %), this value is comparable with a study reported from Ethiopia, in Bahir Dar (80.0%) (Feleke *et al*., 2019), Addis Ababa 81.5% (Bitew, 2019), and Jimma 85% (Mohammedaman *et al*., 2014). In contrast to our study, a lower rate of MDR was reported from Debre Markos 72.2% (Wondemagegn *et al*., 2017), Bahir Dar 65.2% (Mulugeta & Bitew, 2011), Addis Ababa 68.3% (Dejenie *et al*., 2019), Northwest Ethiopia 54.3% (Derese *et al*., 2016), India 37.1% (Silpi *et al*., 2016), 30% (Henkhoneng *et al*., 2014). However, a higher rate of MDR was reported from Gonder 92% (Abtie *et al*., 2018), Addis Ababa 94.5% (Degefu *et al*., 2019).

Our study determined the antibiotics susceptibility patterns of each isolate, based on this ampicillin is the most resisted antibiotics followed by cefuroxime, cefotaxime, cotrimoxazole, ceftazidime, ciprofloxacin, nitrofurantoin, and gentamycin, in descending order with greater than 50% of the resistance. In line with our study similarly a high resistance level of ampicillin was reported from Addis Ababa (Degefu *et al.*, 2019, Tadesse *et al*., 2019), Bahir Dar (Derese *et al*., 2016), a previous

study in the study area (Tsegaye *et al.*, 2019). In contrast to our study, a lower rate of resistance to ciprofloxacin and gentamycin was reported (Degefu *et al*., 2019, Mulugeta & Bitew, 2011, Derese *et al*., 2016), this indicates that the resistance rates of commonly prescribed antibiotics getting a higher chance of resistance. In this study, lower rates of antibiotic resistance were observed for piperacillin-tazobactam, chloramphenicol, meropenem, and amikacin for all isolates in descending order, which is in line with reports from different parts of Ethiopia (Derese *et al.*, 2016, Aynalem *et al.*, 2017).

Our study aimed to conduct the association of socio-demographic and clinical data with carbapenem resistance. However, in this study, there are no statically associated risk factors, for CR as indicated in table 1.

CONCLUSIONS

Our study showed that a high carbapenem resistance bacterium compared to a report from Addis Ababa. The level of multidrug resistance is still alarmingly higher. Our finding indicates that ampicillin, cefuroxime, cefotaxime, cotrimoxazole, ceftazidime, ciprofloxacin, nitrofurantoin, and gentamycin with a high level of resistance >50%. However, piperacillin-tazobactam, chloramphenicol, meropenem, and amikacin were at low rates of resistance. In this study, there were no variables statically associated with carbapenem resistance. Therefore, a measure should be taken to decrease the increment of carbapenem resistance. The clinician should follow strictly the guideline for treating patients as we are running out of effective antibiotics, a study with a large sample of a gram-negative organism should be conducted for a better understanding of carbapenem resistance in the region. Finally, we recommend if empirical treatment is mandatory piperacillin-tazobactam, chloramphenicol, meropenem, and amikacin are more effective.

LIMITATION OF THE STUDY

- The limitation of this study is it only based on the phenotypic characteristic of carbapenem resistance that means not genotypically confirmed due to the budgetary issue and unavailability of set up.
- With this result, we could not generalize the carbapenem resistance in the region as most of the patients come to this hospital after taking numerous treatments.

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Health, Economic and Legal burdens of Road Traffic Injury (RTI) in selected hospitals in Southern Region, Ethiopia (Thematic Research Report)

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ABSTRACT

*Road traffic injuries (RTIs) were responsible for millions of death and disabilities, various psychosocial and economic crisis globally, with the highest incidence in developing countries. However, magnitude of RTIs, its risk factors and outcomes, impact on physical, social, mental and economic aspects of the individual is not well addressed in the study area. The objectives of this project were to determine the magnitude and characteristics, treatment outcomes, incidence and predictors of psychiatric morbidities, socioeconomic costs; gaps and challenges in the legal framework for redressing economic and moral losses of victims with road traffic injury (RTI) in selected public hospitals in Southern Ethiopia. Institution based mixed study design (both quantitative and qualitative methods) was employed according to the specific objectives of the study from April 1st 2017 to March 30th, 2019. All injured victims presented to selected public hospitals in Southern Ethiopia were study population. Random sampling technique using the entry point to the triage seat was used as sampling frame to assess the incidence of RTIs, then victims with RTIs was taken for the rest of the studies. The total sample size was **423**, using single population proportion formula with p=50%. Doctrinal and non-doctrinal legal research methods was also employed to examine the policy and legal frameworks governing RTIs. Victims were selected for in-depth-interview purposefully until the data was saturated. Death on arrival, victims of injury with repeated attendance, injured cases that need immediate transfers to other hospitals during the day of the data collection, and injury involving a stationary vehicle (**e.g**. persons getting injured while washing or loading a vehicle) were excluded from the study. Almost half (50.4%) of the injuries were induced by motorcycle followed by Minibus (21.3%) and Bajaj (15.3%). The findings of multivariate analysis showed that the type of road and weather conditions were significantly associated with motorcycle accident injuries. More than half (54.7%) of the victims received first pre-hospital care, where vast majority (82.7%) was provided by other road users and pedestrians where the quality of care can be questionable. Among victims 17.7% have developed complications following injury. Quarter (23.9%) of the respondents were dis satisfied the care received at hospitals. About 12% had depression and 27.6% had common mental disorder. Above quarter (26.9%) of participants use substances in the past 3 months. The magnitude of post-traumatic stress disorder was 15.4%. Factors associated with PTSD for RTA survivors are duration since accident (<30 days), history of previous road traffic accident, depression and common mental disorder (CMDs).*

***Keywords**: Road traffic injury, accident, incidence, burden, Health, Economic, legal*

INTRODUCTION

Background

Road traffic injury (RTI) is one of the top ten causes of death worldwide. It is accounted for 23% of all deaths worldwide (W.H.O., 2007). Currently, RTI estimated to be the ninth leading cause of death across all age groups globally and predicted to become the seventh leading cause of death by 2030 (World Bank, 2015).

Although nearly less than half of the world's vehicles were owned by low- and middle-income countries, they account for about 90% of the total world fatalities. This is mainly due to lack of necessary infrastructural developments, policy changes and levels of enforcement (ESA, U.N., 2013).

The incidences of RTI were common among the young and productive age group (W.H.O., 2015; Jeepura and Pirasath, 2012; Navali and Pouyandeh, 2015). Disability and death of this productive age group resulted in great loss of individual, family as well as country economy.

Incidence of RTI were associated with driver factors like driving under the influence of alcohol or drugs, without license, without using safety devices, exceeding speed limit; environmental and road factors like bad weather, traffic congestion or busy roads, and poor road condition; vehicle related factors such as brake failures and burst tires; and pedestrian related factors as family conflict, financial problem, visual impairment and alcohol intake (Tiruneh, Dachew and Bifftu 2014; Bener *et al*., 2009; Bekibele *et al*, 2007; Millicent *et al*., 2016; Sanyang *et al*, 2016). However, these factors are not equally important in all regions of the world and even different in different segment of the country.

Most of the victims with road traffic injuries were head and extremities (Tiruneh, Dachew and Bifftu, 2014; Bener *et al*, 2009; Mohammed *et al*. 2015). Head injuries were the leading cause of death, longest hospital stay and resulted in severe neurologic Sequel. Almost all hospitalized victims with road traffic accident sustained moderate to severe injuries (Tiruneh, Dachew and Bifftu, 2014). However, studies about the treatment modalities, its appropriateness, the general outcome and average hospital stay are limited.

In addition to physical injury, road traffic injuries resulted in multiple psychosocial outcomes. Victims with RTI were frequently seen developing acute stress disorder (ASD) and post-traumatic Stress disorder (PTSD) (Brewin *et al*., 2002). Despite their serious impact on duration of injury healing and prognosis, these Psychological consequences are not easily obvious. Moreover, these disorders were not given due attention by clinicians and researches as well (Oluwadiya et al., 2009). Thus, liaison to psychiatry services are rare practices in various hospitals and trauma units of other hospitals in Africa especially Ethiopia.

The cost of road traffic accident significantly affects the global economy. The annual losses in developing countries exceed the total annual development aid and loans received by these countries (W.H.O., 2012). One fifth of an estimated global cost (US$500 billion a year) by RTA is lost in the developing and the transition countries of Eastern Europe. It has been suggested that the cost to the economy due to RTAs is approximately 1% to 2% of a country's gross national product (GNP). The social and economic impacts of road crashes in developing countries are not well understood (Tulu *et al*., 2013). The total cost incurred and the major reason for this cost for a victim with road traffic injury is not well addressed.

Despite enormous physical, moral and economic loses as a result of road traffic injury, the existing law has a gap to determine these loses. The 1960 Ethiopian Civil Code under Book IV, Title XIII provides for the legal framework of determination of liabilities arising out of extra-contractual basis

such as RTA. However, the extent of this redress or compensation for such an injury, whether moral or economic, is not adequate when compared to the different injuries victims of RTAs suffer. Although courts entirely rely on the assessment report sent by medical institution, there is no clearly written guideline that can integrate health institution and courts for clear reporting.

Statement of the problem

Incidence of road traffic injury is increasing at an alarming rate. The most commonly affected group were the productive age group, young people, so that both the country and dependent families are greatly affected by economic crisis (W.H.O., 2015; Jeepura and Pirasath, 2012; Navali and Pouyandeh, 2015). However, the extent of economic loss for individuals with road traffic injury is not well addressed (Tulu G., *et al.*, 2013). Moreover, the existing low has a gap in determining the economic and moral loses of individuals with road traffic injury.

Incidence of road traffic accident is highly associated with behavior of drivers, violating traffic law; poor environmental and road conditions; and defective vehicle (Tiruneh, Dachew and Bifftu, 2014; Bener *et al*, 2009; Bekibele *et al*, 2007; Millicent *et al*., 2016; Sanyang *et al*, 2016).

There are few identified pediatrician related factors responsible for road traffic injury. Although there were common identified risk factors associated with road traffic injuries, it does not holds true for all areas of the world, even in a specific areas of a nation.

Road traffic injuries were also resulted in various physical disabilities, psychosocial problems, and deaths (Tiruneh, Dachew and Bifftu, 2014; Bener *et al*, 2009; Mohammed *et al*, 2015). The risks of developing disabilities from different road traffic injury types were not well studied. Moreover, the impact of psychological problems, particularly stress, on the prognosis of a victim with road traffic injury was not yet addressed in Ethiopia.

Therefore, this study is aimed to assess the incidence and associated factors of road traffic injury, injury characteristics and treatment outcomes of different types of road traffic injuries, incidence and determinants of acute and post-traumatic stress disorders of road traffic injury, estimating socioeconomic costs of individuals with RTIs, and to assess gaps and challenges in the legal framework for redressing economic and moral losses of victims with RTIs in selected hospitals of Southern Ethiopia.

Significance of the research

Globally, RTIs were responsible for millions of death and disabilities, various psychosocial and economic crisis, with the highest incidence in countries like Ethiopia. However, the common incidence of RTIs and its outcome, its impact on physical, social, mental and economic aspects of the individual is not well addressed. Inconsistent way of determining the cost of lost body part and morale kept the disabled and dependent family of victims with RTIs in economic crisis in current Ethiopia.

Therefore, this study is intended to identify the common outcome and means to reduce adverse outcomes associated with road traffic injuries, mental and economic crisis at individual level, and the appropriate means to redress loss secondary to RTIs.

This study will help the health professionals, economists and legal bodies to identify means to reduce RTIs associated adverse outcomes, RTIs associated stress and its impact on the treatment outcome; unexpected economic loss; and the appropriate legal frame work to redress loss in an integrated manner. This study will help all the stakeholders, particularly road and transportation authorities and legal bodies, to enforce and implement laws that can prevent or reduce the major contributing factors to RTIs in the study area.

Finally, this study will be an input for further study and to generalize the impacts of RTIs all over the country.

OBJECTIVES

General Objectives

- To determine Health, Economic and Legal Burdens of Road Traffic Injury among victims admitted to emergency departments of selected hospitals in Southern Region, Ethiopia.

Specific Objectives

1. To determine the magnitude of RTI victims among injury cases who attended the Emergency Department of public hospitals in Southern Region, Ethiopia.
2. To assess factors associated with road traffic injury among victims who attended the Emergency Department of public hospitals in Southern Region, Ethiopia.
3. To determine the characteristics of RTI victims among injury cases who attended the Emergency Department of public hospitals in Southern Region, Ethiopia.
4. To assess the treatment outcomes of victim with road traffic injury attending Emergency Department of public hospitals in Southern Region, Ethiopia
5. To determine Incidence of Psychiatric morbidities following Road Traffic injury among victims attending Emergency Department of public hospitals of Southern Region, Ethiopia.
6. To determine predictors of Psychiatric morbidities following Road Traffic injury among victims attending Emergency Department of public hospitals of Southern Region, Ethiopia.
7. To estimate costs of personal damages of victims with road traffic injury attending Emergency Department of public hospitals in Southern Region, Ethiopia.
8. To estimate costs of property damages of victims with road traffic injury attending Emergency Department of public hospitals in Southern Region, Ethiopia.
9. To identify gaps in the legal framework for redressing economic and moral losses of a victims with road traffic injury attending Emergency Department of selected hospitals in Southern Region, Ethiopia.
10. To explore challenges in the legal framework for redressing economic and moral losses of a victims with road traffic injury attending Emergency Department of selected hospitals in Southern Region, Ethiopia.

METHODS AND MATERIALS

Study design

Institution based mixed study design (both quantitative and qualitative methods) was employed according to the specific objectives of the study, at the Emergency department of selected hospitals in Southern Ethiopia.

Study area and period

Study area

The study was conducted at Hawassa university comprehensive specialized hospital, Yirgalem general hospital, Dilla Referral hospital, Shashemene Referral hospital and Soddo Christian hospital. Hawassa University Comprehensive Specialized Hospital is a teaching Hospital for Medical and other health Sciences students. It is located 275 km south of Addis Ababa, in Hawassa town. The Hospital was established in 1996 E.C. It offers service at general and specialty levels including internal medicine ,pediatrics and child health, general surgery, gynecology and obstetrics, ENT, neurology, neurosurgery, urology, psychiatric, ophthalmology , dermatology, dentistry, radiology, pathology , laboratory, anesthesia and pharmacy service.

Yirgalem general hospital is a public hospital located in Yirgalem town of Sidama zone, in Southern Ethiopia, about 315 km away from the capital city Addis Ababa, inaugurated in 1968. It is one of the highly crowded hospitals in four major clinical disciplines outside Addis Ababa, which was dependent on Norwegian aid till very recently. Dilla Referral hospital is located in Dilla town. Dilla is a market town and separate woreda, the administrative center of the Gedeo Zone in the Southern Nations, Nationalities, and Peoples Region (SNNPR) Ethiopia, located on the main road from Addis Ababa to Nairobi, 360 kilometer away from, Addis Ababa, in the Southern Ethiopia.

Shashemene Referral hospital is located in Shashemene town, previously known as Kuyera Hospital. Shashemene is a self-administrative town, the administrative center of the West Arsi Zone and a separate woreda in West Arsi Zone, Oromia Region, Ethiopia. The town lies on the Trans-African Highway for Cairo-Cape Town, about 240 km from Addis Ababa. It has an average altitude of 1,990 m above sea level, a "Wayinadega" climate zone with a mean annual rainfall of 700-950 mm and mean annual temperature of 12–27 ^{0}C, a latitude of 7° 12' north and a longitude of 38°36' east. Shashemene Referral hospital was founded in 1943 as a leprosy control center in the Oromia region, Ethiopia.

Soddo Christian hospital is located in Soddo town, 327 km South of Addis Ababa. The hospital is expected to serve around two million people. The total number of beds in the hospital was about 200. The hospital is well known for its orthopedic services having Ethiopians and foreigner professionals.

Study period

A study was conducted from April 1st 2017 to March 30th, 2019.

Source population

All injured victims who were managed in selected referral hospitals of Southern Region, Ethiopia.

Study population

All eligible RTI victims in the selected referral hospitals in Southern Region, Ethiopia, during the study period.

Inclusion and exclusion criteria

Inclusion criteria

- Victims of road traffic injuries who visited the Emergency Departments of selected hospitals in Southern Ethiopia during the study period

Exclusion criteria

- death on arrival
- victims of injury with repeated attendance
- Injured cases that need immediate transfers to other hospitals because of organizational problem and/or lack of bed during the day of the data collection
- Injury involving a stationary vehicle (e.g. persons getting injured while washing or loading a vehicle)

Sample size

- First, the sample size for prevalence of road traffic injury was calculated using single population proportion formula, assuming **P** = 36.8 %, Incidence of RTI from previous literature (Tiruneh, Dachew and Bifftu, 2014), at confidence level of 95% and marginal error of 5%, a total of 393 injured victims were interviewed.

$$n = \frac{(Z\alpha/2)\mathbf{2}(pq)}{d2} \quad \text{Where, } q = 1-p$$

$$n = \frac{(1.96)\mathbf{2}(.368*.632)}{(0.05)2} = 357$$

= Non-respondent rate was taken 10%

= Total sample size = 393

- But for the remaining subthemes the researchers did not get any proportion. Therefore, the sample size was calculated using the above formula assuming p=50%, at a confidence level of 95% and marginal error of 5%,

$$n = \frac{(Z\alpha/2)\mathbf{2}(pq)}{d2} \quad \text{Where, } q = 1-p$$

$$n = \frac{(1.96)\mathbf{2}(.5*.5)}{(0.05)2} = 384$$

= Non-respondent rate was taken 10%

= Total sample size = 423

- In order to get the maximum sample size 423 respondents was interviewed.

Sampling method and procedures

- First, we determined to include five hospitals in Southern region based on their level and patient flows, due to budget and time constraints. But out of these five hospitals, Shashemene Referral Hospital which is out of Southern region is included purposely because of its proximity to other selected hospitals.
- Second, based on the number of injury victims at selected five hospitals (2550 victims/6 months), number of victims have been selected using probability proportional to size method. Lastly, 120, 100, 85, 65 and 55 victims were selected from HUCSH, Soddo Christian, Shashemene, Dilla and Yirgalem Hospitals respectively.
- For sub-theme five, victims were selected purposely for an interview until the information was saturated.

Data collection Tool and Procedure

- Structured pretested questionnaires were used for face to face interview, check lists were used to review charts for clinical data, for observation and for in-depth interview.
- Data collection period was from January 1st to June 30, 2018.

Data processing and analysis

For sub-theme one up to three Epi-info version 7 was used for data entry and SPSS version 20.0 software for analysis. Descriptive findings were presented by table, graphs, and charts. Logistic regression was used for factor analysis, i.e. Odds ratios at 95% confidence interval and P-value < 0.05 was taken as statistically significant association.

SAS software was used for cost analysis and results were narrated after collecting qualitative data for subtheme-five.

Data quality assurance

To maintain data quality, training was given for data collectors and supervisors for a total of three days. Supervision was carried out on daily bases to check completeness and consistency of both quantitative and qualitative data by the supervisors and respective principal investigators. Correctly completed questionnaires were collected from data collectors. Cleaning, coding and entering of the data was carried out carefully for quantitative data. Audios were checked for consistency of transcribed data.

RESULTS

Results on incidence and Risk Factors of Road Traffic Incidence (RTI)

Background information on road traffic accident victims

A total of 413 RTIs were admitted to five hospitals of Southern Ethiopia. Of the total RTIs 311 (73.5%) were male cases, 229 (54.1%) from a rural area, and 160 (37.8%) were passengers. (Table 1). The mean age with standard deviation (S.D) was 29.2 years-old (±11.6 years).

Table 42: Background characteristics of road traffic accident victims.

Characteristics	**Frequency n (%)**
Place of residence	N=423
Urban	229(54.1)
Rural	194(45.9)
Sex	N=423
Male	311(73.5)
Female	112(26.5)
Age (in a year)	N=423
≤ 20	109(25.8)
20-30	180(42.6)
30-40	71(16.8)
>40	63(14.9)
Occupation type	N=423
Self-employee	181(42.8)
Student	96(22.7)
Government employee	67(15.8)
Private employee	26(6.1)
Daily laborer	13(3.1)
Unemployed	40(9.5)
Type of victim	N=423
Passengers	160(37.8)
Pedestrians	147(34.8)
Driver	116(27.4)

The magnitude of motorcycle accident injuries

Of the total 423 road traffic injuries, motorcycle accident injuries were 213 (50.4%) and followed by Minibus 90 (21.3%) and Bajaj 64(15.3%). (Table2)

Poor road conditions like loose gravel, steep descent, and rough road were responsible for 95(44.6%) of the motorcycle accident injuries. (Table 3)

Table 2: Injury characteristics and vehicles involved in road traffic injury.

Characteristics	Frequency n (%)
Presence of road traffic injury	N= 5283
Yes	423 (8)
No	4860 (92)
Specific sites of injury*	N=423
Head	181(42.8)
Neck	52(12.3)
Trunk	96(22.7)
Extremities	295(69.7)
Other body areas**	112(26.5)
Type of vehicle involved in road traffic injury	N= 423
Bicycle	6(1.4)
Motor cycle	213(50.4)
Bajaj	64(15.1)
Automobile	23(5.4)
Minibus	90(21.3)
Bus	8(1.9)
Lorry	15(3.5)
Animal pulled cart	4(0.9)

*Multiple responses, ** buttock, shoulder, pelvis, etc.

Table 3: Presence and characteristics of poor road conditions during Motorcycle accident injury.

Characteristics	Frequency n (%)
Presence of Poor road condition	N=213
Yes	95(44.6%)
No	118(55.4%)
Type of poor road condition	N=95
loose gravel	26(27.4%)
slippery road	6(6.3%)
steep ascent	6(6.3%)
steep descent	24(25.3%)
Potholes	6(6.3%)
narrow road	10(10.5%)
hump or rough road	17(17.9%)

Factors associated with a motorcycle accident injury

In this study, the findings of multivariate analysis showed that the type of road and weather conditions were significantly associated with motorcycle accident injuries. Motorcycle was 49.6% less likely to involve in a road traffic accident on a sunny day than on a rainy day as compared to another type of vehicle. The study also revealed that Motorcycle was 52.3.6% less likely to involve in a road traffic accident in a foggy or cloudy day than on rainy days as compared to other type of vehicles. Foggy weather condition was also responsible for 75(35.2%) of motor accident injuries. (Table 5)

Table 4: Multivariate analysis of factors and vehicles involved in a road traffic accident.

Variables		**Vehicles involved in RTA**		**AOR(95%CI)**
		Motorcycle n =213	**Other vehicles n=210**	
Accident location on the road	straight road	137	140	1.021 (0.443 2.354)
	Circle	18	14	1.180 (0.401 3.477)
	Junction	44	43	1.182 (0.471 2.964)
	cross road	14	13	1
Weather condition of the day	Sunny	112	101	0.504 (0.279 0.912)*
	Fogy/cloudy	75	65	0.477 (0.258 0.879)*
	Rainy	26	44	1
Specific time of the day	Day	157	150	0.940 (0.575 1.536)
	Night	56	60	1
Traffic congestion or busy road	Yes	57	58	0.811(.511 1.289)
	No	156	152	1
Age of the victim	<35	167	167	0.994 (.609 1.622)
	35+	46	43	1
Geographical location of the accident	Urban	90	107	1.141(.755 1.726)
	Rural	123	103	1

Results on injury characteristics and treatment outcome of road traffic injury

Among 423 sampled RTI victims to be included in this study, 402 were responded to the study giving the response rate of 95.04%. Among the participants 120(29.9%) 99(24.6%) 79(19.7%) 53(13.2%) 51(12.7%) were interviewed at Hawassa University Compressive Specialized Hospital, Shashemene Referral Hospital, Soddo Christian Hospital, Yirgalem General Hospital and Dilla Referral Hospital respectively.

Of these participants, 306(76.1%) were males and 96(23.9%) were females aged 3 to 90 years with mean age of 29.47 (SD± 13.077), median of 26 years and male to female ratio of 3.19:1.

Table 5: Socio-demographic profiles of study participants

No.	Variable		Frequency	Percentage
1.	Age	≤15	30	7.5
		16-30	239	59.5
		31-45	94	23.4
		46-60	26	6.5
		>60	13	3.2
2.	Sex	Male	306	76.1
		Female	96	23.9
3.	Residence	Urban	199	49.5
		Rural	203	50.5
4.	Region	1. SNNPR	238	59.2
		2. Oromia	145	36.1
		3. Other	19	4.7
5.	Religion	1. Orthodox	106	26.4
		2. Muslim	98	24.4
		3. Protestant	189	47
		4. Catholic	3	0.7
		5. Other	6	1.5
6.	Occupation	1. Merchant	144	35.8
		2. Student	96	23.9
		3. Private/NGO employee	91	22.6
		4. Government employee	52	12.9
		5. Homemaker	10	2.5
		6. Unemployed	9	2.2
7.	Educational Status	1.None	58	14.4
		2. Primary school	184	45.8
		3. Secondary school	100	24.9
		4. Tertiary Education	60	14.9

Table 6: Results for Condition of the patient on admission

S/No.	Variable		Frequency	Percentage
1.	Received first pre-hospital care	Yes	220	54.7
		No	182	45.3
2.	Provider of the first pre-hospital care	Other Road users	140	63.6
		Pedestrians	42	19.1
		Ambulance	24	10.9
		Police	14	6.4
3.	The victim is brought to the hospital by	Family	219	54.5
		Pedestrians and residents	51	12.7
		Ambulance	48	11.9
		Injury inducer	43	10.7
		Police	41	10.2
4.	Glasgow coma score at admission	≤ 7	18	4.5
		≥ 8	384	95.5
5.	Hemoglobin level at admission	< 8	4	1.0
		8 – 11	38	9.5
		>11	360	89.6
6.	SPO2	<90	37	9.2
		90-95	177	44.0
		95–100	188	46.8

7.	Pulse Rate (PR)	<60	5	1.2
		60-100	327	81.3
		>100	70	17.4
8.	Systolic BP	<90	9	2.2
		90-140	364	90.6
		≥ 140	29	7.2
9.	Diastolic BP	< 60	22	5.5
		60-90	329	81.8
		≥ 90	51	12.7
10.	History of any Chronic illness	Yes	15	3.7
		No	387	96.3

Out of 402 study participants, 15(3.7%) have chronic illnesses. Of this victims 8 clients have cardiovascular system disorders (cardiac problem and hypertension), 5 clients have Nervous system problems (including mental illness, migraine headache, nerve problem, spinal cord problem), 1 hepatitis and 1 TB cases are also identified.

Injury Characteristics

Table 7: Time of arrival to the hospital after injury

S. No	Duration of arrival	Frequency	Percentage
1	1 hour	226	56.2
2	1 – 2 hours	44	10.9
3	2 – 6 hours	70	17.4
4	6 – 12 hours	32	8.0
5	12 – 24 hours	20	5.0
6	24 – 48 hours	10	2.5

Out of 402 respondents, 100(24.9%) perceived that their arrival to the hospital is delayed. They perceived that the reason for delay is primarily due to lack of transportation access 63(63%).

Table 8: Reasons for delay to arrive hospital early

S. No	Perceived reason for delay	Frequency	Percentage
1.	lack of transport access	63	63
2.	lack of support	11	11
3.	went to traditional healers	4	4
4.	Thought for self-healing	2	2
5.	Others	20	20

Among the study participants motor cycle accident is the leading cause of injury accounting for 182(45.3%), car accident 101(25.1%) and other modes of transports account 119(29.6%).

Table 9: Body region involved in the injury

S. No	Body region involved in the injury	Frequency	Percentage
1	Extremity	278	69.2
2	Head	180	44.8
3	Thorax	65	16.2
4	Spine	63	15.7
5	Maxillofacial	44	11
6	Abdomen	36	9
7	Pelvis	22	5.5
8	Others	30	7.5

Table 10: Type of injury sustained (n= 402)

S. No	Type of injury sustained	Frequency	Percentage
1.	Fracture	239	59.5
2.	Open wound (Cut/laceration)	186	46.3
3.	Crush injury	123	30.6
4.	Blunt injury	89	2.1
5.	Internal hemorrhage	42	10.4
6.	Dislocation	40	10
7.	Other (eye, forehead and teeth)	5	1.2

Among study participants, 54 (13.4%) have neurological findings. Among these clients 37(68.5%), 22(40.7%), 20(37%), 14(25.9%) and 12(22.2%) clients have Late onset seizure, Paraplegia, Behavioral change, Early seizure and Hemiplegia respectively.

Table 11: Types of procedure (Treatments) performed (n=402)

S No	Treatments required	Frequency	Percentage
1.	Wound debridement (I&D)	340	84.6
2.	prophylactic antibiotic	303	75.4
3.	Treatment of fractures	235	58.5
4.	Other mixed cares	142	35.3
5.	Other surgical procedures	64	15.9
6.	Referral	24	6
7.	Craniotomy/burr holes	30	7.5
8.	Skin graft	13	3.2
9.	Limb re-amputation	3	0.7

Among interviewed victims 71(17.7%) have developed complications while 331(82.3%) have no complications following injury.

Table 12: Proportion of complication type among those victims reported complication (n=71)

	Type of Complications occurred	Frequency	Percentage
1	Surgical site infection	23	32.4
2	Gangrene	1	1.4
3	Systemic infection	21	29.6
4	Anemia	15	21.1
5	Contracture	7	9.9
6	Psychiatric complications	32	45.1
7	Altered gait	20	28.2

Table 13: Additional diagnosis at discharge (n=402)

S.No	Additional diagnosis at discharge	Frequency	Percentage
1	Facial palsy	11	2.7
2	Persistent weakness	31	7.7
3	Behavioral change	40	10
4	Deformity	46	11.4
5	Visual impairment	29	7.2
6	Hearing deficit	19	4.7
7	Aphasia	37	9.2
8	Balance problem	48	11.9
9	Memory loss	52	12.9
10	Other	15	3.7

Table 14: Glasgow Coma Scale (GCS)

S. No	GCS	Interpretation	Frequency	Percentage
1	3	Deep coma	2	0.5
2	4-7	Coma	7	1.7
3	8-14	Mild Coma	75	18.7
4	15	Fully conscious (oriented)	318	79.1

With overall current clinical status of the RTI victims at hospitals, 255(63.4%), 118(29.4%), 15(3.7%) and 14 (3.5%) clients' condition were reported improved, remained the same, worsened and death respectively.

Table 15: Presumed causes of death

S. No	Causes of death	Frequency	Percentage
1	Respiratory arrest	6	42.9
2	Brain injury	2	14.3
3	Death on arrival	1	7.1
4	Aspiration	1	7.1
5	Bleeding	1	7.1
6	Deep throat injury	1	7.1
7	Unknown	2	14.3

With regard to the satisfaction rate of the victims on the care received, 306 (76.1%) have been satisfied while the remaining 96 (23.9%) not satisfied.

Table 16: Suggested area of services to be improved

No	Suggested areas for improvement	Frequency	Percentage
1	Promptness of care	140	34.8
2	Conduct towards patients	96	23.9
3	Equipment & tools	86	21.4
4	Layout of facilities	16	4
5	Knowledge of health care personnel	39	9.7
6	Provision of more administrative and medical information	33	8.2
7	Lack of medications at HCF's pharmacy	155	38.6
8	Less administrative processes	48	11.9
9	Cleanliness of premises or equipment	58	14.4
10	Decreasing cost of care	111	27.6
11	Coordination/orderliness among personnel for provision of care	87	21.6

Result for Psychiatric Morbidity

Socio-demographic characteristics

A total of 416 participants were included in the study with a response rate of 98.6%. The mean (±SD) age of the respondents was 29.89 (±12.48) years. Among the respondents, 192 (46.2%) were in the age range of 15-25 years, 303 (72.8%) were male, 217 (52.2%) were married and 148 (34.9%) attended secondary education. The median monthly income of the participants was 2000 ranges from 200 to 10000 ETB (**Table 1**).

Table 17: Socio-demographic characteristics of road traffic accident survivors at selected public hospitals in southern Ethiopia, 2019 (*n=416*)

S.no	Variables	Category	Frequency	Percentage
1	Sex	Male	303	72.8%
		Female	113	27.2%
2	Age	15-25	192	46.2%
		26-35	132	31.7%
		36-45	51	12.3%
		≥46	41	9.9%
3	Marital Status	Single	199	47.8%
		Married	217	52.2%
4	Educational level	Unable to read/write	60	14.4%
		Primary education	139	33.4%
		Secondary education	145	34.9%
		College and above	72	17.3%
5	Ethnicity	Oromo	156	37.5%
		Wolaita	64	15.4%
		Sidama	78	18.8%
		Amhara	33	7.9%
		Others	85	20.4%
6	Religion	Orthodox	105	25.2%
		Protestant	197	47.4%
		Catholic	1	0.2%
		Muslim	109	26.2%
		Others	4	1%
7	Occupation	Housewife	32	7.7%
		Civil Servant	55	13.2%
		Farmer	81	19.5%
		Merchant	68	16.3%
		Student	94	22.6%
		Private/NGO	48	11.5%
		Others	38	9.15%
8	Monthly Income	<750 ETB	45	10.8%
		750-1250 ETB	101	24.3%
		>1250 ETB	270	64.9%

Clinical and accident related factors

From the total study participants, about 50(12%) had depression and 115(27.6%) had common mental disorder. One hundred four (25%) had a history of previous road traffic accident and 171(41.1%) of the victim were passengers. 15(3.6%) had diagnosed co-morbid medical illness and 112(26.9%) of the study participants use substance in the past 3 months (**Table 2**).

Table 18: Clinical and accident related factors among road traffic accident survivors attending emergency department of selected public hospitals in southern Ethiopia, SNNPR, Ethiopia, 2019 (n=416)

S.no	Variables	Category	Frequency	Percentage
1	Duration since accident	<30 days	344	82.7%
		≥30 days	72	17.3%
2	History of Previous road traffic accident	Yes	104	25%
		No	312	75%
3	Role during accident	Driver and assistant	115	26.9%
		Passenger	171	41.1%
		Pedestrian	130	31.3%
4	Presence of family or friend in the same accident	Yes	37	8.9%
		No	379	91.15
5	Depression	Yes	50	12%
		No	366	88%
6	CMDs	Yes	115	27.6%
		No	301	72.4%
7	Diagnosed Co-morbid Medical Illness	Yes	15	3.6%
		No	401	96.4%
8	Type of Diagnosed Co-morbid Medical Illness	HTN only	9	60%
		CVD only	3	20%
		DM	2	13.3%
		≥ 2 of the above	1	6.7%

Substance use of the respondent's

From the total study participants, 26.9 %(112) were use substance in the past 3 months. From the total study participants who use substance 34(8.2%) use both alcohol and khat.

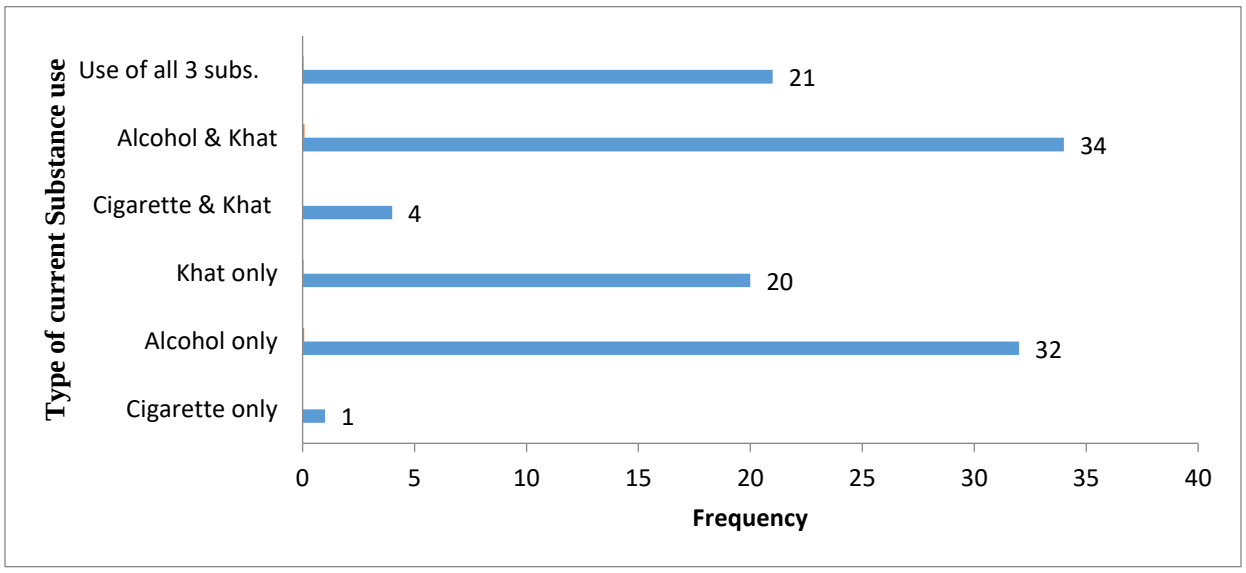


Figure 16: Substance use of road traffic accident survivors attending selected public hospitals in southern Ethiopia, 2019 (n=416)

The prevalence of PTSD

In the current study, the magnitude of post-traumatic stress disorder was 15.4% with a CI of (12.3–18.8%). The prevalence rate was higher among males (15.8%) than females (14.2%). About 84.4% and 34.4% of the participants with PTSD had co-morbid common mental disorders (CMD) and depression respectively.

Factors associated with PTSD

After running multiple logistic regression analysis, the current study showed that factors associated with PTSD for Road traffic accident survivors are duration since accident (<30 days), history of previous road traffic accident, depression and common mental disorder (CMDs).

Duration post-accident, is found to be significantly associated with PTSD; the odds of developing PTSD among patients who experienced RTA <30 days before data collection time were 67% (AOR=0.33; 95%CI (0.15, 0.73) less likely to develop PTSD compared to victims who were injured after 30 days of data collection time.

Having history of previous road traffic accident was significantly associated with PTSD; the odds of developing PTSD among RTA victims who have previous history of RTA were 2.6 times (AOR=2.67; 95%CI (1.23, 5.77) more likely to develop PTSD as compared to those who did not have previous history RTA. Depression was also significantly associated with PTSD. Those patients with depression were 2.5 times (AOR=2.5, 95% CI (1.10, 6.10)) more likely to develop PTSD compared to their counterparts. In addition, common mental disorder (CMD) was significantly associated with PTSD. Those patients with CMD were more than 12 times (AOR=12.78, 95% CI (5.56, 29.36)) more likely to develop PTSD compared to those who did not have CMD.

Table 19: Binary and multiple logistic regression analysis of factors associated with PTSD among road traffic accident survivors at selected public hospitals in southern Ethiopia, 2019 (n=416)

Variable		PTSD		COR (95% CI)	AOR (95%CI)	P-value
		No	Yes			
Sex	Female	97	16	0.87(0.48, 1.62)		
	Male	255	48	RC	RC	
Age	15-25	165	27	0.68(0.28,1.62)		
	26-35	113	19	0.69(0.28, 1.73)		
	36-45	41	10	1(0.36, 2.84)		
	≥ 46	33	8	RC	RC	
Marital Status	Single and Widowed	168	31	1.03(0.6, 1.75)		
	Married	184	33	RC	RC	
Educational level	Unable to read and write	50	10	1.4(0.53, 3.71)	0.78(0.14, 4.31)	0.78
	Primary education	121	18	1.04(0.44, 2.45)	0.75(0.17, 3.24)	0.69
	Secondary education	118	27	1.6(0.71, 3.61)	1.42(0.36, 5.63)	0.62
	College and above	63	9	RC	RC	
Occupation	House wife	25	7	RC	RC	
	Civil servant	50	5	0.35(0.1, 1.24)	0.38(.051, 2.83)	0.34
	Farmer	65	16	0.87(0.32, 2.39)	0.91(0.25, 3.21)	0.91
	Merchant	52	16	1.09(0.4, 3.01)	1.1(0.28, 4.47)	0.88
	Student	87	7	0.28(0.09, 0.89)	0.37(0.08, 1.63)	0.19
	Private/NGO	40	8	0.71(0.23, 2.21)	0.36(0.07, 1.82)	0.22
	Others	33	5	0.54(0.15, 1.9)	0.63(0.13, 3.1)	0.57
Monthly Income	<750 ETB	40	5	0.62(0.23, 1.67)		
	750-1250 ETB	87	14	0.80(0.42, 1.54)		
	>1250 ETB	225	45	RC	RC	
Duration since accident	<30 days	311	33	0.14(0.078, 0.25)	0.33(0.15, 0.73)	**0.006***
	≥30 days	41	31	RC	RC	
Role during accident	Driver and assistant	92	23	RC	RC	
	Passenger	147	24	1.66 (0.84, 3.29)	0.72(0.28, 1.84)	0.49
	Pedestrian	113	17	1.08(0.55, 2.11)	0.63(0.22, 1.77)	0.38
Previous RTA History	Yes	62	42	8.9(4.97, 16.01)	2.67(1.23, 5.77)	**0.013***
	No	290	22	RC	RC	
Presence of family/friend in the same accident	Yes	33	4	0.64(0.22, 1.88)		
	No	319	60	RC	RC	
Depression	Yes	28	22	6.06(3.18, 11.54)	2.58(1.10, 6.10)	**0.29***
	No	324	42	RC	RC	
CMDs	Yes	61	54	25.76(12.4, 53.4)	12.78(5.56, 29.36)	**0.00***
	No	291	10	RC	RC	
Diagnosed Co-morbid Medical Illness	Yes	13	2	0.84(0.18,3.82)		
	No	339	62	RC	RC	
Substance use in the past 3 month	Yes	90	22	1.52(0.86, 2.69)	0.81(0.35, 1.86)	0.61
	No	262	42	RC	RC	
	Yes	6	2	1.86(0.36, 9.42)		

Family history of mental illness	No	346	62	RC	RC	

***P<0.05(variables significantly associated with PTSD), Abbreviation: COR: Crude Odds Ration, AOR: Adjusted Odds Ration, CI: Confidence interval**

Hosmer and Lemeshow Test for model fitness

Step	Chi-square	Df	sig
1	**4.764**	**8**	**0.782**

Result and discussion on cost estimation of RTA

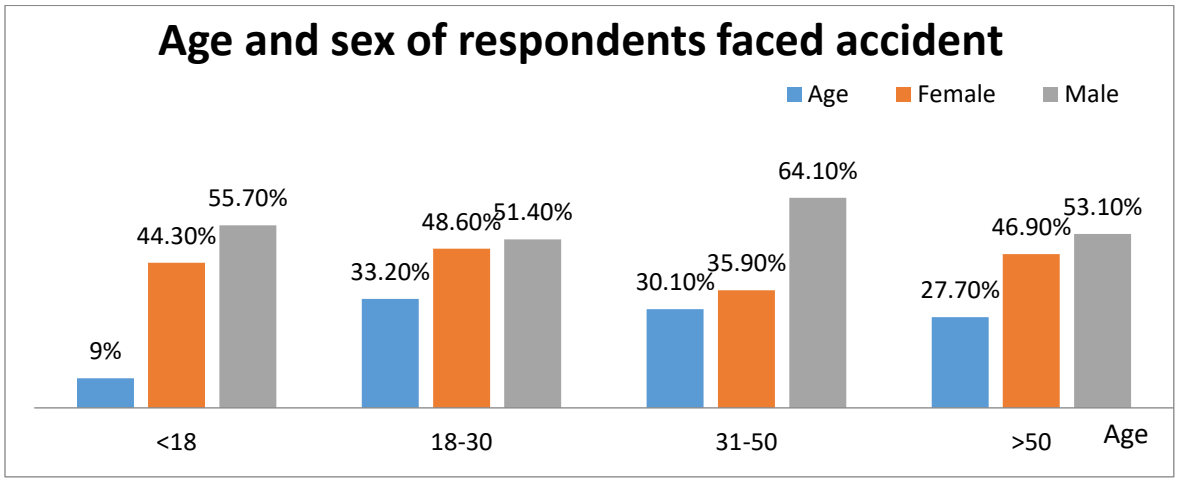
Demographic characteristics of the respondents

In table1, the results show that 54.84 percent of the respondents are male and the remaining 45.16 percent are females. Similarly, from respondents 46.09% were married, 52% were single and 1.91% was widowed. Most of the respondents were Protestants comprising 37.11%, 24.82% Muslim, 21.04% orthodox, 10.63 % catholic, 4.96% traditional religion, and 1.41% no religion.

Table 20: distribution of respondents by demographic characteristics (n=423)

Variable	Response	Frequency	Percent
Sex	Female	191	45.16
	Male	232	54.84
Marital status	Married	195	46.09
	Single	220	52
	Other	2	1.91
Religion of Respondents	No religion	6	1.41
	Traditional	21	4.96
	Orthodox	89	21.04
	Catholic	45	10.63
	Protestant	157	37.11
	Muslim	105	24.82

Source: own survey, 2019



Source: own survey, 2019

Figure 2: Sex distribution in relation with ages of respondents

The analysis of road traffic accident by sex and age group showed a uniform predominance of males over females in all age categories; where males accounted for almost 55.7% of accident in the age of below 18. Whereas males' percentage counted is 51.4 % between 18 up to 30 years of age. Even the proportion of males reached 64.1 % in age range between 31 up to 50 years of age. The working age group between 15 and 50 years accounted for more than two-thirds of below 18 years traffic accident (Figure 1). Additionally, percentage of injured persons between 32 up to 50 years of age is reached 64.10 %. This has a great impact on the family and on the nation at large because the loss of such active working group may lead to foregone GDP due to the diminished workforce and economic shock to families that have lost a breadwinner.

Table 21: Occupation of respondents

Victims occupation	Frequency	Percent
Student	79	18.7
Government Employee	103	24.3
Farmer	66	15.6
Businessmen	54	12.8
Daily workers	87	20.6
Private drivers	13	3.1
Others	21	5.0

Source: Own survey, 2019

Government employees were more vulnerable for accidents comprising 24.3%, this study showed 20% daily laborers and 28 % students were more involved. But those of private drivers are least affected (3.1%).

Table 22: Hospitalization

Days	Frequency	Percentage
1-30	141	33.3
31-180	204	48.2
180-360	62	14.6
Over 1 year	16	3.7
Total	423	100

Source: Own survey (2019)

141 victims (33.3%) had a hospital stay of between 1-30 days, while 204 (48.2%) were hospitalized for 31-180 days. 62 RTA victims (14.6%) stayed for a period exceeding 180 days, while 16 victims had stayed over a year in the hospital.

Table 23: Economic cost of traffic accident

Cost Component	Fatal	Serious Injury	Slight Injury	Property Damage	Average
		Causality			
Medical Cost	30,034	20,546	14,342.5	-	21,640.83
Lost labor Output	614,939				614,939
Pain, Grief, and Suffering	89,345.56	68,546.8	47,345	-	68,412.45
Cost per Casualty	244,773	44,546.5	30,843.75		
		Per Crash			
Property Damages (Repair, Towing Cost and Lost Economic Output) Cost	-	-	-	540,057	540,057
Administration (Insurance, Legal or court and Police) Cost	135,345.3	44,954	20,341.5	204,245	101,221.5
Cost per Crash	135,345.3	44,954	20,341.5	204,245	

Source: own Calculation, 2019

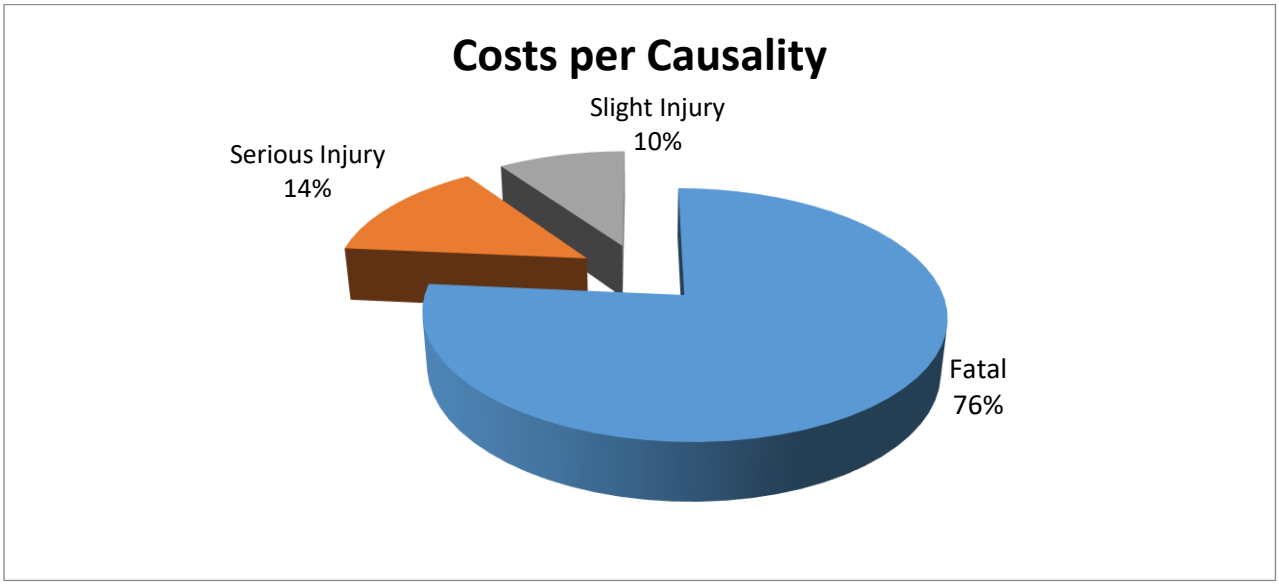
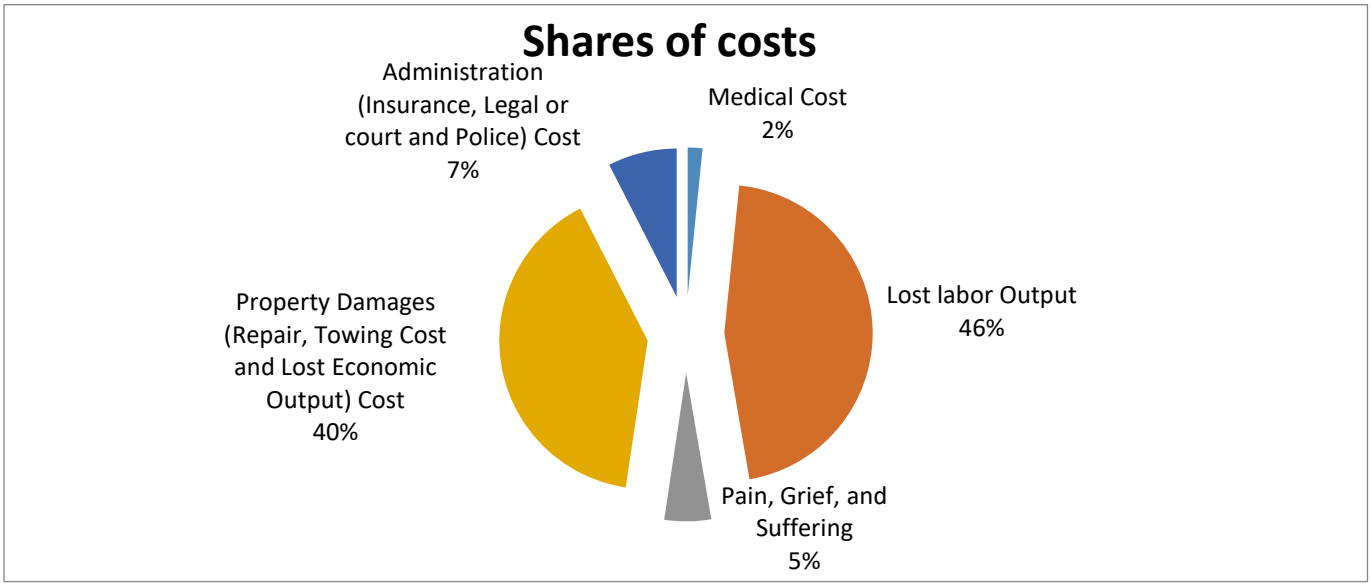


Figure 3: costs per causality (Source: own survey, 2019)

Figure 2 showed that fatal takes 76%, serious injury about 14% and slight injury about 10%. Additionally, figure 3 below illustrates the components of traffic accident costs in selected hospitals in SNNPRS. Property damages comprise 40% of the total accident costs. This finding is comparable with the results of some previous studies (Morden, 1989), which reported that property damage costs may reach up to 55% of the total traffic accident costs. However, lower share of property damage costs would be obtained if more appropriate willingness-to-pay approach was used. Also, the costs of hospitalization and medical treatments of accident fatalities and injuries account for 2 % of the total accident costs. Again, this percentage is compatible with the results of previous studies (Miller *et al*., 1997), which indicated that these costs vary from 2 to 11% of the total traffic accident costs. The cost of human losses, including loss-of-output due to fatalities and injuries consists of 46 % and loss of quality of life or pain and suffering, constitutes about 5 % of the total accident costs. Obviously, this percentage would be much higher if more appropriate willingness-to-pay value was used.

Finally, the costs of police activities and insurance administration are accounted for 7 % of the total costs. Finally, we believe that traffic accident costs estimated in this study are conservative for basic reason that the costs were estimated only for reported traffic accidents. In fact, there is no documented information of the level of unreported accidents in study area.



Source: own survey, 2019

Figure 4: shares of cost

Medical Costs

Medical costs of those injured in crashes range from at-scene to recovery, or death, and include first aid and rescue services (ambulance), hospital costs (food and bed, operations, xrays, medicines, doctors services) and rehabilitation costs (treatment and prosthetics).

It has been tried to collect as much relevant information as possible though it is difficult to obtain all the required data only from hospital. Based on the possible data that could be available the data collection form is redesigned. Basically there are data which are obtained from the victim‟s medical records like duration in the hospital, x-ray, medication, operation etc; and there are also some data which can only be obtained by making interview with appropriate personnel in the hospital like the daily cost of food and bed, the average number of bed in a trauma ward, the number of victims visited by a doctor per day etc. Medical treatment in Ethiopia is highly subsidized by the government. As per the information obtained from Hospital administrators and medical directors the government provides subsidy for medical treatment in these hospitals.

Medical costs only usually constitute a small proportion of the total costs of crashes. However, the burden of road casualties on medical sector resources is likely to be significant

According to figure 3, the computations have produced an average of 20,546 birr for serious injury, which includes among others ambulance fees, hospitals charges, medicines and professional fees from medical specialists. Serious injuries because of an accident will sometimes result to irreversible acquired disabilities. This will result to added financial burden to the family. It is assumed that the disabled will be taken care of until his death. It was found that the average cost of hospitalization of fatal injuries amounted to 30,034 birr. For minor injury (injury which does not need hospitalization for more than a week), the average cost of treatment is estimated at 14,342.5 birr. This covers first aid and other emergency medical services like ambulance service and emergency room treatment.

Lost Labor Output

Lost output refers to the lost productive capacity from those affected by road crashes and is typically the largest part of casualty related costs. It can range from the value resulting from as little as one day of lost time for a slight casualty, up to decades of foregone work for those killed or permanently

disabled. Lost output is believed to have been underestimated in most past studies, as it was limited to the crash victim(s) only and to the number of work days lost - either to recovery or to average retirement age in the case of death. Some of those injured will not return to their jobs, and will spend additional time looking for new employment. Thus there is not only lost working time to take into account, but also reduced income after resuming employment. Lost output estimates should also take account of income lost by caregivers. When someone in a poor family is injured the whole family gets involved; those on daily wages may lose their job, children may not go to school and older members may spend less time caring for infants.

Road accidents could lead to a loss of output in the year in which the accidents occur and in future years. In order to determine lost output certain assumptions have to be made. In the case of fatal accidents obtaining the average age of road accident fatalities and subtracting this from the average age at which the person ceases to work gives the number of "person years lost" and also the lost output due to drivers causing death accident and put into prison is obtained by determining the number of years the driver lost at his stay in jail as a punishment. In the case of serious accidents, estimates must be obtained of the average number of days that the injured person spends in hospital together with the number of days they stayed at home recovering from the accident. In the case of a slightly injured person, an estimate must be obtained of the number of days that the person is off work due to receiving treatment outpatient for their minor injury, or convalescing at home.

Accordingly the average age of road accident fatalities has been calculated for each age group by using the weighted average system. In Ethiopia civil servants retire at the age of 60 years and the corresponding years of lost output following fatal road accidents is shown in the table below for each age group.

Table 24: Fatality related information

Age Group	Average Fatal Age	Years of Lost Output	Number of fatal casualties	Total lost output per victim (Birr)
< 7 Years	3.5	56.5	11	112,815
7 – 13 Years	10	50	15	108,600
14 – 17 Years	15.5	44.5	12	118,563
18 – 30 Years	24	36	140	134,822
31 – 50 Years	40.5	19.5	133	94,909
>51 Years	55	5	112	45,230
Total				614,939

Source: own computation, 2019

Thus, the total lost output cost per victim is estimated to be 614,939 ETB. The lost output cost for slight injuries is estimated from the number of days an outpatient takes rest at home. Accordingly from the interview with doctors and outpatients an outpatient person/slightly injured person could be off work for about 6 days due to receiving treatment for their minor injury. And thus the total cost of lost output is estimated to be 614,939 ETB per injured casualties.

Pain, Grief and Suffering

In order to quantify the social cost and emotional burden accidents bring about to the victim and their families, a notional amount to reflect 'pain, grief and suffering' is added to the total costs for each accident severity when using the Human Capital method. The Willingness-To-Pay method is considered the most relevant method for accident and has now been adopted by many developed countries. Pain, Grief, and Suffering was 68,412.45 birr. However, this method is difficult to apply in developing countries, for it is based on complex questionnaires asking about perceived risk and payment for the avoidance of hypothetical risk. The amount to be added in the human capital method

could be considered as part of a social objective of poverty alleviation, as accidents are known to have a greater adverse effect upon the poor. The amount to be added is often a political and subjective decision, and an element of judgment is unavoidable.

Property Damage

The largest portion of property damage is that which stems from damage to vehicles due to mishaps and lost economic productivity of wrecked public transport vehicles. Other property damage is less significant. Repair garages down to informal 'shade tree or back yard' mechanics were also surveyed. This method is more likely to be representative of the true cost of damage to vehicles, since it includes both insured and uninsured vehicles of different vehicle types.

Administration Cost

It is usual in previous international studies that police and administration costs are low compared to other cost components. The reason being is these costs are not direct costs that can be associated to accidents. It is advised not to spend much time and effort in producing detailed estimates of these costs because of the sector's complexity. Police and administration costs are usually low when compared to other cost components.

Result on Legal frame works

This study revealed that, redressing economic and moral loses arising from RTI, as other scheme of compensation, has been facing legal as well as practical challenges.

The legal lacuna is visualized in the nonexistence of plausible formula or method to determine the quantum of damage and the amount of compensation. (Zerihun, April 30, 2019 and Hamerson June 15, 2019). Even if the law provides the amount of damage is equivalent in damage (Ethiopian Civil Code, Art 2090(1)) no guide line is there to guide the equivalency in objective manner. Furthermore, the court has endowed with equity power in determining compensation. (Ibid, Art 2099). This power rather than serving objectivity, it gives the merit of compensation on the subjective hands of judges.

Despite the fact that the victims have been found between the age of 16 – 45 which is the age of productivity, payment of due compensation found in short of satisfaction, since it is dependable on lost benefit and reduction of work capacity, as of majority cases. (Zerihun, April 30, 2019)

It is also ensured that in fatal accident, the right of claiming compensation is limited to spouses, decedents and ascendants. Other dependents precluded from demanding compensation whatever their dependency and irrespective of the proof their dependency. (Ethiopian Civil Code, Art 2095 (1) and Art 2096). This provisions make the other dependents uncompensated for the loss. In practical cases also such preclusion affirmed by the country's Supreme Court whose interpretation of the law is binding over every court in the country. (Federal Supreme Court cassation bench decisions, Volume 22, file no 134240, September, 2019.p288)

The other legal lacuna which is emanated from outdating of the law is amount of compensation for moral damage. Though the law declares the non-eligibility of monetary compensation of moral damage (Ethiopian Civil Code Art 2105), it sets the sealing of compensation award for moral injury is one thousand Ethiopian Dollar. (Ibid, Art 2116(3)). The amount stays without any change with the fact of inflation and declining of purchasing power of the country currency. Increase of the number of victims for a single compensable event also has not the power to change the amount of moral damage compensation. All victims should apportion the said one thousand Ethiopian Birr among them. Such legal lacuna also supported with practical case. The Federal Supreme court relinquish the federal first instance court decision that provide the applicant and her two children award of one thousand Ethiopian Birr per head, in sum three thousand Ethiopian Birr (Alisha, 2015). In the strict sense of the term it can be said that there is no moral compensation if the fixed one

thousand Birr apportioned among whatever number of the victims. The Federal Supreme Court has failed to use its opportunity to rectify such legal gap through interpretation.

Additional legal gap has extracted in depth investigation of the purpose of law of compensation. Though a decision provided by the Supreme Court cassation division dictated that the country extra contractual liability has insurance goal and deterrence goal (Genet, Nahom and Wondesen, 2015) in practical scenario deterrence effect has not exhibited. With having one thousand Birr maximum moral damage which is not there to duly compensating pain and suffer, loss of comfort of life, it is difficult to achieve deterrence effect. Let alone a failure of inducing deterrence effect through inflicting due care sense on others, the system is not enough in redressing the victim. (Zerihun, 2019)

The other gap has expressed from lack of road safety policy in the country. The country has not road safety policy. The coined kind of policy is yet found under the process of drafting. (Daniel, 2019). More over Ethiopia is not signatory to African Road safety charter and does not be party to UN conventions. (Yohanes, 2019). Such failure indicted the less focus provided for the matter in legal aspect. Even if those policy, charter and conventions have not direct impact on redressing losses, they have indirect impact since they can serve as a base for other direct rules and regulations pertaining to the matter.

With respects to practical challenge ensuring criminal liability for the perpetrator of the injury has found ineffective. Despite the independence of criminal cases with civil cases, ensuring criminal guilty ship can be served as an evidence for litigation on compensation. Nonappearance of witness make files for the criminal cases fate closing. Seventy-seven percent of Criminal cases of RTA have closed in Hawassa city high court for failure of appearance of witness in the year 2011 EC.

The other practical challenge is enforcement of Vehicle insurance against third party risk. Forty-nine percent of vehicles caused accidents which covered in this study have not insurance coverage. The non-enforcement of such obligation has cause the non-enforcement of compensation given in Vehicle insurance against third party risk

DISCUSSION

Prevalence of PTSD

The current study tried to assess the prevalence and factors associated with of PTSD among RTA survivors. The prevalence of PTSD was found to be 15.4% (CI; 12.3-18.8) among survivors of RTA. The prevalence of this study was in line with the study done in Kenya 13.3% (26) and Iran which was 19.2% (27).

However, the finding of this study was lower than the study conducted in Nigeria 26.7% (28) and Serbian study 36% (29). The reason for the variation on magnitude of PTSD might be because of the study area, sample size, and tool used to assess PTSD.

In contrary, the finding of this study was higher compared to study from Cape Town 12.2% of PTSD (30). The possible reason for the variation might be the difference in the time point of PTSD assessment, which is in South African', the study was conducted 6-month of the post-accident period, but the current study assessed all RTA survivors from 1 month of the post-accident period.

Factors Associated with PTSD

Duration post-accident is found to be significantly associated with PTSD; the odds of developing PTSD among patients who experienced RTA <30 days before data collection time were 67% (AOR=0.33; 95%CI (0.15, 0.73) less likely to develop PTSD compared to victims who were injured after 30 days of data collection time. The reason could be the gradual decline over the course of the illness as time goes far after injury. This finding was supported by studies from California (31) and South Africa (30).

Also, having history of previous road traffic accident was significantly associated with PTSD; the odds of developing PTSD among RTA victims who have previous history of RTA were 2.6 times (AOR=2.67; 95%CI (1.23, 5.77) more likely to develop PTSD as compared to those who did not have previous history RTA. The reason could be repeated exposure to stressful event could lead individuals to develop mental illness.

Depression was also significant predictors of PTSD. Those patients with depression were 2.5 times (AOR=2.5, 95% CI (1.10, 6.10)) more likely to develop PTSD compared to their counterpart. Also, common mental disorder (CMD) was significantly associated with PTSD. Those patients with CMD were more than 12 times (AOR=12.78, 95% CI (5.56, 29.36)) more likely to develop PTSD compared to those who did not have CMD. The could be due to the fact of having another psychiatric diagnosis increase the risk of developing PTSD and other psychiatric disorder and in turn leads to impaired physical functioning and poor quality of life. The finding in the current study was supported by studies from Cape Town (30) and Nigeria (32).

RTI in Ethiopia and the region

The everyday road transport exposition and traffic reports of the country have affirmative juxtaposition with the assertion "the occurrences of accidents caused by vehicles are escalating from time to time." (Vehicle Insurance against Third Party Risk Proclamation No 799/2013, preamble) This FDRE legislature's recognition is in conformity with the world health organization report, which articulates "in most regions of the world this epidemic of road traffic is still increasing" (WHO, 2009). The magnitude of traffic accident in the country have recorded as 33,547; 38, 737; 40,998; in 2016/2017, 2017/2018, 2018/2019 respectively (FDRE transport Authority 2011 EC Report). The SNNPRS traffic accidents has been recorded, 1,198 in 2016/17, 1,467 in 2017/18 and 1,543 in 2018/19. (Ibid). The effect further deepening up in to psychological loss, beyond physical injury and mortality, in addition to infliction of pain and suffers. The scope of the loss also possibly extended to the society at large beyond the family boundary. "... Loss of lives, bodily injuries and

damages to properties caused by vehicle accidents are creating social problems". (Vehicle Insurance Against Third Party risk Proclamation No 799/2013, preamble). The total property damage has estimated around plus or minus a billion in each year. So as to tackle these overall RTA troubles, beyond the necessity of having preventive mechanism in the country, designing and implementing victims' treatment and rehabilitation system in post-accident/post-crash phase is non escapable. Making damages good in due manner should be there. Compensating damage for victims is one way of protecting some aspects of human right and ensuring security of citizens. (Zerihun, 2019)

Compensation for Damage in general and RTI in Ethiopia

Once liability is determined, the next issue is compensating the damage on which such liability is resulted. Compensation is one of the objectives of tort law. (Harpwood, 2000) To make a tort system on maximum service, awarding damages in efficient level is decisive. (Arlen, 2000). The classical purpose of compensation in itself is to put the victim in the position he was in before the tort (Van Wijck, 2001)

The Ethiopian law of compensation tried to handle compensation within the scope of material damage compensation (Ethiopian Civil Code, Art 2090- 2104), and compensation for moral injury (Ibid, Art 2105-2123). In the scheme of the handling, there exists no legal definition for material damage and moral damage. (Krzeczunaowicz, 1977). Material damage is economic loss which affects the victim pocket and moral damage affects the victim feeling. (Krzeczunaowicz, 1977). Material damage is subjects to compensation on the bases of present loss and future damage aspects. (Ethiopian civil code, Art 2091 and 2092)

The rule for material damage is pecuniary compensation since article 2090 (2) indicate the possibility of other mode of compensation. (Krzeczunaowicz, 1977). This rule of monetary compensation award qualified as an equivalent amount in damage. (Ethiopian civil code Art 2090 (1)) The rule of equivalency of compensation for damage is a rule which is left a lacuna for exceptions. However, the condition of equal compensation with sustained damage provided in the provision appear next to the basic rule. (Ibid, Art 2091). It needs to identify when equivalency is applicable and when equal to be prevail.

Compensation for motor vehicle accident victims in Ethiopia in general

The law governing RTI in Ethiopia is mainly related with the 1960 Ethiopian Civil Code. The Case of RTI is subjects to extra contractual liability. The most relevant provision which is explicitly stipulated to the issue under scrutiny is that a liability provided for machine and motor vehicle under liability in the absence of an offence. (Ethiopian Civil Code, Art 2081)

In accordance with the provisions the owner is liable for any damage caused by his machine or vehicle, unless otherwise he can proof at the time of damage the machine or vehicle was stolen. (Ibid) The Provision is there under liability with no offence or fault (Civil Code, Title XIII, and Section 2). If there is any kind of damage, the owner will be liable. However, such liability is not absolute. The law tries to relive the owner from liability by way of transferring liability to the tort feaser by providing recovery right to the owner, which is limited fault or answerability. (Ibid Art 2083) RTI victims' mode and extent of compensation follow the extra contractual general mode and extent; compensation for material and moral damage. No different mode and extent specific to it.

The other law which is enacted to governing RTA and RTI is Vehicle insurance against third party risk. From the very inception, having a valid vehicle insurance coverage against third party to risks to such specific vehicle is mandatory requirement to drive a vehicle on road in Ethiopia. (Vehicle insurance against third party risks proclamation, Proclamation No. 799/2013) One of the purposes

of such obligation is to facilitate the provision of emergency treatments to the victim of the vehicle accident. (Ibid)

In connection with the insurance policy, the very proclamation stipulated that such required insurance policy as an obligation "shall cover the compensation payable for death, bodily injury, damage to property and the expenses of emergency medical treatment arising from the insured vehicle. (Ibid, Art 4 (2)). As to this respect, the proclamation has determined the sealing of the coverage. The maximum threshold of the liability for a death of one person and bodily injury is 40,000 Birr with the bottom compensation level is 5,000 Birr for bodily injury (Ibid Art 16 (1) (a) and (b)). Bearing in mind with the non-marketability of human body and life, in the insurance scheme for road traffic accident victims in Ethiopia the maximum compensation for life is less than 1,300 Dollar, in computing it with the current foreign exchange rate which is 31.50 Birr to 1 Dollar. (Currency rate – commercial bank of Ethiopia) No court decision is there in considering the high inflation increment in the country from time to time. The principle of compensation equivalency with loss seems not considered here. The problem is also similar with property loss. The amount of property loss compensation is still freeze at 100,000 ETB. (Vehicle insurance against third party risks proclamation, Proclamation No. 799/2013, Art 16 (1) (c)) It is against the principle of a compensation equivalency with damage or loss. The intervention of court decision is not explicitly provided under the proclamation. The proclamation has provided a pave to claim damage exceeding the limit provided in the proclamation. The person who alleged more compensation endowed right to claim as per relevant law.(Ibid, Art 16 (3)). This provision again leads to the applicability of Civil Code.

On top of the insurance policy provision more weight for property than human body and life, the insurance coverage left untouched the moral compensation issue. To demand moral damage compensation, it is mandatory to go back to the civil code. The moral issue which also expected engulf pain, suffer, psychological loss and mental trauma (Vallano, 2013) is over looked. The moral issue or non-pecuniary loss has not attracted modern and sophisticated attention in Ethiopia.

Absence of Plausible Formula and Guide Line to Assess Compensation for RTI Cases

No uniform formula for assessment of damage in general. Perhaps it is unthinkable to think consensual standard for assessment of damage. Similarly, it shouldn't have left for subjective verdict hand of the judiciary in order to ensure justice and equality in compensation. In the stated consideration countries have exert their effort to have some kind of assessment guide line or similar way of approach to the issue under discussion. "In England, the 'Guidelines for the assessment of general damages in personal injury cases' provide a number of specific guidelines to determine the amount of damages." (Barendrecht, 2001) It is possible to come across a formula for the calculation of damages for pain and suffering in Netherlands. (Ibid) The issue of calculation of the amount of damage/compensation is similarly worried by other countries too. Of course setting out standard for compensation may encounter its own disadvantages side by side with its advantages.

The actual amount of the damage declared by specific provision in the term of extent of damage in Ethiopia is equal to the damage cause to the victim. (Ethiopian civil code, Art 2091) The awarding of the damage in principle is expected to be equivalent to the damage sustained. (Ibid, Art2090) How such equivalency/equality is determined has not addressed. The method of calculation or elements to be considered to cut the magnitude of damage has failed to indicate. The role of expertise in economic aspect also disregarded. In other scenario, when the exact amount of the damage cannot be calculated, the court shall fix the damage, taking in to account ordinary course of events and the measures taken by the injured party (Ibid, Art 2102). Even if the consideration of ordinary course of events has provided in case of difficulty of assessment, what constitute such consideration has not been given. When seen this provision thoroughly, the law seems presume assessment of damage can be conducted in proper manner and exactly. Furthermore, in determining

the compensation amount the court has the power of equity (Ibid, Art 2099). Through tooling such equity power the court is at liberty to escalate or decrease the amount of compensation, on the bases of awareness of the wrong fullness or not of the act conducted and financial position.

In some legal systems, a party need not prove the actual extent of its damages in all cases to be successful. It must merely prove that it has suffered damages and that there is some difficulty in establishing the exact quantum (Eiselen, 2005).

In different approach to other country, under the procedure of what have been dealt till now in this section the Ethiopian law follow the mechanism of proof by the victim. "The victim of the injury shall establish the amount there of and prove the circumstances which render the defendant liable to make it good" (Ethiopian Civil Code, Art 2141). The burden of proof of the amount of damage is lied on the victim. If the victims are in a position to proof the amount of damage, he/she would have succeeded high amount of compensation. That possibly makes the amount of damage on the heavy hands of bargaining or litigation power.

"In Ethiopia there is no guide line which is help full to determine compensation in equivalent manner. In most of cases courts tends to use equity which subjective one. The absence of guide line for compensation affects interpretation of the law in this regard. We can perceive such influence in different actual cases" (Zerihun, 2019).

The problem is identical in RTI cases. The issue is similar in case of future material damage. The law extends payment of compensation for future material damage as long as it is certain to occur without waiting for materialization. (Ethiopian Civil Code, Art 2092). The problem is ensuring certainty of future material damage

Right of claiming compensation in case of fatal accident

The right to compensated for sustained damage should be inspecting when it is connected with mortality. Despite the fact that there is the right to claim compensation for spouses, descendants and ascendants in case of fatal accident, other dependents precluded from such right. (Ethiopian Civil Code, Art 2095 (1) and Art 2096) Since the right extended for the formers is claimable by way of maintenance (Ibid Art 2095(2)), the purpose of the law is not clear to forbid such similar maintenance claim for others (Ibid Art 2096). The law precludes others persons from claiming compensation even if they can show the deceased support or assistance materially. In the culture of extended family of the country, this kind of legislative narrow plat form would not be compatible to tackle the actual problem. The FDRE Supreme Court cassation bench also affirms such prohibition with no justification (Ethiopia Federal Supreme Court, 2019), while it has the power to interpret the law (Federal Courts proclamation re amendment proclamation, Proclamation No. 454/2005, Art 2(1)) and adjust the law if it is necessary or develop the law rationale by providing deep justification. The Federal Cassation bench has relinquished the compensation awarded by SNNPRS Region Sheka Zone High Court (and had been accepted as correct decision by the region supreme court) to the applicants from the death of their brother due to a car accident (Ethiopia Federal Supreme, 2019). Even if there is an attempt to provide compensation to the losses without discrimination by the lower courts, the Supreme Court restitute the position enshrined in the civil code.

On the other hand, vehicle insurance against third party risks proclamation provides the amount of compensation in lump sum as 5,000 up to 40,000 ETB (Vehicle insurance against third party risk proclamation, Proclamation No 799/2013 Art 16(1) (a)). Definition of third party given is in exclusion style of definition. The definition provided in a fashion of showing persons whom are not included as of third party. (Ibid Art 2(10)). It excludes what are excluded in Art 7 of the

proclamation. In such stipulation no clear preclusion indicated for other person dependent to the deceased to claim insurance compensation.

Problem in Assessing Moral (Psychological Damage)

Moral damage in Ethiopia is not subjects to monetary compensation. The law clearly said that unless otherwise the law clearly stipulated moral harm may not good by way of damage. (Ethiopian Civil Code, Art 2105(2)) Even if the law prefers to refrain from attaching monetary value for moral harm, when the law permits so, the amount is incredibly limited to one thousand ETB. Whatever the number of victims for certain moral damage, irrespective of severity of the damage, the monetary compensation extent cannot have improved. Moral damage is as cheap as compensable by less than 40 Dollar. The Federal Supreme Court cassation division affirm such one thousand ETB maximum amount of compensation for the delicate moral harm (Alisha, 2015; Ethiopian Federal Supreme Court cassation, 2015). In such case the present applicant decided to pay three thousand Birr for three victims at the lower court. But the Federal cassation division reduced the amount to one thousand ETB. The reason provided by the division has "regarding the amount, it is clearly stipulated in Art 2116 that, in no case it cannot exceed one thousand Ethiopian Dollar. If the law limits the compensation in this manner it is not possible to decide in contrary." (Ibid, p.128).

In other jurisdiction there is compensation for pain and suffer different from moral damage. In this regard The French law can be raised as example. "Compensation for pain and suffering, often referred to as pretium doloris, is probably the most ancient form of non-pecuniary consequential damage." (Jean-Se, 2015)This kind of compensation is not similar with moral damage. "Another type of non-pecuniary damage is the moral pain experienced by a person, not as a result of his own bodily injuries but, rather, as a consequence of another person's death or injury" (Ibid)

Limited objective of law of compensation

The law of compensation of Ethiopia objectives have not articulated in explicit manner. The clear objective is simply to compensating people harmed by damage. (Ethiopian Civil Code, Art 2090) As the cassation division the Ethiopian extra contractual liability has insurance goal and deterrence goal (Genet and Nahom, 2015). However, in the actual reality the deterrence effect has not observed. The overall purpose of deterrence objective is to discourage individuals from doing the same wrongful acts by fearing payment of compensation discourages. (David, 1996) In order to act carefully through fear of payment of compensation, the amount of compensation should be high. In other word by paying one thousand ETB for moral harm, it is unthinkable to think achievement of deterrence effect. Here, it doesn't mean that for the sake of achieving deterrence effect, the compensation amount should be inclined improperly. The law should adjust to serve multiple purposes.

Beyond moral harm compensation, other compensation for personal injuries also not plausible to implement deterrence effect in the same tone of the justification provided by the federal cassation division. The compensation amount, let alone exert deterrence consequence, it is not seen enough to compensate victims in proper manner; because the compensation amount has been subjects to reduction of working ability. (Zerihun, 2019) The goal of compensation in our country is compensating the victim. It is highly related with lost income or benefit. No deterrence purpose (Hamerson, 2019). Of course the cassation division provides a possibility to paying compensation even if there is no lost benefit or income with the power of equity (Ethioipian Federal Supreme Court cassation, 2019). The judgment of the court has based its justification the existence of negative impact. Even if such judgment has taken one stapes forward, still it is not guarantying its effectiveness with respects to deterrence purpose.

Other purposes also not well recognized. Compensation or tort law has objective of compensation, protection of interests, deterrence, retribution, vindication, loss distribution and punishment of

wrong full act (Harpwood, 2000). Other than compensation and distribution of loss no other objectives targeted in Ethiopia (Hamesron, 2019)

Absence of Road Safety Policy

In African continent there is road safety charter. (African road safety charter,) One of the main objectives of this charter is to serve as a policy frame work for road safety improvement in Africa. (Ibid Art1 (a)). The charter urges the member countries among others, to establish emergency medical service coordinating centers and implement 3rd party insurance law to ensure emergency medical service and rehabilitation of vehicle crash victims (Ibid Art 17 (2) and (3)). Road safety policy mostly focuses on prevention of road accidents. But it has its own impact to handle accidents in post-crash events. In post-crash, in the situation of prevention failed, effective post-crash emergency medical and rehabilitation services are important to reduce both the number of fatalities and the length and severity of surviving victims' disability. (Road Safety Approaches and Policies, 2005-06) Demanding to adopt road safety policy is a global issue in this day. The World Health Organization in 2013 developed twenty policy directives on road safety for countries to comply with (Peprah *et al*, 2018). Ethiopia is neither signatories of African Road Safety charter nor incorporated as member in a single UN Conventions among 58 conventions (Yonas, 2019). On top this failure, the country has not well-defined and ratified road safety policy; the policy is found under drafting process (Daniel, 2019). Moreover the country has not equipped with gap filling document to road safety policy. Similarly, transport policy of the country has been staggering in drafting stage (Yacob, 2019). In the absence of such important policy, there are rules and regulations. Required 3rd party risk insurance law is there. But the establishment of emergency medical service coordination centers is not ensuring yet. The task of emergency treatment seems run with in the channel of regular activities of Hospitals and Health Centers. Without the policy, the country has legislations that supposed to manage post-crash difficulties, such as third party insurance.

Criminal liability (practical challenge with enforcement)

Ensuring criminal liability for RTA has not a direct relation with compensation, even if it has post crashes legal outcome. However, when the compensation requisition relies on fault proofing criminal guilty has a contribution with in evidentiary value.

The Ethiopian Criminal Code criminalized homicide by professionals including drivers negligently and stipulated penalty (Criminal Code of Ethiopia Proclamation No 414/2004,Art 543) When number of victims counted more than one or the infringement of right caused from deliberate intention, the punishment inflicted will be changed in to rigors. (Ibid, Art 543(2)) The law makes punishments stronger than the former law among other purposes to deter wrong doer from involving in criminal activity.

However, the criminal law enforceability has failed to be effective. Among 18 cases instituted in 2018/19 in Hawassa City High court 14 cases closed because of non-appearance of witness as per Article 142 of criminal procedure code. Two accused set free since they have not found guilty of the offence. The rest two offenders found guilty and penalized their punishment has been suspended. In nutshell, no criminal offender has gone to jail to serve any criminal punishment with regards to vehicle accident. It is possible to grasp the fact of non-effectively deterrence on RTA in criminal case too. The reason of closing of criminal cases in RTA is Victims and offender used to settle their controversies outside the court (Hamerson, 2019). Negotiation on the amount of compensation prevails over the criminal policy importance. The issue of public interest behind criminal laws has been over ridded by private interest.

Having vehicle insurance against third party risk coverage

One of Vehicle insurance against third party Risks proclamation enactment explicit rationale is "... to require owners of vehicle to have third party insurance coverage against third party risks." (Vehicle insurance against third party risks proclamation, proclamation number 799/2013, preamble, paragraph three) With this the proclamation imposes a prohibition of driving motor vehicle on a road unless otherwise there is valid insurance coverage against third party risks (Ibid Art 3(1)) The purpose of having the stated insurance coverage is to make the insured vehicle to cover the compensation and expenses of emergency medical treatment. However, having insurance coverage seems not respected. According to the informants' response, among 431 responds, 211 respondents, i.e. 49 percent affirmed the vehicle which caused the accident has not insurance coverage. Only 148 that is 34.3 percent affirmatively to the presence of insurance against third party risk to the vehicle caused the accident. This finding asserted that Article 3 (1) of the proclamation is not respected in full manner. By such failure, the purpose of covering compensation and medical expenses become defeated at least in half.

Emergency medical treatment

Having emergency medical treatment up to Birr two thousand is the right of a person who sustain injury from vehicle accident. (Ibid, Art 27). However, in practice during emergency the insurance coverage has not meet its requirement, only around 2 percent expenses of emergency medical cost covered by an insurance company. As to victims' respondents, 70 percent of the emergency medical cost covered by the victims. Among 431 respondents, only 77, that is 17.9 percent confirmed that their emergency medical treatment cost has covered by the driver representatives.

CONCLUSION

The prevalence of motorcycle accident injuries in this study was higher than the previous works of literature. Poor road conditions and bad weather conditions were responsible for the higher prevalence of motorcycle accident injuries. This study also revealed that rainy weather condition was significantly associated with motorcycle accident injuries.

The finding in the current study revealed the magnitude of PTSD was 15.4%. Also, duration since accident (30-90 days), history of previous road traffic accident, depression and common mental disorder (CMDs) were factors associated with PTSD.

Road accidents pose a serious drain on scarce financial resources and medical services. Road Traffic Accident victims mainly belong to the most productive age range and have often just begun to pay back their debts to society. Based on the findings of the study, the cost based on causality of damage only, slight, serious and fatal road traffic crashes were 540,057; 30,843.75; 44,546.5 and 244,773 Birr respectively in the study area. Based on this estimated road accident cost, it can be said that road accidents do not cause only losses in lives of productive members of the population and a substantial number of disabilities and injuries but also generate a gigantic loss to the country's economy. It is timely to urge all agencies concerned to put forward more efforts, as well as sufficient manpower and other resources, to effectively address the road traffic accident problems. There is the need for more efforts and resources to be channelled to address the issues of road traffic safety in the country. Even though intangible costs (lost output and human costs) are big burden of victims and their families, friends and relatives as well as a whole society, those costs are unrecognizable yet to people. The estimation of those intangible costs among the overall costs of road accident is to highlight appropriate recognition and awareness of a whole society to traffic safety aspect. It is necessary that the government should invest more into traffic safety database system to have better statistics and data of road accidents. It would be very useful for the analysis and decision making in improving the road traffic safety in the country.

RTI has been global problem which has impacts on personal, family and social life. So as to tackle these overall RTI troubles, beyond the necessity of having preventive mechanism in the country, designing and implementing victim's treatment and rehabilitation system in post-accident/crash phase is non escapable. Different jurisdiction have seen implementing road safety policy and other legislative as well as executive mechanism to prevent RTA and to reduce RTI. Beyond different preventive mechanism, they have striving to handle post-crash issues in proper manner. In addition to that the compensation mechanisms become sophisticated and sensitive. Countries crafted guide line to establish reasonable compensation system for personal injury and they have tried to encompasses some abstract losses like pain and suffer and loss of life comfort. On the other way, the Ethiopian Law of Compensation for Damage, which is part parcel of The 1960 Ethiopian Civil Code, Titled as Extra contractual liability, is old law. Even if it has an objective to reinstate the victim to previous position, since the amount of compensation is expected to be equivalent or equal to loss, no other objectives which are compatible with other countries tort law. In practice the implementation of the law has not been seen plays deterrence purposes. Distributions of loss also have failed to achieve since all dependents are not with right to claim compensation in fatal incident. The country has not road safety policy. As well, Ethiopia is not signatory's to African Road safety charter and party to UN road traffic conventions and other documents. The nonexistence of guide line to calculate general personal injury caused a problem in providing verdict to actual cases. It is dependent on the amount of lost income or benefit and reduction of working capacity, save to some decision pertaining to equity. The 3rd party risk insurance scheme of the country seems not in line with resolving the compensation problem. The maximum amount of compensation for personal injury is ETB 40,000.00. The same with respects to compensation of property damage which sealing is fixed in ETB 100,000.00. Even the law allows a party who is not satisfied with the compensation can take his case to the court of law, it is became a burden since it is forced the victim to face double procedure to a single compensation. The amount of moral injury in no case cannot be more than 1,000 ETB. Such maximum sealing was set in 1960. After half a century no improvement has been made. Courts also refrain from amending the amount by way of interpretation. Compensating a moral harm with nearly 30 US Dollar irrespective of the extent of damage and number of victims cannot be considered. The purpose of compensation has defeated here. However a moral damage for copy right is goes up to ETB 100,000.00. Is there any difference between one moral harm and other moral harm? What about equality before the law. Scope of moral harm is also general and narrow. No one worried about suffer and pain, life comfort loss and mental trauma. Even in criminal case, incrimination of wrong doer is near to zero. Most files closed because of lack of evidence. Lack of enforcement envisage in 3rd party risk insurance with regards to having the stated insurance for Motor bicycle. Emergency treatment cost is subjects to the pocket of victims mostly. Emergency treatment center yet are not realized.

RECOMMENDATIONS

- Creating awareness and implementing traffic laws is highly recommended to reduce the risk of motorcycle accident injuries
- Adult Emergency and orthopedic clinic better to screen and treat PTSD among survivors from a road traffic injury.
- Due focus should be given for post-crash management.
- The concerned body should cooperatively work with insurances to gather summary of statistics on the costs of vehicle repair periodically and with Ministry of Health to have a separate section for road accident casualties in its vital registration books and routine publications.
- A separate detail study on underreporting of traffic accidents is very much required and this study strongly recommends conducting research on this topic to arrive at a more dependable and realistic estimate.

- Research efforts are strongly required in the area of road safety in Ethiopia. For instance reducing the number of fatal accident will result in huge economic savings. There are also high economic returns in any research effort that can reduce accident severity and frequency.
- The country should strive to complete the drafting process of road safety policy and hard work to have a policy which better to be compatible with regional documents and up to date concepts.
- Ethiopia should be signatory of African Road safety Charter and UN derived conventions, because it is one of the pushing factor on the government and stakeholders to provide proper emphasis to the matter
- The law of compensation of the country should be up dated to incorporate other purposes of extra contractual liability than indemnifying victims like deterrence distribution of loss.
- The concept of moral harm should be widened to embraces psychological anguish, pain and suffer, loss of comfort of life etc.
- Even if moral harm is not subjects to monetary value, the amount of compensation should be improved. 1,000.00 ETB compensation is outdated from time value of money and inflation perspective. The emphasis on the compensation aspect of morality change in this era obliged to reconsider and change the then intention of the law maker. If a country dare to pay a compensation for copy right infringement moral compensation up to 100,000 ETB, it will not be odd to improve compensation amount for moral harm of RTI. At least courts better to reconsider their decision on moral compensation and improve the concept by way of interpretation in future cases.
- In fatal incidents a right to claim compensation should be given for other dependents based on proof. Because in fatal incidents the compensation expected to be by way of maintenance.
- The amount of compensation in 3rd party risk insurance should be seen in a fresh manner.
- The government should work hard for enforcement of the law including criminal liability.
- To ensure equity and non-discrimination in compensation, the judiciary with consultancy of ministry of health and other concerned body, better to adopt guide line for determination of compensation and craft calculation method to take away the issue from absolute subjective hand of the judiciary.

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