

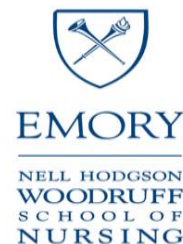
Violence Against Women; Intimate Partner Violence: Association with Maternal Health Service Utilization and Women Empowerment

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Dissertation for the Degree of Doctor of Philosophy (PhD) in Nursing Addis Ababa University-Emory University PhD Collaboration Program, Addis Ababa, Ethiopia

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**ADDIS ABABA UNIVERSITY
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**Violence Against Women; Intimate Partner Violence: Association with
Maternal Health Service Utilization and Women Empowerment**

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THE ADDIS ABABA UNIVERSITY IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY (Ph.D.) IN
NURSING.**

DECEMBER, 2025

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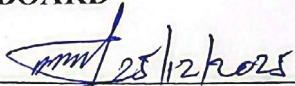
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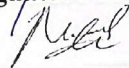
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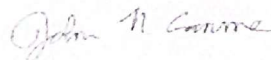
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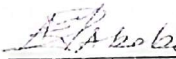
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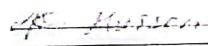
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DEDICATION

THIS DISSERTATION IS DEDICATED TO ETHIOPIAN WOMEN WHO ARE VICTIMS OF
INTIMATE PARTNER VIOLENCE AND, TO THOSE WHO ARE DENIED OF THEIR
AUTONOMY

List of original papers

This dissertation is based on the original papers listed hereunder

- I. Bazie Mekonnen, Abebe Gebremariam, Negussie Deyessa, John N Cranmer. Intimate partner violence and maternal antenatal care utilization: is there a dose-response relationship? Findings from the Ethiopian National Demographic and Health Survey. International Health. 2025;ihaf003. Available @ <https://doi.org/10.1093/inthealth/ihaf003>
- II. Bazie Mekonnen, Abebe Gebremariam, Negussie Deyessa, John N Cranmer. Women Empowerment and Healthcare Utilization for Childhood Illnesses: Evidence From Ethiopia. International Health. 2025; ihaf062. Available @: <https://doi.org/10.1093/inthealth/ihaf062>
- III. Bazie Mekonnen, Abebe Gebremariam, Negussie Deyessa, John N Cranmer. Intimate Partner Violence Among Women in Ethiopia: Is Women Empowerment Protective? Evidence from Ethiopia. (Manuscript).

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List of Abbreviations/Acronyms

ANC	Antenatal care
ARI	Acute respiratory infection
BEmOC	Basic emergency obstetric care
CDC	Center for Communicable Disease
CEmOC	Comprehensive emergency obstetric care
CSA	Central statistical agency
DHS	Demographic and health survey
DV	Domestic violence
EDHS	Ethiopia demographic and health survey
EmOC	Emergency obstetric care
FANC	Focused antenatal care
GAPPD	Global Action Plan for the Prevention and Control of Pneumonia and Diarrhea
IPV	Intimate partner violence
MCH	Maternal and child health
MMR	Maternal mortality ratio
ORS	Oral rehydration salt
SDG	Sustainable development goal
SGBV	Sexual gender-based violence
SSA	Sub-Saharan Africa
SV	Sexual Violence
U5MR	Under-five mortality rate
UN IGME	United Nations Inter-agency Group for Child Mortality Estimation
U5	Under five
VAW	Violence against women
WHO	World Health Organization

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Abstract

Background: Maternal and child mortality from preventable causes remains unacceptably high globally. The majority of the deaths occur in Sub-Saharan Africa (SSA) countries. Adequate and timely utilization of maternal and child health services (MCH) could avert many of these deaths. However, utilization of MCH services remains low in the SSA region. Different factors may deter women from access to and receipt of maternal health services. Intimate partner violence (IPV) is one such common factor. IPV affects maternal health service utilization by denying women's autonomy in decision making, women rights to freedom of movement, and making the victim economically dependent. It is the most prevalent form of violence against women and a common global human rights violation.

Objective: The aim of this study was to assess the association of intimate partner violence on maternal health service utilization and women empowerment, otherwise known as women autonomy.

Method: The data source for this study was the 2016 Ethiopia Demographic and Health survey (EDHS) dataset, which is de-identified, de-linked and publicly available. The EDHS collected data using stratified multistage proportional-to-size allocation sampling technique. We used complex samples regression analysis for this study. In addition, we employed Principal Component Analysis (PCA) and k-means clustering for our research on the association between IPV and women empowerment. This study examined for the presence of a dose-response relationship between IPV sub-types (emotional, sexual, and physical IPV) and maternal antenatal service utilization in paper I. The second paper addressed the research question on whether women empowerment protects mothers from experiencing intimate partner violence. Our third paper assessed the relationship between women empowerment and maternal healthcare utilization for under-five illnesses.

Results: About 2,599 (weighted) mothers currently married or living with a partner were included in our assessment of the relationship between IPV and ANC utilization. Only 30.2% of respondents had utilized adequate ANC service for the last child (ANC-4). The prevalence of maternal life time experience of IPV ranged from 10.3% for sexual violence, to 23.0% and 22.9% for emotional and physical violence, respectively.

The result from the full model complex samples logistic regression analysis found a dose-response relationship between IPV sub-scale scores and maternal antenatal service utilization. A unit increase in maternal life time experience of **emotional** IPV score from 0 through 3 decreased the likelihood of maternal ANC-4 utilization by 22.0% (aOR=0.78, CI=0.64, 0.97). A unit increase in the **sexual** IPV score from 0 to 3 decreased ANC-4 by 32.0% (aOR=0.68, CI=0.50, 0.92). On the other hand, a unit increase in the **physical** IPV score from 0 to 7 increased ANC uptake slightly, although the change was not significant (aOR=1.15, CI=0.97, 1.35).

Our research on the relationship between women empowerment and IPV involved 3689 (weighted) women currently married or living with a partner. The majority (64.3%) of the respondents constituted the more empowered cluster, while 16.0% were from the most empowered cluster. Women empowerment was found to have a significant protective effect on emotional IPV. Women in the most empowered cluster were 69% less likely to experience emotional IPV compared to the least empowered cluster counterparts (aOR= 0.31, CI= 0.17, 0.53). However, we found no significant association between women empowerment and, sexual or physical partner violence.

Our assessment of the relationship between women empowerment and healthcare utilization for under-five illnesses included 2101 cases of children. Children whose mothers are empowered with attitude towards wife beating were found to have 59% more probability of receiving healthcare services towards all U5 illnesses in the complex samples ordinal regression (β = 0.46, cu-OR= 1.59, $P < 0.01$). Children of mothers with no healthcare access problem were also more likely to get health services for all U5 illnesses (β = 0.42, cu-OR= 1.52, $P= 0.01$).

Conclusion: Intimate partner violence deters maternal healthservice utilization. Women empowerment, however, has a positive effect on healthcare seeking. In addition, empowerment protects women from experiencing intimate partner violence.

Key words: Antenatal care, ANC, childhood illness, healthservice utilization, intimate partner violence, IPV, under-five illness, women empowerment.

CHAPTER I

STATEMENT OF THE PROBLEM

In the last two decades, approximately 10.7 million women have died globally due to obstetric complications- two-thirds of these deaths occurred in Sub-Saharan Africa (1). In 2017 alone, 295,000 mothers died globally. The majority (66%) of these deaths occurred in SSA, with a corresponding maternal mortality ratio (MMR) of 542 deaths per 100,000 live births (2). The life-time risk of maternal death is high in SSA, with an estimated death of 1 in 36, compared to 1 in 3300 in high-income countries (1). For each maternal death, 20 to 30 more women suffer acute or chronic pregnancy-related complications, such as obstetric fistula and depression (3).

Under-five mortality is also high in the SSA region. From the global 5 million deaths of children U5 in 2021, nearly 2.8 million (56%) occurred in SSA, with an average under-five mortality rate of 74 deaths per 1,000 live births. This mortality translates to 1 in 14 children dying before kicking their 5th birthday – 15 times higher than the average ratio of 1 in 200 in high-income countries (4).

Neonatal deaths accounted for 47% of the global under-five deaths in 2021, increasing from 40% in 1990. This is so because most childhood health interventions focus on children beyond the neonatal age group (4). Among newborns, the probability of dying in the first month of life in SSA is 1 in 37 compared to 1 in 333 in high-income countries (2, 4).

On current trends, about 40 million children younger than five will die before 2030. Well over half of these deaths, 59%(24 million), will take place in Sub-Saharan Africa (4).

Maternal mortality leaves a range of physical, psychological, and socio-economic burdens to the family, community, and society. Depression, malnutrition, decreased access to needed health care, school dropout or problem enrollment, migration, family fragmentation, changes in labour allocation, and immediate economic challenges due to high direct costs such as medical or funeral expenditures are some examples of the consequences of maternal death (5-8).

Most maternal and child deaths occur from causes for which effective prevention and management interventions are available. Bleeding disorders (mainly postpartum hemorrhage), hypertensive disorders of pregnancy, infection (primarily postpartum), obstructed labor, and abortion are the common direct causes of maternal mortality- accounting for nearly 70% of maternal deaths. Acute

respiratory infections (mainly pneumonia), diarrheal diseases, and febrile illnesses (primarily malaria) account for the three leading causes of under-five mortality (2, 4).

These causes of maternal and child morbidity and mortality could be prevented through utilization of maternal and child health (MCH) services. However, MCH service utilization remains low in SSA(2,4). Intimate Partner Violence(IPV) is a common predisposing factor for inadequate utilization of healthcare services(9). In addition, IPV negatively affects women's physical, mental, sexual, and reproductive health conditions. Globally, 42% of women who have been physically and/ or sexually abused by a partner have experienced injuries due to the violence. Compared to women who have not experienced partner violence, they: have 16% greater odds of having a low-birthweight baby, are more than twice as likely to have an induced abortion, and are more than twice as likely to experience depression. In some regions, they are 1.5 times more likely to acquire HIV, and 1.6 times more likely to have syphilis (9). More than a third (30,000) of the women intentionally killed in 2017 were killed by their current or former intimate partner (10). A study in South Africa found that of the 3,797 female homicides, 50.3% were from IPV (11).

Women victims of spousal violence are also more likely to have an unwanted pregnancy, abortion, miscarriage, and stillbirth (12-15). One DHS analytical study indicated that in 6 out of 10 studied countries, women with a history of partner violence were 1.48 to 1.72 times more likely to experience pregnancy termination (abortion, miscarriage, and stillbirth) than those free of such experience (16). Another Systematic review indicated that while physical and sexual IPV increased the risk of induced abortion, emotional IPV was strongly associated with spontaneous fetal loss (17). Children who witness marital violence are also more likely to develop anxiety, depression, poor school performance, low self-esteem, disobedience, nightmares, physical health complaints, and death in extreme cases. IPV is also associated with absenteeism and reduced productivity in the workplace, which may affect social and economic well-being and exacerbate the risk of poor health outcomes for survivors and their families (18-21).

Violence leads to low maternal and child health service utilization and several adverse reproductive health outcomes through direct and indirect routes. In addition to the direct injury and /or death of mothers from partner violence, the biological stress response, the behavior exhibited by the women in response to the abusive relationship, and the psychological control are the main mechanisms predisposing the victim to untoward health conditions. Growing evidence

suggests that the abusive partner's psychological control makes the woman financially dependent, limiting women's ability to control their sexual and reproductive decision-making, their access to health care, or their medication adherence. All these violence-related maternal behaviors and outcomes will limit women's health service utilization and lead to adverse health conditions (9).

Though considerable progress has been made, particularly in recent years, the goal of reducing maternal and child mortality by 75% by 2015 was not met. The world envisions that by 2030, every country should reduce its maternal mortality ratio (MMR) by at least two-thirds from the 2010 baseline. No country should have a MMR higher than 140 deaths per 100,000 live births (twice the global target). The global vision is that all countries reduce neonatal mortality to as low as 12 deaths per 1,000 live births and under-five mortality to at least as low as 25 deaths per 1,000 live births by 2030 (4, 22-24).

Ethiopia has significantly reduced maternal and child mortality since the last decade of the 20th century. However, the country is still categorized among the global high-burden states. In 2017 alone, 14,000 mothers and 191,000 children under five died in the country (2, 4). The country has a high MMR of 412, and nearly 11% of mothers experience adverse pregnancy outcomes (25). It is estimated that 3,500 mothers in Ethiopia develop a fistula yearly, with a prevalence of 37,500 untreated fistula and 161,000 urinary incontinence cases in 2010 (26). The country is also one of the five countries where half of all under-five deaths occurred in 2018 (4). Low coverage of MCH service utilization underlies the country's high maternal and child morbidity and mortality.

Purpose of the study

Most of the maternal and child mortality occurs from causes for which effective and low-cost interventions are available (1-4, 27). The World Health Organization (WHO) has since long put in place strategies to mitigate this catastrophic health outcome. Adequate and timely utilization of maternal and child healthcare (MCH) services including antenatal care, skilled delivery care, and child healthcare services- play a crucial role in this regard (3, 27-28). However, in high-burden countries, like SSA, access to and receipt of routine and emergency maternal and child healthcare services remains low. This inadequate utilization of MCH services is commonly cited as a predisposing factor for the high maternal and child morbidity and mortality in the region (27-28).

Different factors may deter mothers from accessing and receiving essential maternal and child healthcare services. Intimate partner violence (IPV) is one such factor. Though findings are mixed, different studies indicate that women who experience IPV are less likely to seek and/or receive maternal and child healthcare services than those free of such experience (9, 29).

The measurement of IPV entails a number of items mapped to its sub-domains. However, studies done so far managed maternal experience of IPV as a yes/no binary variable. This approach fails to consider the number of violence behaviors a woman had experienced. Hence, it has the potential to obscure the true predictor- outcome relationship. A recent study underscored the challenge associated with IPV dichotomy and recommended researchers to use alternative violence conceptualization and coding approaches(30).

Building from the argument and the research findings above, the first aim of this research managed maternal experience of violence as a count data and assessed for a potential dose-response relationships between IPV and maternal ANC utilization.

One way by which IPV leads to untoward maternal and child health outcomes is through denying women autonomy in decision making, freedom of movement, and making the woman financially dependent. We, therefore, assessed whether empowered women are less likely to experience IPV and, by extension, more likely to utilize healthcare services(research aims 2 and 3). We used data from the 2016 Ethiopia Demographic and Health Survey(EDHS) for this dissertation research.

Specific aims. This dissertation research addressed the following research aims:

- 1: Assess the association between the number of partner violence behaviors women experienced and utilization of adequate antenatal care services for the last child born before the 2016 demographic and health survey Ethiopia.
- 2: Examine the association between maternal experience of intimate partner violence and women empowerment.
- 3: Assess the association between women's empowerment and healthcare utilization for under-five illnesses.

Our research findings would supplement the evidence base on alternative approaches of IPV conceptualization and coding, prevention of partner violence, and improving MCH service utilization in SSA.

BACKGROUND AND SIGNIFICANCE

Intimate Partner Violence: Overview and Definition

Violence against women (VAW) is a significant public health problem and a fundamental violation of women's human rights. Unfortunately, no standard internationally accepted terminology describes violence against women (31). However, since violence affects women disproportionately more than men, gender-based violence (GBV), violence against women (VAW), domestic violence (DV), and intimate partner violence (IPV) are often used interchangeably (21,31). IPV is used to differentiate violence between two people involved in a romantic relationship from other types of domestic violence, such as child abuse and elderly abuse (32). Unless specified otherwise, the term 'intimate partner violence' (IPV) is used for this study.

Intimate partner violence is the most common form of violence against women globally, with devastating physical, psychological, and economic consequences for the victim (9,33-34). IPV refers to any behavior within an intimate relationship that causes physical, psychological, or sexual harm to those in the relationship. Such conduct includes: 1. acts of physical aggression – such as slapping, hitting, kicking, and beating; 2. psychological abuse – such as intimidation, constant belittling, and humiliation; 3. forced intercourse and other forms of sexual coercion; 4. various controlling behaviors including isolating people from their family and friends, monitoring their movements, and restricting their access to information or assistance (34). Psychological violence often occurs before or concurrently with physical or sexual abuse (35). IPV is classified as 'severe' if the woman has ever been kicked or dragged, strangled or burnt, or threatened with a knife/gun or another weapon by her husband/partner. Some authors also classify sexual violence as a severe form of partner violence (9,21,33-34,36).

Magnitude of IPV

The economic and sociocultural factors that foster a culture of violence against women predispose mothers to experience more partner abuse behaviors in developing countries. Compared to the global 30%, close to 37% of ever-partnered women in Africa have experienced some form of physical and/ or sexual violence by their intimate partner (9, 36).

A study in Nigeria found a 23.5 % general IPV prevalence. The study further indicated that 18.0, 13.5, and 4.7% of couples surveyed had experienced emotional, physical, and sexual violence,

respectively (37). Another study in Nigeria found a 15% and 3% lifetime prevalence of sexual and physical violence, respectively (38). In Ghana, 33.6 % of ever-married women had ever experienced domestic violence (39). A national survey report in Malawi estimates that 21.7% of Malawian women have experienced physical intimate partner violence, 18.9% sexual intimate partner violence, and 25.2% emotional intimate partner violence. The survey indicated that economic intimate partner violence (restricting women's access to money or their ability to generate income) affects close to one in three Malawian women (40).

A systematic review of studies done in Ethiopia from 2000 to 2014 indicated that the lifetime prevalence of violence against women by husband or intimate partner ranged from 20 to 78 %. The study showed that 31% to 76.5% of women had physical violence, 19.2% to 59 % had sexual violence, and 51.7% had a mean lifetime emotional violence (41). Another study in western Ethiopia found a 76.5% and 72.5%, respectively, of lifetime and past 12 months intimate partner violence experience against women. The study indicated that the overlap of psychological, physical, and sexual violence was 56.9% (42). A similar survey in Kersa town of the Oromia region found a 19.6% ever experience of IPV (43). A study in the Awi zone of Amhara regional state indicated a 78.0% ever experience partner violence among women. The survey further indicated that 73.3%, 58.4%, and 49.1% of the respondents experienced psychological, physical, and sexual violence, respectively (44).

Causes and predisposing factors of IPV

Many theoretical perspectives and models have been developed to explain factors affecting women's risks of IPV and guide research. While the feminist perspective ascribes patriarchy and male dominance, the sociological perspective attributes prior experiences of violence and unequal resources in relationships as predisposing factors for IPV (45-48). The ecological model is yet another more comprehensive approach on factors leading to IPV (49-50). The model categorizes these factors into individual, relationship, community and societal predispositions. Grouped under the individual elements are; being a victim of childhood maltreatment, psychological/personality disorder, alcohol/substance abuse, and a history of violent behavior. Poor parenting practices, marital discord, violent parental conflict, household low socio-economic status, and friends engaging in violence are listed under relationship factors.

According to the model, the community factors included; poverty, high crime levels, high residential mobility, high unemployment, local illicit drug trade, and situational factors. The societal factors are rapid social changes, gender and socio-economic inequalities, poverty, weak financial safety nets, the flawed rule of law, and cultural norms that support violence (49-50).

Some examples of community/societal norms and beliefs that support violence against women include: a man is socially superior and has a right to assert power over a woman; he shall physically discipline a woman for 'incorrect' behavior; physical violence is one means of settling conflict in a relationship; sexual intercourse is a man's right in marriage; a woman should tolerate partner violence to preserve family integrity; a woman deserves to be beaten sometimes; sexual activity (including rape) is a marker of masculinity and; girls are responsible for controlling a man's sexual urges (21).

An interplay of these violence predisposing factors explains the occurrence or non-occurrence of IPV, research indicates. In addition, some risk factors, such as the experience of childhood physical or sexual violence, may predispose IPV victimization and perpetration at the same time. Some risk factors may also be associated with each other (45-51).

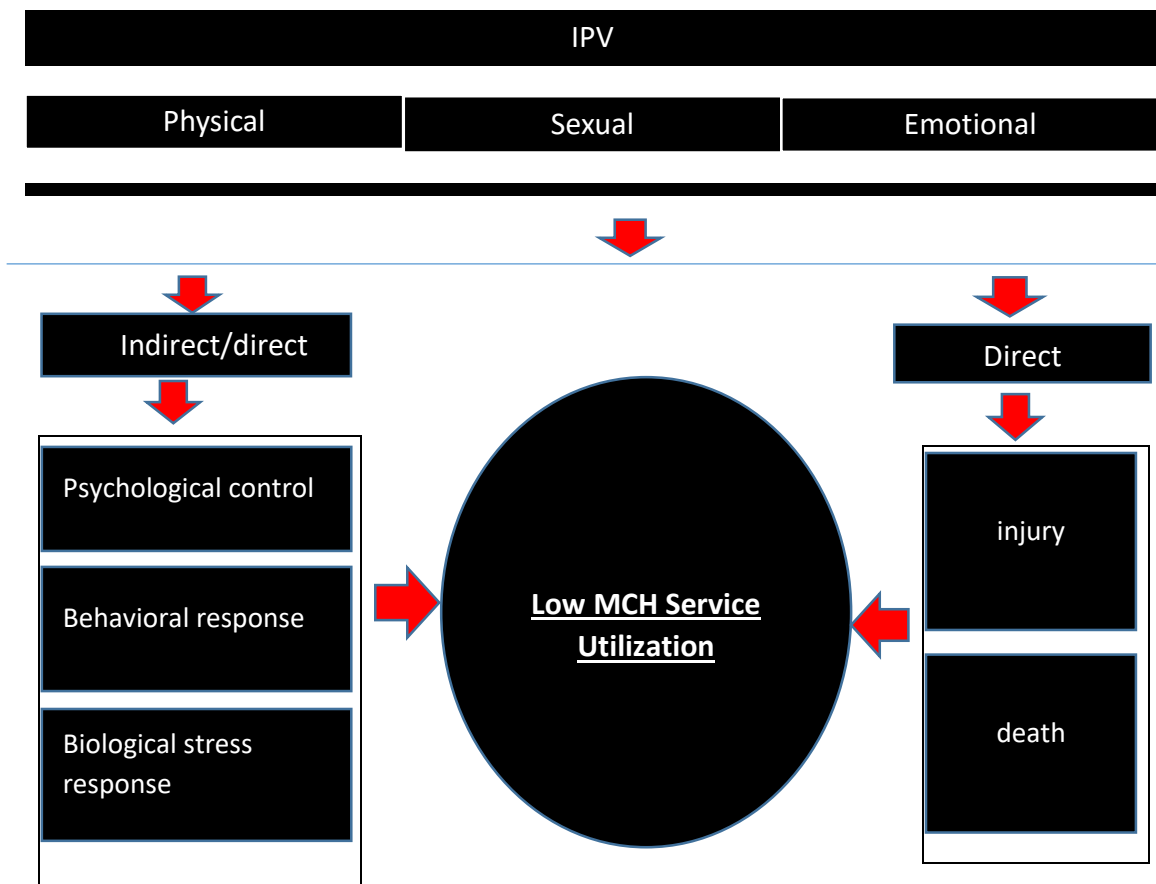
Different research have examined the violence risk factors as outlined in the theories and models. Although the findings vary, most studies indicate that secondary education, high socio-economic status (SES), and formal marriage offer protection against intimate partner violence. On the other hand, alcohol abuse, cohabitation, young age, attitudes supportive of wife-beating, having outside sexual partners, experiencing childhood abuse, growing up with domestic violence, and experiencing or perpetrating other forms of violence in adulthood were found to increase the risk of IPV (9, 11).

Mechanism of producing adverse health outcomes

Women victims of intimate partner violence are prone to develop a range of serious short- and long-term physical, mental, sexual, and reproductive health problems. The pathways and health effects model of IPV explains how violence leads to adverse health conditions. The model indicates that the pathways are often complex and include: 1. the direct pathway of violence—resulting in injury and death directly, and 2. the other direct and indirect routes, which comprise; the biological stress response (which results in the production of harmful chemicals/hormones), the behavior exhibited by the women in response to the abusive relationship (use of alcohol,

tobacco, and/ or other drugs) and, the psychological control- the male partner in an abusive relationship might attempt to control and/ or limit the behavior and social interactions of their female partner (9). Among the psychological control behaviors exhibited by the male partner are limiting social and family interactions, insisting on knowing where she is at all times, being suspicious of unfaithfulness, getting angry if she speaks with another man, and expecting his permission to seek health care. These behaviors can limit women’s ability to control their sexual and reproductive decision-making, access to health care, or medication adherence (9, 33-34) (**fig 1**).

Fig 1: Schematic presentation of how IPV leads to low MCH service utilization for the dissertation research on the relationship between IPV, health service utilization, and women empowerment



Although IPV affects women more and leads to a range of adverse conditions, many still blame the women themselves for being subjected to violence (9). In the case of partner violence, women are blamed for talking to another man, refusing sexual intercourse, not asking permission from their partner (e.g., for going out or visiting their family), or for not conforming to their role as wives/ partners in some other way. In non-partner sexual violence, women are blamed for deviating from accepted social functions, being in the wrong place, or wearing the wrong clothes (9).

Most women don't leave a violent relationship for reasons of economic challenges, concern for children, fear of retaliation, lack of support from others, stigma related to divorce, love, and hope for partner change (21,31,33,52).

Prevention of violence

Violence is not an inevitable societal problem. The attitude and behavior, social, economic, political, and cultural conditions that lead to violence can be changed. Three levels of public health interventions for preventing violence include primary prevention, which consists of approaches that aim to prevent violence before it occurs; secondary prevention- approaches that focus on the more immediate responses, such as pre-hospital care, emergency services, or treatment for sexually transmitted diseases following rape, and tertiary prevention – approaches that focus on long-term care for victims, such as rehabilitation and reintegration, and attempts to lessen trauma or reduce the long-term disability associated with violence (34).

The set of specific strategies that have demonstrated promise or effectiveness in the prevention and control of violence include: reforming civil and criminal legal frameworks ; organize media and advocacy campaigns to raise awareness about existing legislation; strengthen women's civil rights related to divorce, property, child support and custody; build coalitions of government and civil society institutions; build the evidence base for advocacy and awareness; use behavior change communication to achieve social change; transform whole institutions in every sector using a gender perspective; integrate attention to violence against women into sexual and reproductive health services; promote social and economic empowerment of women and girls; build comprehensive service responses to IPV survivors in communities; design life-skills and school-based programmes; engage men and boys to promote nonviolence and gender equality; and provide early-intervention services to at-risk families (21).

In low-resource settings, promising prevention strategies include economic and social empowerment of women through microfinance and skills training related to gender equality, activities that enhance communication and relationship skills within couples and communities, actions that reduce access to and harmful use of alcohol, transforming harmful gender and social norms through community mobilization, and group-based participatory education with women and men to generate critical reflections about unequal gender and power relationships (10,53).

Addressing IPV in healthcare setting

Prevention, management, and control of violence entail a multi-sectoral approach. IPV interventions are complex, requiring more than healthcare provider training to enable effective program functioning within a health system (54). In general, the health sector can: advocate violence against women to be an unacceptable public health problem, provide comprehensive services and address the needs of survivors holistically and empathetically, prevent the recurrence of violence, promote egalitarian gender norms and comprehensive sexuality education curricula, and generate evidence on what works and on the magnitude of the problem. The health care setting is an important place where women undergoing abuse can be identified, provided with support and referred, if necessary, to specialized services (34).

The world health organization (WHO) does not recommend universal screening or routine inquiry about IPV, although some developed countries are implementing the approach. However, common clinical searches about IPV should be strongly considered at antenatal care visits when assessing conditions that may be caused or complicated by IPV and where the minimum WHO requirements for screening are met (12). The minimum requirements are a protocol/standard operating procedure and include: training on how to ask about IPV and provide the minimum response or beyond, a private setting, confidentiality ensured, a system for referral in place, and time to allow for appropriate disclosure (55).

Evidence indicates that unless post-screening interventions are available, screening for IPV alone has not shown a reduction in intimate partner violence, nor any notable benefit for women's health (55). However, women who talk to their providers about their experience of abuse are more likely to use an IPV intervention to which their providers refer them (56). Yet, women victims of violence

who had access to a health service often do not discuss their abuse with health care providers due to low screening rates in health care settings (34,57).

Healthcare providers cite several factors for not asking about IPV during patient encounters including; the absence of a clear protocol for screening practices, that it is a criminal justice issue, a domestic matter, lack of time, low self-efficacy, discomfort with the topic, or lack of knowledge. Providers also note that the lack of clear referral and follow-up protocols for patients who disclose abuse, leaves them with a sense that they are limited in offering help (55,58-60). Maternal barriers to not discussing such issues with the care providers include shame and embarrassment, fear of retaliation, fear that their children will be taken away, and concerns that the police might become involved and arrest their partner (56,58). Targeted provider training, technical assistance, and education on IPV screening, referral protocols, and adopting broad system changes could be practical in helping providers overcome these barriers (58).

Violence against women: Ethiopia's situation

Inline with global and national commitments, the government of Ethiopia has developed policy, legislative, institutional, and strategic measures to address violence against women and girls(VAWG). The 1995 constitution of Ethiopia lays the ground for equal rights of men and women. It prohibits discrimination based on sex (61). Key policies that reinforce gender equality goals and objectives are; the National Population Policy, the Health Policy, and the National Policy on Ethiopian Women(62). The Revised Family Code in 2000, the 2005 Revised Criminal Code, the 2017 Women's Development and Change Strategy, the GTP II, and the second National Human Rights Action Plan 2016-2020 are among the critical strategic moves by the government in the prevention and control of VAWG(63).

The Gender Directorate at the Federal Ministry of Health (FMOH) was created in Ethiopia in 2008. National management and training manual on sexual violence(SV), incorporation of sexual and gender-based violence (SGBV) in the medical school curriculum, and establishment of model clinics for survivors of SV were accomplished in 2009. To address gender inequalities that may be impacting the utilization and/ or delivery of health services, the country released an updated health sector gender mainstreaming strategy in 2013 that helped integrate gender into the sector's routine activity at all levels. A national standard operating procedure (SOP) for the response and prevention of SV that clarified the roles and responsibilities of the different stakeholders_ the

health providers, the client, the police, and the judiciary_ was developed in 2016 (62). Unique victim-friendly benches are also set up in the justice system to handle child victims of SV. In addition, special offices and women and children protection centers have been established by public prosecutors and the police, respectively (62).

Although violence against women has been accepted as a critical public health and clinical care issue, it is not still included in the healthcare policies of many countries (55). The evidence in Ethiopia shows that comprehensive prevention, management, and control approaches to violence are yet to be implemented. The focus of FMOH is on preventing and responding to sexual violence, particularly on addressing survivors of rape(62). Research done to assess the health sector's response to IPV in Ethiopia indicated the absence of well-established and consolidated IPV services within the health care system. The study outlined system and related structural issues, gaps in professional competencies, tolerant cultural norms, and low IPV reporting and disclosure practices as the barriers to efficient health systems' response in Ethiopia (64).

Intimate partner violence costs Ethiopia about \$1.3 billion annually; this is related to the economic burden from maternal(the victim) and household losses, as well as potential service provision costs for the victim women(63). IPV also causes a number of adverse maternal and child health outcomes. However, the country still lacks a comprehensive violence prevention management and control strategies.

Maternal and Child Health Services

Antenatal care for pregnant women

Antenatal care is a right for any pregnant woman. Every pregnant woman should receive adequate, quality antenatal care free of charge (65). Antenatal care is defined as the care given by skilled health professionals to pregnant women to ensure they achieve the desired maternal and neonatal outcomes. It is considered the key indicator of SDG 3, target 3.1, which aims to reduce the global MMR to 70 (3,12, 27).

Quality antenatal care service from a skilled health provider helps avoid maternal and newborn deaths and pregnancy-related complications (1, 3-4). It reduces maternal and perinatal morbidity and mortality directly by detecting and treating pregnancy-related complications, and indirectly by identifying women and girls at increased risk of developing complications, thus ensuring referral for better care (12). Quality of care depends on the provision and content of ANC and women's experiences of ANC, which relies on the availability of the health-care provider and physical resources (66)

In a bid to improve service quality, ANC has evolved through different models- from the traditional care model (since the early 1900s, which used to recommend 16 visits), to the focused antenatal care (FANC) (since 2002) and the current (from 2016 on) ANC for positive pregnancy model (12, 66-67). The new ANC model is a goal-oriented approach to delivering evidence-based interventions focusing on the quality and content of care- including clinical care and the adolescent girl's or woman's experience (12, 66-67).

The current ANC model aims to provide pregnant women with respectful, individualized, person-centered care at every contact, with the implementation of effective clinical practices (interventions and tests), relevant and timely information, and psychosocial and emotional support. Within this model, the word "contact" has been used instead of "visit", as it implies an active connection between a pregnant woman and a healthcare provider that is not implicit with the word "visit" (12). The model recommends a minimum of eight contacts with a trained health care provider- with the first contact scheduled to take place in the first trimester (before 12 weeks), two contacts in the second trimester (at 20 and 26 weeks of gestation), and five contacts in the third trimester (at 30, 34, 36, 38 and 40 weeks) (12).

The goal of ANC is to prepare for birth and parenthood as well as prevent, detect, alleviate, or manage health problems that could occur during pregnancy and affect mothers and babies- vis-à-vis- complications of pregnancy itself, pre-existing conditions that worsen during pregnancy and effects of unhealthy lifestyles (67).

The essential elements of antenatal care a pregnant woman receives that help achieve the goals and aims of the program includes identification and surveillance of the pregnant woman and her expected child; recognition and management of pregnancy-related complications and underlying or concurrent illness; screening for conditions and diseases; preventive measures including tetanus toxoid immunization, iron and folic acid and; advice and support to the woman and her family for developing healthy home behaviors and a birth and emergency preparedness plan. These contents are not prescriptive; but contextualized according to one's national health situation (12,67)

Utilization of antenatal care services

Nearly 15% of pregnancies result in obstetric complications and maternal and perinatal mortality (68). Evidence shows that 25% of maternal deaths occur during pregnancy- much of which could be prevented through adequate and timely antenatal care interventions. A case-control study done to assess factors associated with maternal death from direct pregnancy complications found that mothers with inadequate antenatal care utilization were about 16 times more likely to die than their counterparts (69)

A prospective cohort study on 9117 mothers done to assess the association between utilization of antenatal care and severe maternal and perinatal morbidity found that inadequate utilization of antenatal care was associated with severe maternal (AOR:2.40) and severe perinatal (AOR: 2.27) morbidity. The study indicated that 2.91 % of mothers and 5.47% of newborns or fetuses developed extreme adverse health conditions (70). An ecological survey in SSA done to determine the factors associated with maternal mortality ratio found a significant inverse relationship ($r = -0.413$) between MMR and utilization of antenatal care (71).

However, the utilization of adequate and timely ANC services remains low in SSA. Only 53% of pregnant mothers in the region received sufficient (at least four visits) antenatal care in 2020 (72). A cross-sectional study done in two states of Nigeria to examine factors associated with ANC service utilization found that only 40% of women in Bauchi and 46% in Cross River had at least

four ANC visits. The study indicated that women education, urban residence, health worker information, family members' help, and household motorized transport are factors associated with ANC use in both states (73).

Another study in Ghana, which assessed the relationship between women empowerment and ANC utilization, found that 74% of participants had adequate service utilization (74). A cross-sectional study done in Nepal to examine ANC service utilization found that nearly 73% of women had at least four ANC visits. The study indicated women's age, type of family, and mothers' education as significant predictors of service utilization (75).

The 2016 EDHS showed that 32% of women who had a live birth in the five years before the survey had at least four ANC visits during their last pregnancy. Among these women, 62.4% received ANC from a skilled provider at least once for their last birth, while 37.1% had not used ANC service at all(25). The survey also indicated that non-skilled providers attended 0.5% of ANCs

A meta-analysis study in Ethiopia to assess factors related to ANC use indicated that 64% of mothers had at least one ANC visit. The study outlined that urban residence, women's education, husband's education, and planned pregnancy were significant predictors of ANC service utilization (76).

Another study to identify factors affecting antenatal care use found that nearly 37% of the women had utilized a minimum of 4 ANC services. The study indicated that place of residence, region, mothers' education level, and household wealth index were significant predictors of ANC utilization. It also showed that desire for pregnancy, frequency of reading newspapers, frequency of listening to the radio, and frequency of watching television were other significant predictors of ANC utilization (77).

A community-based cross-sectional study in Tigray to assess the determinants of ANC and delivery care utilization found that 54% of the respondents had at least one prenatal visit to a health institution. According to the study, significant predictors of ANC utilization were marital status, education, distance, and the husband's occupation (78).

A literature review of studies done to assess factors associated with ANC utilization indicated that maternal age, number of living children, education, socio-economic status, previous bad

obstetrical history, support from spouse, quality of care, and distance from health care facility were significantly associated with the use of antenatal care (79).

Maternal institutional delivery care services

Appropriate management of childbirth and the period immediately after birth is critical for maternal, fetal, and neonatal survival and health. These essential health conditions can be realized by making pregnancy and childbirth safer by ensuring that women who face obstetric complications have access to timely care (80). Institutional delivery enables mothers to receive emergency obstetric care (EmOC) on time.

Introduced in 2002, EmOC is a life-saving intervention for mothers during pregnancy, childbirth, and the immediate postpartum period (81-82). EmOC encompasses two complementary services: basic emergency obstetric care (BEmOC) and comprehensive emergency obstetric care (CEmOC) packages (82). A BEmOC package contains six crucial obstetric service elements, otherwise known as “signal functions,” that include; administration of parenteral antibiotics, provision of parenteral anticonvulsants, provision of parenteral uterotonics, removal of retained products, manual removal of the placenta, and assisted vaginal delivery. Cesarean sections (CS) and blood transfusions are vital service elements added in facilities that deliver CEmOC (81).

Skilled attendance at delivery and soon after helps prevent and manage pregnancy complications—through monitoring the progress of labor and feto-maternal well-being. It significantly reduces maternal deaths, stillbirths, and early neonatal deaths—a triple return on investment (13).

Utilization of institutional delivery care services

Effective care for women during delivery could prevent as many as 113,000 maternal deaths each year (83). An ecological study in SSA found a significant inverse relationship ($r: -0.572$) between skilled delivery attendance and MMR (70).

Yet, SSA's maternal utilization of institutional deliveries attended by a skilled provider is low. In 2021, only 61% of mothers from the region delivered in a health institution (72). A study in Nigeria done to assess the factors associated with the utilization of obstetric services found that only 37% of the mothers delivered in a health institution. The study indicated that education, residence, wealth level, parity, and antenatal care use strongly predict health facility delivery (84).

Another study in Tanzania found that nearly 67% of mothers delivered in a health institution. The study indicated that region, number of children, household wealth index, four or more antenatal care visits, knowing three or more pregnancy danger signs, and birth preparations were significantly associated with institutional delivery (85).

Studies in Malawi and Ghana, done to assess the factors associated with maternal mortality, found utilization of institutional delivery to be 90% and 69%, respectively(86-87). The study in Ghana indicated no association between institutional delivery and maternal mortality. It concluded that unless health facilities provide emergency obstetric and neonatal care, a mere increase in facility delivery rate will be indifferent to home delivery.

Different studies in Ethiopia found an institutional delivery prevalence ranging from 15.6% to 54.2%, with a marked urban-rural disparity (26, 88-91). A systematic review of studies on factors associated with institutional delivery in Ethiopia found maternal age, residence, educational status of couples, owning radio/TV, parity, ANC visit, frequency of ANC visit, distance from a nearby health care facility, type of pregnancy, age at first pregnancy, a problem during pregnancy, and knowledge of danger signs during pregnancy as determinants for institutional delivery service utilization (92).

Antenatal care and institutional delivery services are provided at a lower cost, if not free, in Ethiopia. Yet, maternal obstetric service utilization in the country remains low. According to the 2016 EDHS report, only 32% and 26 % of mothers received adequate antenatal care and attended their deliveries at health institutions, respectively (25). The survey indicated that 98.9% of health facility deliveries and 2.4% of deliveries conducted outside a health facility were attended by a skilled provider.

Healthcare services for under-five children

Tremendous progress in child survival has been made over the past decades. In 2021, the total number of deaths among children under five decreased by nearly 60% from the 12.5 million deaths in 1990 (4). The global under-five mortality rate fell to 38 deaths per 1,000 live births in 2021, a 50% decline from the baseline in the year 2000. The neonatal mortality rate fell to 18 deaths per 1,000 live births in 2021, a 42% decline from the 2000 baseline(4,83).

Yet, millions of children under -five continue to die globally. Five million children under five died in 2021 alone. Neonatal death contributed the highest (47%) share of the global under-five mortality. Compared to reducing mortality rates among children aged 1–59 months, progress is slower in lowering neonatal mortality rates. Preterm birth complications, intrapartum-related adverse events, sepsis, and congenital abnormalities contributed the highest (85%) share of the causes of neonatal death (4,83). The chances of child survival show widespread regional disparities. Sub-Saharan Africa remains the region with the highest under-five mortality rate. In 2021, the area had an average under-five mortality rate of 74 deaths per 1,000 live births (4,83).

Low utilization of obstetric services is a common predisposing factor for perinatal complications and neonatal death. A study on 2139 mothers who delivered at a teaching hospital found that women with less than four ANC visits were significantly more likely to have low-birth-weight babies and babies with a 5th-minute Apgar score of less than seven (15).

A retrospective cross-sectional study done to assess the determinants and consequences of home delivery found that nearly half of home-delivered infants died and indicated that institutional delivery and prenatal care could have averted this death (16). Another study on 471 hospital-delivered mothers found that women with less than four ANC visits (AOR: 1.74) and previous home delivery (AOR: 1.87) were more likely to develop perinatal complications. The study indicated that 24.9% of the respondents developed some form of adverse perinatal outcomes like stillbirth, low Apgar score, congenital malformation, meconium aspiration, need for resuscitation, and macrosomia (17).

Most deaths among children under five are caused by readily preventable or treatable diseases with proven, cost-effective interventions. The infectious diseases pneumonia (15%), diarrhea(8%), and malaria (5%) remain the leading causes of death globally. Most child deaths from pneumonia and diarrhea occur in the world's poorest regions – with nearly 90% in sub-Saharan Africa and South Asia (4,28).

Different proven child health services are targeted to prevent U5 morbidity and mortality from pneumonia and/or diarrhea: exclusive breastfeeding for six months; use of vaccines against the common causes of pneumonia, diarrhea, measles, and pertussis; use of guidelines for the identification and treatment of pneumonia and diarrhea; and, provision of ORS and zinc supplements for diarrhea are common such interventions (4,27-28).

A global call to action for child survival in 2012 pledged to reduce child mortality to 20 or fewer deaths per 1000 live births by 2035. In response to this call, the integrated Global Action Plan for the Prevention and Control of Pneumonia and Diarrhea (GAPPD) was formulated in 2013- two years before the Millennium Development Goals (MDG) closure. GAPPD revised goals and targets, consolidating those that have already been accomplished and striving towards achieving those that have not yet been reached (28).

The GAPPD program goals are to reduce U5 mortality from pneumonia to fewer than 3 per 1000 live births and mortality from diarrhea to fewer than 1 per 1000 live births. The program promotes good health practices, preventing children from developing pneumonia and diarrhoea, HIV prevention and healthy environments, and treating children sick with pneumonia and diarrhea appropriately. The program targets 90% coverage of access to proper pneumonia and diarrhea case management by the end of 2025 (28).

Utilization of healthcare services for under-five illnesses

Effective, low-cost disease prevention and management interventions help reduce under-five mortality. Early detection and treatment of childhood illnesses is one such component (23,28,83). An ecological study done to identify correlates of child mortality in 82 developing countries indicated that health-seeking for acute respiratory infections, provision of oral rehydration salt (ORS) for diarrhea, and anti-malaria given for children with fever had a significant protective effect on child mortality with a corresponding correlation coefficient (r) values of -0.48, -0.52, and -0.56, in that order (93).

However, health-seeking behavior and child health services utilization in developing countries remain low (24,72,83,93). The UNICEF estimate for the SSA region indicated that while care-seeking for children with ARI symptoms and children with fever was 46% and 60%, respectively, only 37% of children with diarrhea received ORS (72). An ecological study in developing countries indicated that, on average, close to 49% of child caregivers sought care for childhood ARI symptoms from a health institution, while 39% of children with diarrhea received ORS. The study indicated that only 13% of children with fever were given anti-malaria (93).

A study in Nigeria to assess the health-seeking behavior for childhood illnesses found that only 21.6% of the caregivers sought care from a health institution. The study indicated treatment costs and long waiting times as significant reasons for not seeking care (94). A similar study in Kenya

found only 30% of the respondents sought care from a health institution for childhood illness. The study indicated distance, service quality, and cost as the most common reasons for not seeking health care for childhood illnesses (95).

Studies in Ethiopia found health-seeking behavior for childhood illnesses from a health institution ranging from 26.5% to 55.4%. The studies indicated marital status, education, family size, awareness of childhood illnesses, number of symptoms experienced by the child, perceived severity of the disease, perceived benefit of early treatment, and previous history of under-five child death were predictors of healthcare seeking behavior (96-98). According to the EDHS 2016 report, among U5 children who had ARI symptoms, fever, and diarrhea in the two weeks before the survey, only 31%, 35%, and 44% of the caregivers, respectively, sought treatment from a health institution. The report indicated that 7% of the children had ARI symptoms, 14% had fever, and 12% had diarrhea in the two weeks before the survey (25).

The table below (**table1**) presents a summary of MCH service utilization for the SSA region in general, and for selected African countries including Ethiopia.

Table 1: Summary of magnitude of maternal and child health service utilization for the dissertation research on the relationship between IPV, health service utilization, and women empowerment

Description	SSA	Ethiopia		African countries (Sample)	
	UNICEF (2015-2020) (Aggregate)	UNICEF (2015-2020) (Aggregate)	EDHS (2016)	UNICEF (2015-2020) (Aggregate)	
				Nigeria	Ghana
Maternal health services					
Adequate ANC (4+)	53	43	32	57	85
Institutional delivery	61	48	26	39	78
Health seeking U5 illness					
ARI smptoms	46	30	31	40	56
Fever	60	35	35	73	69
ORS diarrhea treatment	37	30	44	40	48

Ethiopia is making significant progress towards lowering under-five mortality. According to the United Nations Inter-agency Group for Child Mortality Estimation (UN IGME) report, the country reduced its 1990 U5 mortality rate of 202 deaths per 1000 live births to 47 in 2021- nearly a three-forth reduction (4,83). Yet, a significant number of children continue to die in Ethiopia. In 2021 alone, 178,000 under-five children died in the country (4,83).

IPV AND MCH SERVICE UTILIZATION

Maternal and child health care services enable mothers and children to receive quality and timely interventions that are proven effective in preventing and/or managing adverse health conditions. During this time, women and children are given health services related to health promotion, disease prevention, screening, diagnosis, and treatment (12,27-28). The period also allows mothers to communicate with and get support from the health care providers on various physical, social, and psychological issues (13-14). These preventive and therapeutic MCH services are integrated in a way that is compassionate and respectful of the care recipient.

More ANC visits will likely increase maternal knowledge of pregnancy and improve the relationship with the care providers. This would help mothers develop a good experience and a positive attitude toward using other MCH services (3,12). In addition, research indicates that adequate utilization of ANC is associated with subsequent high utilization of institutional delivery services. Mothers who attend obstetric services more are also more likely to seek child health services (15-17).

The global focus of MCH services has shifted from a mere increase in service coverage to providing quality care (12-13,28). Quality prenatal care is crucial in achieving the desired maternal and fetal outcomes. In line with this, the WHO has recently revised the focused antenatal care (FANC) model and adopted a new approach called ANC for positive pregnancy experience. The new model has, among others, increased the recommended minimum number of ANC visits from 4 (FANC model) to eight (12).

However, studies indicate that intimate partner violence is a deterring factor for MCH service utilization. A meta-analysis of studies done to assess the associations between intimate partner violence and maternal health care service utilization indicated IPV significantly negatively impacts MCH service utilization. The study found that women who experienced intimate partner violence had 25% decreased odds of using adequate antenatal care and 20% decreased odds of using skilled delivery care compared to those free of experiencing IPV (29).

A study done to assess the association between IPV and maternal healthcare-seeking behavior found a significant inverse relationship in Kenya. The study indicated that women who experienced IPV were 39% less likely to have adequate antenatal care and 26% less likely to

deliver in health facilities after severe IPV exposure. Thirty-eight percent of the women in the study had experienced some form of intimate partner violence in the last 12 months (99).

A similar study in Nigeria to assess the association between intimate partner violence and utilization of maternal health services found that IPV significantly affects health care utilization. Women who have ever experienced emotional violence were 24.2% less likely to utilize skilled antenatal care, 36.0% less likely to have facility delivery, and 37.3% less likely to have professional assistance during delivery. The study indicated that 15.6% of the women had experienced at least one type of physical violence, 4.1% had experienced at least one kind of sexual violence, and 22.4% had ever experienced emotional violence (100).

In Bangladesh, a study to assess the association between intimate partner violence and the use of reproductive health services among married women indicated that 48.2% of the respondents had experienced physical IPV. Furthermore, women who experienced physical IPV were 31% and 46% less likely to have received sufficient ANC and assisted deliveries from a skilled provider, respectively (101).

A similar study in Cambodia found that women with emotional violence were 30% less likely to receive sufficient antenatal care. In contrast, those with physical violence were 50% less likely to have deliveries attended by a skilled birth attendant (102). Another study in the USA indicated that IPV victimization was significantly associated with having foregone care in the past year (AOR 2.59) (103).

A study in Addis Ababa found that women who reported physical IPV in their relationship were, respectively, 52%, 69%, and 65% less likely to use adequate ANC, have a skilled delivery attendant, and deliver in a health facility. The study indicated that women who experienced sexual IPV were 9% less likely to have utilized sufficient ANC (104). IPV is also associated with late entry for ANC. In one study, over half of the pregnant women entered ANC late (>16 weeks). Any lifetime emotional or physical abuse significantly predicted a late entry for ANC among multiparous women. In this survey, women with recent experience of partner sexual violence were 1.55 times more likely to be late entries for ANC in the entire sample (105).

Studies on violence and health-seeking behavior for childhood illness in SSA are limited. In Kenya, a study to assess the relationship between IPV and maternal health care-seeking behavior found that most mothers don't seek care for U5 illnesses. Only 4.6% of mothers reported using antimalarial drugs to treat malaria; 8.1% reported using ORS to treat diarrhoea; 25.2% used antibiotics to treat pneumonia. The study indicated no statistically significant association between IPV and using ORS, antibiotics, or antimalarial drugs for childhood illness (99).

Though most studies indicate a negative association between IPV and MCH service utilization, other times, a positive or no relationship is found. A study in Egypt found that ever-abused professional women were more likely to make four or more ANC visits than their counterparts (106). On the other hand, another study among rural women in Uganda found no significant relationship between IPV and skilled birth attendance (107).

In the last two decades, Ethiopia has developed different strategies and programs to increase MCH service coverage and quality. Primarily, since the formulation of the 1993 national health policy and the subsequent formulation of the health sector development programs (HSDP I through IV) implemented from 1997 to 2015 and the health sector transformation plan implemented from 2015 to 2020- the country has made significant progress on health service issues related to accessibility and affordability, service decentralization, task shifting, human resource for health development, and quality care (108-110). The country has also set adequate ANC utilization, delivery at a health facility with skilled medical attendants and hygienic conditions, reduction in complications and infections during labour and delivery, timely postnatal care that treats complications from delivery, and education of the mother on care for herself and her infant as crucial components of the strategic plan (108-110).

However, inadequate MCH service utilization and high prevalence of intimate partner violence are still rampant health challenges in the country. According to the country's 2016 DHS report, the ever and current IPV experience among reproductive-age women was 34% and 27%, respectively (25). The country also has one of the lowest MCH service utilization rates.

IPV AND WOMEN EMPOWERMENT

One way by which intimate partner violence predisposes women and children to untoward health outcomes is through denying women autonomy; the violence perpetrators controlling behavior of the victim limits her freedom of movement, makes her economically dependent, and incapacitates her decision-making power(9,33).

Empowerment is a transformation process by which disempowered women reclaim their autonomy(22-23,111-112). This involves making choices and decisions to shape one's social, economic and political life dimensions(22-23, 111-112). It is a complex multidimensional concept grouped under three pillars: (1) Resources- the financial, physical, human, and social capital that enable choice, (2) Agency- the capacity to make decisions about one's own life freely. Self-efficacy; the belief in one's ability to act effectively towards a goal and, (3) Context- the social arrangements, mainly norms and institutions necessary to express agency and assert control over resources(22-23, 111-112). Empowerment entails removing the barriers to achieving these pillars(22-23, 111-112).

It is a contextual notion as well; because the sociocultural, political, and economic conditions vary across societies and over time. Thus, empowerment programs/indicator might not have a similar empowering effect across nations(113-114). This makes it challenging to have a standard measurement indicator and understand its magnitude globally(113-114). However, a recent report indicated that, on average, only 60.7 percent of women internationally are empowered to achieve their full potential (115). The equivalent women empowerment figure for SSA is 49.8 percent, compared to 76.3 percent for Europe and Northern America. The report covered 114 countries using ten indicators from five women empowerment dimensions(115). Women empowerment is one agenda of the 2030 Sustainable Development Goal 5- Achieve gender equality and empower all women and girls (20,111,113).

Women empowerment plays a vital role in the prevention and control activities of partner violence. A systematic review and meta-analysis of 19 randomized controlled trials in low- and middle-income countries indicated women economic empowerment to have a significant deterring effect on all forms of IPV - emotional, sexual, and physical(116).

A study done using 25 DHS data sets from 15 countries indicated women higher levels of education and increased household wealth significantly reduce IPV(117). The study used household wealth, education level, employment status, type of earning, and income-related decision participation as women economic empowerment indicators.

Other studies also report similar finding. In Zimbabwe, economic empowerment and women freedom of movement were found to have a significant protective effect from all forms of emotional violence(118). A study in India indicated participation in household decision-making and mobile phone ownership significantly reduced IPV(119). The study used participation in major household decisions, employment and earning in cash, ownership of house/land, having a bank account, and owning a mobile phone as women empowerment indicators.

However, research findings on women empowerment and IPV are mixed. In other studies, employment and earning more than the partner(117), ownership of durable asset(119), participation in a gender and entrepreneurship training program(120), participation in decision making(121-122), and economic independence(123) were found to increase women risk of IPV significantly.

Ethiopia has adopted and is implementing several women empowerment strategies. The 1997 Constitution, the National Policy on Women, the Family Law, the Growth and Transformation Plan (GTP), and the 2015 Proclamation- which requires women's issues be included in policies, laws, and development programs and projects- are among the national endeavors on women empowerment(25).

The majority of women in Ethiopia, however, are far behind in achieving their full empowerment potential and suffer from IPV. According to the 2016 EDHS report, 63% of reproductive-age women in Ethiopia are not fully empowered with attitude towards wife beating; the respondents justify at least one wife beating specified reason. In addition, only 70.6% of currently married women participated in all three household decision-making areas; own health, large household purchases, and family visit. The report also indicated the current and ever experience of IPV among reproductive-age women was 27% and 34%, respectively(25).

Our literature review indicated that previous studies modeled women empowerment either with empowerment percentile or dichotomous empowerment indicator variables, most of which were economic empowerment indicators. Using the most recent EDHS data set, we used a cluster-based women empowerment approach utilizing national context variables classified into four domain structures for this study. To our knowledge, no previous research has addressed the relationship between women empowerment and IPV using a similar approach.

Empowerment and Healthcare Utilization for Childhood Illnesses

Research on the relationship between women empowerment and care-seeking for childhood health conditions is limited and show mixed findings. A study done using the Institute for Health Metrics and Evaluation's (IHME) database of 161 countries indicated that women's political empowerment has a relevant effect on immunization for low-income and least-developed countries(124). A study in Zimbabwe, however, found no significant association between women empowerment and childhood vaccination and treatment for diarrhea(114).

Nonetheless, several other studies have assessed the effect of empowerment on the nutritional status of children. A systematic review of studies in SSA(125) and another comparative research in the region(126) indicated women empowerment has a significant positive effect on childhood anthropometric indicators. A survey in Gambia showed women who reported accepting wife beating had 69% and 66% greater odds of having stunted and underweight children respectively(127). In Peru, a study indicated that a low level of women's autonomy was significantly associated with a higher probability of anemia in children under five years of age(128). Studies conducted in Ethiopia also indicated that women empowerment significantly protects against childhood malnutrition(129-130).

Although Ethiopia has significantly reduced child mortality, it is still categorized among the global high-burden states(4,25). It is one of the five countries where half of all under-five deaths occurred in 2018(4). However, the prevalence of healthcare seeking for under-five illnesses and women empowerment remain low in Ethiopia(25,72).

Most studies on women empowerment and child health used child anthropometric indicators as the outcome variable. This study assessed the effect of women empowerment on healthcare seeking for the U5 illnesses of diarrhea, fever and ARI symptoms- the three major causes of U5 mortality. To our knowledge, no previous study examined the relationship between empowerment and healthcare seeking for U5 illnesses.

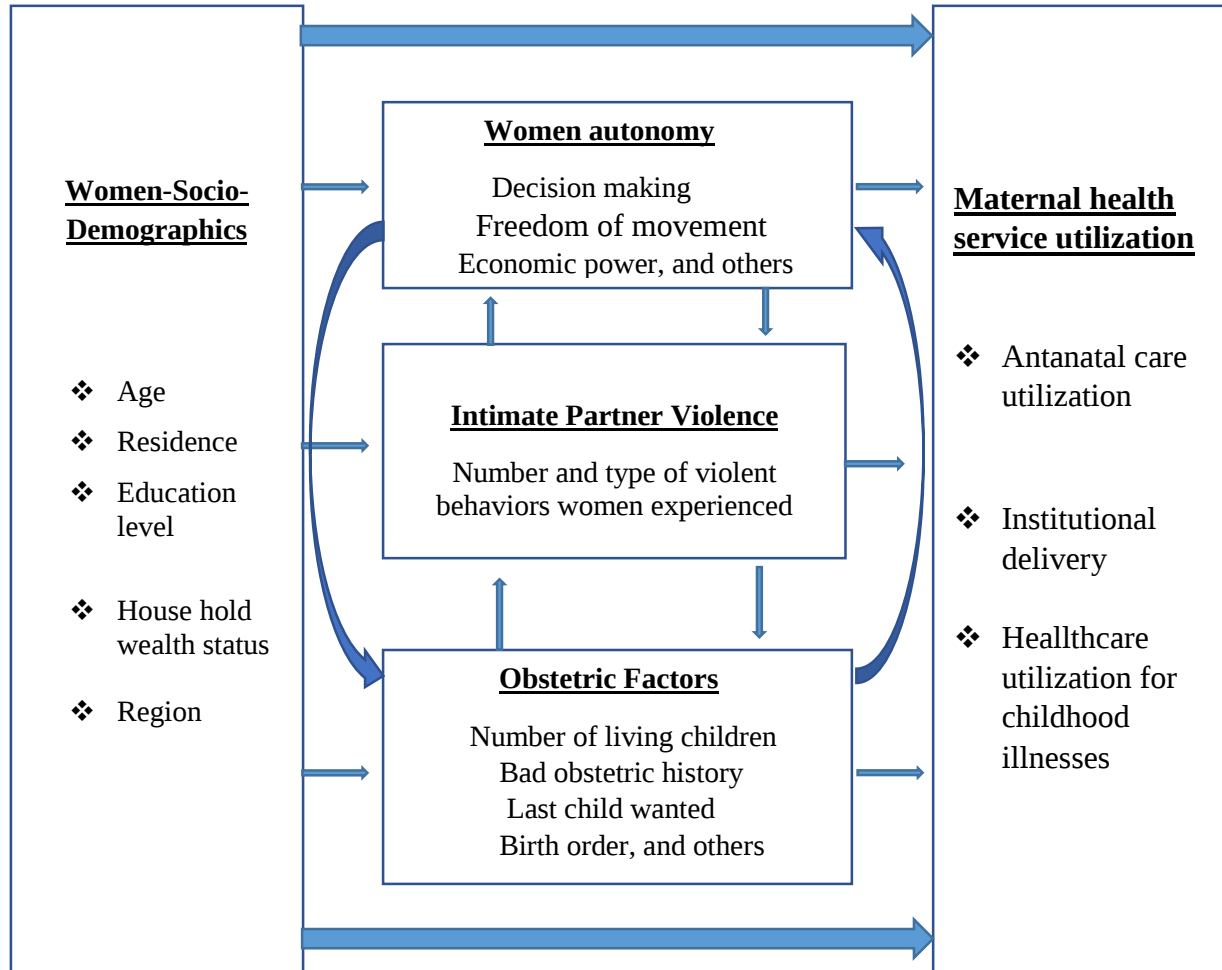
Conceptual Framework

IPV and MCH service utilization

Maternal and child health care services enable mothers and children to receive quality and timely interventions. Adequate and timely utilization of health services is among the critical strategies to decrease maternal and child morbidity and mortality. However, maternal and child health services consumption remains low- especially in high-burden countries like SSA.

Maternal utilization of health services depends on an inter-play of many factors. Among others, intimate partner violence is commonly cited as having a significant deterring effect. IPV is a prevalent public-health problem that leads to bad maternal and child health conditions through its direct and/or indirect influence. Based on our literature review, women autonomy, maternal obstetrics and sociodemographic factors were included as co-variates of maternal health service utilization for this dissertation research, apart from IPV (**fig 2**).

Fig 2: Conceptual framework depicting the relationship between IPV and maternal and child health service utilization for the dissertation research on IPV, health service utilization, and women empowerment



Conceptual framework developed based on the literature review.

METHOD AND MATERIAL

Source of Data

The data source for this study was the 2016 Ethiopia Demographic and Health Survey (EDHS). It is the fourth in a series of Demographic and Health Surveys conducted every five years since 2000. The main objective of the 2016 EDHS was to provide up-to-date information on women's fertility and childhood mortality levels, maternal and child health, domestic violence, HIV/AIDS and other sexually transmitted infections (25). Data collection occurred from January 18, 2016, to June 27, 2016

Sample design and selection

The sampling frame used for the 2016 Ethiopia demographic and health survey is the Population and Housing Census (PHC) frame developed in 2007. The census frame is a complete list of all census enumeration areas (EA) created for the 2007 PHC. An EA is a geographic area that covers an average of 181 households.

The EDHS sample was a two-stage stratified cluster sample. Each region was stratified into urban and rural areas. Samples of EAs were selected independently in each stratum. At the first sampling stage EAs were selected using probability proportional to size selection technique. Then, a household listing operation was implemented in the selected EAs. A fixed number of 28 households per cluster were chosen in the second selection stage with an equal probability of systematic selection from the newly created household listing.

All women aged 15-49 were eligible to be interviewed. In half of the selected households, women were suitable for the interviews on domestic violence (DV). One woman per household was randomly selected for the DV module from this subsample. Information was obtained from women who had never married on their experience of violence and from ever-married women on their experience of violence committed by their current and former husbands/partners and others. In total, 5,860 women were asked questions about violence against women

Sampling weights

Due to the non-proportional allocation of the sample to different regions and their urban and rural areas and the possible differences in response rates, a sampling weight was used in all analyses. The sample weight for the domestic violence module (V044) was used for papers I and II. The women individual sample weight(V005) was used for paper III.

Statistical Analysis

The DHS data collection involves a complex process. Accordingly, we used complex samples logistic regression analysis for this dissertation research work. The table below summarizes the statistical analysis techniques we used for our study(**table 2**).

Table 2: Summary of statistical techniques utilized for the dissertation research on the relationship between IPV, health service utilization, and women empowerment

S.No	Research aim	Predictor Variable (main)	Outcome variable	Statistical technique used for analysis
1	Assess the relationship between IPV and ANC utilization	Number of violent behaviors women experienced for each IPV subscales	Adequate utilization of ANC (≥ 4 ANC) for the last child (among children born in the five years before the survey)	Complex samples logistic regression (CS-LOGISTIC)
2	Assess the association between women empowerment and IPV	Women empowerment clusters	Maternal experience of IPV subscales- emotional, sexual and physical	Complex samples logistic regression, Exploratory factor analysis (EFA)/PCA, K-means clustering
3	Assess the relationship between women empowerment and healthcare seeking for U5 illnesses	Women empowerment percentage (fully empowered)	Number of under-five illnesses for which women sought healthcare.	Complex samples ordinal regression, EFA/PCA

This dissertation study addressed the following research questions: 1. What is the relationship between the number of violent behaviors a woman experiences and maternal antenatal care service utilization; is there a dose-response relationship, i.e., are mothers with more violent experiences less likely to use the health service? 2. What is the role of women empowerment as it relates to intimate partner violence; are empowered women less likely to experience partner violence? and 3. What is the relationship between women's empowerment and healthcare utilization for childhood illnesses; are empowered women more likely to utilize healthcare for under-five illnesses?

Significance of the study

Ethiopia has for the first time collected data on domestic violence that employed 13 measurement items to assess women's experience of IPV. This publicly available unrestricted DHS data set was used as a data source for this study. This would help produce a national-level research data. Partner violence affects maternal and child health by suppressing women autonomy. Whereas there is no research on the relationship between IPV and women empowerment using national level data in Ethiopia, studies on the relationship between women empowerment and health service utilization for childhood illness are limited if not absent globally. Accordingly, the outcomes of our research would be an important input to the world of scholars at the national and global level. In addition, the fact that this study managed the primary exposure variable, maternal experience of intimate partner violence, as a continuous count data would help address the following points:

1. Provides an alternative violence conceptualization and coding approach to researchers
2. It could address the issue of ‘dilution’, hence improve the validity of tests and contribute significantly to violence-related study findings.
3. The dose-response concept of violence could help revisit the definition of severe IPV and
4. In the long run, this approach could help dictate whether exposure dose-related differential interventions be used in IPV prevention, management, and control efforts.

The findings from our study could help different stakeholders involved in policy, practice, and research undertaking in the following ways:

1. **The scientific community-** contributes to narrowing knowledge gaps related to violence and highlights a new research approach in the area
2. **To the policymakers-** Ethiopia's available violence-related policies and programs are geared towards sexual violence. This study measured the effect of the number of maternal experiences of IPV subscales(emotional, sexual, and physical) on MCH service utilization. This would help higher authorities to revise existing violence-related policies and programs to better fit into the new development.
3. **To those caring for victims of violence-** helps to revise and align the available SOPs and guidelines related to the prevention, management, and control of partner violence behaviors in line with the new developments and national policies and programs.

4. **To women victims of violence-** the revision of policies and guidelines would enable victims of violence to receive better care from all stakeholders involved in the prevention, management, and control of partner violence.
5. Our research findings related to women empowerment could add more knowledge on the outcome of empowerment in general and its role in maternal experience of partner violence and healthcare utilization for childhood illnesses, in particular.

Strengths and limitations of the study

This study employed a complex sample analysis using a nationally representative data from EDHS 2016. Hence, the findings from this research could be generalized to Ethiopia. We assessed for the presence of a dose-response relationship between IPV and ANC-4 utilization, making it the first known study on exposure dose impact of IPV and maternal health outcome.

We used a complex sample cluster analysis to assess the relationship between women empowerment and maternal experience of intimate partner violence for the three sub-scales. To our knowledge, this is the first ever study done utilizing a different conceptualization and coding of women empowerment approach using a national level data.

Our third paper addressed the research question on the relationship between women empowerment and health seeking for the common causes of U5 mortality; diarrhea, ARI symptoms, and fever. This makes our work the first in its kind.

The lack of standard women empowerment indicators constitutes the first limitation of this study. In addition, because our study is based on a cross-sectional survey data, we cannot establish a cause and effect relationship.

Structure of the dissertation

Whereas chapter I of this paper provided a general introduction on the dissertation research project, chapter two covers the the first aim on the relationship between IPV and maternal antenatal care service utilization. This research work (chapter two) examines the presence of a dose-response relationship between the predictor and the outcome variable. The article is published in International Health Journal and is open accessed on the internet. Chapter three addresses the the 2nd aim of the dissertation project. In this chapter, the effect of women empowerment on maternal experience of IPV is presented. The article is submitted to the International Health Journal and is under review. Chapter four covers our third aim on the association between women empowerment and healthcare seeking for childhood illnesses. This chapter is also published in International Health Journal and is open accessed on the internet.

Towards the end of this dissertation research paper, general discussion, conclusion and recommendations are provided, followed by the reference and annex sections.

CHAPTER II: PAPER 1

Intimate Partner Violence and Maternal Antenatal Care utilization; is there a dose-response relation-ship? Findings from The Ethiopian National Demographic and Health Survey.

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Abstract:

Background: Maternal mortality in Sub-Sahara-Africa (SSA) is an enduring public health challenge. Adequate utilization of antenatal care (ANC) services is one strategy to mitigate the problem by identifying and managing pregnancy risks early. Yet, in SSA, uptake of ANC remains low. Intimate partner violence (IPV) may be a deterrent to ANC uptake. We measured the dose-response relationship between IPV and adequate ANC utilization (defined as four or more visits, ANC-4^f) using data from the Ethiopia Demographic and Health Survey (EDHS)-2016.

Methods: We used complex sample logistic regression to measure the impact of three IPV subscales (emotional, sexual and physical) on ANC-4 while controlling for sociodemographic, obstetric and women empowerment factors.

Results: A total of 2,599 (weighted) currently married or in-union women were included. There was a significant dose-response relationship between IPV and ANC utilization. Emotional violence (aOR=0.78, CI=0.64, 0.97), and sexual violence (aOR=0.68, CI=0.50, 0.92) reduced ANC-4 uptake while controlling for the covariates.

Conclusions: IPV is common, yet often invisible in Ethiopia. Health workers may begin directly screening pregnant women for IPV in order to increase targeted support of ANC uptake. This is the first known study to confirm IPV has a dose-response relationship with ANC-4 uptake.

Key words: ANTENATAL CARE(ANC), INTIMATE PARTNER VIOLENCE(IPV), MATERNAL MORTALITY, SUB-SAHARA AFRICA (SSA).

^f ≥ 4 visits.

INTRODUCTION

Maternal Mortality, Antenatal Care utilization, and Partner violence

Maternal mortality from preventable causes remains persistently high especially in Sub-Saharan African (SSA) countries. Worldwide, 295,000 mothers died in 2017 from pregnancy-related causes.² Sixty-six percent of deaths occurred in SSA.^{2,4} For each maternal death, 20 to 30 more women suffer acute or chronic pregnancy-related complications such as obstetric fistula and depression.⁴

Seventy percent of these deaths are due to preventable or readily treatable causes such as postpartum hemorrhage (PPH), hypertensive disorders (eclampsia, pre-eclampsia), postpartum infections, obstructed labor and abortion.³ One key strategy for reducing pregnancy related maternal mortality is the provision of compassionate and respectful care during pregnancy.^{3,12} Antenatal care provides the opportunity for screening and tests that are directed to identify early and manage pregnancy related complication which endanger the life and health of the mother and fetus.¹² It also serves as a foundation for linking pregnant women to other health care services when necessary.^{4,12} However, the uptake of adequate ANC (at least 4 visits) and timely ANC (early in 1st trimester) services remains low in SSA. Only 53% of SSA pregnant mothers received four or more ANC visits in 2020.⁷²

A host of factors may deter mothers from accessing adequate and timely ANC. Intimate partner violence (IPV) is one such factor.^{9,29} A meta-analysis of ten studies in Africa indicated that women who experienced intimate partner violence (IPV) had 25% decreased odds of accessing adequate antenatal care.²⁹ In other studies, women who experienced physical, and ever emotional IPV were 52%, 27%, and 32% less likely to complete adequate ANC, respectively.^{108,136,139} Furthermore, IPV predicts late entry into ANC (past the 16th week of pregnancy); women who recently experienced partner sexual violence were 1.55 times more likely to enter ANC late.¹⁰⁵

Research findings are not consistent, however. A study in Nepal found no significant association between partner violence and the uptake of skilled maternity care.¹⁴⁰ In India, no significant association was observed between emotional intimate partner violence and reproductive health outcomes.¹³⁸ An Egyptian study indicated that ever-abused professional women were more likely

to make four or more ANC visits than those who did not report abuse.¹⁰⁶ Another study in Rwanda found no significant association between IPV adequate ANC.^{137, 138}

Women who experience IPV are also more likely to have low-birthweight baby, induced abortions, depression, and acquire HIV or syphilis.⁹ They are also more likely to experience unwanted pregnancy, miscarriage, and still-birth.^{12-13,15} More than a third (30,000) of the women intentionally killed globally in 2017 were killed by their current or former intimate partner.⁵³ A study in South Africa found that of 3,797 female homicides, 50.3% were from IPV.¹¹ Children who witness intimate partner violence are also more likely to develop anxiety, depression, poor school performance, low self-esteem, nightmares, physical health complaints, and death in extreme cases.^{19,21}

Intimate partner violence (IPV) is defined as any behavior within an intimate relationship that causes physical, psychological/emotional, or sexual harm to those in the relationship.^{9,36} It is the most prevalent form of violence against women world-wide.^{9,36} Nearly 37% of ever-partnered women in Africa experienced some form of physical and/or sexual violence from their intimate partner, which is slightly higher than the 30% global estimate.^{9,36}

Many theoretical perspectives and models have been developed to explain and predict IPV risk. From a feminist model perspective, patriarchy and male dominance are seen as primary drivers.^{45,47-48} From a sociological model perspective, one's prior experiences of violence and unequal resources in relationships are viewed as primary predisposing factors for violence.^{45,47-48} In contrast, the social-ecologic model provides a more comprehensive and nuanced perspective by mapping IPV drivers to individual, relationship, community, and societal levels of influence.⁴⁹⁻⁵⁰

Ethiopia has significantly reduced maternal mortality over the last decade ^{2,4}. However, it is still ranked among the highest burdened countries globally.²⁵ In 2017, 14,000 Ethiopian mothers died.^{2,4} The country also has a high maternal mortality ratio (MMR) of 401 deaths per 100,000 live births. This is nearly double the global MMR of 211.^{2,4} Almost 11% of Ethiopian mothers experience adverse pregnancy outcomes annually.²⁵ Despite these high burdens of mortality and morbidity, the 2016 EDHS report indicated only 32% of mothers received adequate ANC nationally.²⁵ Further, 37% of Ethiopian mothers did not receive any ANC.²⁵ Simultaneously, the

report showed intimate partner violence (IPV) remains high with 27% of reproductive age women reporting a current experience of IPV and 34% reporting ever having experienced IPV.²⁵

Predicting Health Service Utilization with Continuous IPV Scores

Usually, measurement of maternal IPV experience uses multiple items mapped to three sub-scales for emotional, sexual, and physical violence. The EDHS “domestic violence module” measures IPV experience using 13 items mapped to these three sub-scales.²⁵

However, violence-related studies to date have primarily analyzed IPV as a dichotomous variable—“yes,” she experienced IPV or “no,” she did not. This yes/no dichotomous approach merges and treats a woman victim of only a ‘single’ form and/or number of violent behavior equally with the woman who experienced multiple forms and numbers of violent behavior from emotional, sexual, and physical partner violence. Treating IPV as a dichotomous “yes” versus “no” experience may dilute the impact of IPV (overall, and the three sub-scales) on the outcome variable of interest including its effect on adequate ANC utilization and other health services.

Historic approaches to dichotomizing IPV and not measuring it on multiple scales may in part explain why studies on IPV and obstetric health service utilization have mixed findings. A study done to assess how different conceptualization and coding of IPV variables affects the interpretation of the impact of violence prevention intervention compared the ‘standard’ dichotomous approach to a new method which accounted for the severity and intensity of IPV sub-scales¹⁴³. The study indicated the new approach allowed for a better understanding of the impacts of the intervention which was masked by the traditional way of lumping maternal violence experience all together. The research used secondary data from six randomized controlled trials conducted in low- and middle-income countries¹⁴³.

Grounding on the argument and the research findings above, this study is designed to treat each type of IPV as discrete count data and measure the potential dose-response relationships between each IPV sub-scale and adequate antenatal care uptake for the last child born in the five years before the survey.

Materials and Methods

The data source for this study was the EDHS 2016 survey, which is de-identified, de-linked, and publicly available.²⁵ The survey was conducted from January 18, 2016, to June 27. The target groups included women aged 15-49 in randomly selected households across Ethiopia. A stratified multistage cluster sampling technique was used to select samples of enumeration areas (EAs) in two stages. In the first stage, a total of 645 EAs (202 in urban areas and 443 in rural areas) were selected with probability proportional to EA size and with independent selection in each sampling stratum. In the second stage of selection, a fixed number of 28 households per cluster were selected with an equal probability systematic selection from the newly created household listing.²⁵ Data collection was done with a face-to-face interview utilizing a computer-assisted personal interviewing data collection system (CAPI). A total of 15,683 women were interviewed and 95% of women invited to interview provided data.²⁵

Information on partner violence was obtained from ever-married women on their experience of violence committed by their current and/or former husbands/partners. Specially constructed weights in the EDHS were used to adjust for the selection of only one woman per household and to ensure that the violence module subsample was nationally representative.²⁵

The 2016 EDHS- and the corresponding data set from the DHS program database- is the 4th and most recent standard demographic and health survey (DHS) available for public use. In 2019, Ethiopia conducted Interim DHS Survey and collected information on key performance monitoring indicators. However, this mini DHS did not collect data on domestic violence.

Measurement of variables

Outcome measurement

The outcome variable for this study was adequate utilization of antenatal care for the last birth occurred in the five years before the survey- defined as four or more ANC services received from a skilled health care provider (such as a doctor, nurse or midwife (ANC-4)). Although the current World Health Organization (WHO) recommendations are for pregnant women to have at least eight ANC visits,¹² the EDHS 2016 data were collected when the focused antenatal care model (FANC), which recommended a minimum of four visits, was the standard model of care.^{131,142}

Predictor variables

Main predictor variable

The main predictor variable for this study is intimate partner violence measured on three sub-scales. The 2016 DHS Ethiopia employed 13 items to quantify IPV for currently or ever partnered women. The **emotional violence** sub-scale has three items (1. Say or do something to humiliate you (the woman) in front of others; 2. Threaten to hurt or harm you or someone close to you; 3. Insult you or make you feel bad about yourself). The **sexual violence** sub-scale has three items (1. Physically force you to have sexual intercourse with him even when you did not want to; 2. Physically force you to perform any other sexual acts you did not want to; 3. Force you with threats or in any other way to perform sexual acts you did not want to). The **physical violence** sub-scale has seven items (1. Push you, shake you, or throw something at you; 2. Slap you; 3. Twist your arm or pull your hair; 4. Punch you with his fist or with something that could hurt you; 5. Kick you, drag you, or beat you up; 6. Try to choke you or burn you on purpose; and 7. Threaten or attack you with a knife, gun, or any other weapon). Consequently, the IPV score ranges from 0-3 for Emotional violence, 0-3 for Sexual, 0-7 for Physical violence, and the total IPV score ranges from 0 to 13 without weighting or standardizing the sub-scale scores.

Co-Variates

Based on the literature review of factors that have been used to predict ANC service utilization globally and in Ethiopia, maternal **sociodemographic** variables (e.g., age, religion, region, residence, education, and house hold wealth), **obstetrics** variables (e.g., last child was wanted, bad obstetric history, number of living children, and birth order of the last child), and women **empowerment** variables (e.g., participation in house hold decision making), and problem related to health care access were included as covariates in this study. In the EDHS, a bad obstetric history is defined as ever experiencing abortion, miscarriage, and/ or still birth.

The woman empowerment indicator, participation in house-hold decision making, was a composite variable generated by joining three DHS variables on household decision making into a single yes/no dichotomous variable. The three merged questions items are: 1) own health care; 2) large household purchases, and 3) visits to family or relatives. Each question item was first converted to ‘yes’ if the woman participates in the decision making alone or jointly with her partner, and ‘no’ if she does not participate at all. The other predictor “access to health care is a

big problem,” was created by merging five variables into a single dichotomous yes/no indicator. These variables were 1) getting medical help for self is a big problem, 2) getting permission to go out is a big problem, 3) getting money needed for treatment is a big problem, 4) distance to health facility is a big problem and 5) not wanting to go alone to the health facility is a big problem.

Statistical analysis

Statistical software for social sciences (SPSS) version 27 was used for data analysis. Data management was done before creating the complex sample analysis plan. We first confirmed each variable’s adequacy for use in this study with descriptive figures (histograms, boxplots) and descriptive statistics (absolute range, interquartile range (IQR), median and percent since data were not normally distributed). After exploring each variable independently, we explored the relationship between each predictor and the outcome using stratified figures (histograms, boxplots) and stratified measures of central tendency and variability (median/IQR or percent). Next, we statistically tested for differences in the predictors stratified by the outcome (ANC- 4 visits versus <4). For continuous variables we used the Wilcoxon Ranked Sum Test to compare the rank distributions across these two levels of ANC uptake. For categorical variables with cell counts >6, we used the chi-square test of independence since all variables had cell counts >6 in this large sample EDHS dataset.

We then quantified the direction and strength of association between each predictor and the outcome of ANC-4 using univariate logistic regression (ULR including the odds ratio (OR), 95% confidence interval and p-value). We also calculated the Area Under the Receiver-Operator Characteristics Curve (AUC, C-statistic) for each individual predictor.

To construct the multivariate logistic regression model predicting adequate ANC-4, we empirically and iteratively refined how certain variables were modeled. For example, when continuous variables such as age had a high AUC on univariate modeling, but did not have an odds ratio that was statistically significant, we tested various cut-points for age based on the ANC-4 stratified box plots and empiric odds ratios.

After using the empiric approaches to finding the optimal cut-points, we did a full model MLR by adding all predictor variables along with the IPV sub-scales treated as continuous count data.

Although logistic regression does not require the predictor be unbounded and that violation of assumption of linearity in the logits results in Type II errors ¹³³, we performed a residual analysis creating a Scatter Plot of the Logit residual by Predicted probability and found a linear relationship ‘(see Supplementary Figure 1 and 2)’. We also compared the sensitivity and the Area Under the Receiver-Operator Characteristics Curve and observed nearly the same model performance for the IPV continuous versus IPV dichotomous model approaches. These findings allowed us to treat the IPV sub-scales as continuous count data in our final CSLOGISTIC model ¹³³. We performed a separate analysis on IPV and ANC for the women group who gave birth in the 12 months before the survey and found a 10% improvement in the model sensitivity. We assessed for multi-collinearity in the MLR using a VIF cut-point >10; variable with a VIF >10 would be considered potentially co-linear and subject to being removed from the final MLR model.

Following the data management, **complex sample analysis plan** was created to predict ANC-4 using three intimate partner violence sub-scales (emotional, sexual and physical IPV), sociodemographic, obstetric and empowerment variables. The EDHS 2016 **sample weight for domestic violence**, **sample strata for sampling errors**, and the **clusters variable** were used to create the complex sample analysis plan-based on how the EDHS data were collected.^{25, 134}

Complex sample frequency, descriptive, and crosstab was done to describe the background characteristics of respondents and test for predictor differences in ANC-4 uptake. Univariate and multivariate complex samples logistic regression analysis (CSLOGISTIC) with the corresponding odds-ratio (OR) and 95% confidence intervals (CIs) was employed to assess the effect size of each predictor variable on the outcome. Taylor Series Linearization variance estimation method was used to produce design-adjusted standard errors. No observation deletion or suppression was made in the analysis.¹³⁵

Some EDHS variables included in this study were specific only for woman currently in union or living with a man. So, this analysis was limited to the sub-population of mothers who were in union or living with a man at the time of the EDHS survey.

RESULTS

Description of respondents by background characteristics and ANC service utilization

A total of 2,599 weighted (2,788 un-weighted) currently married or in-union mothers from the 2016 EDHS were included in this study. less than one percent of the sample did not have data on ANC. The respondents age ranged from 15-49 years with a mean of 29.8. The majority were Christians (60.6%), lived in rural areas (88.1%), and had no formal education (64.3%, **table 3**).

Sexual violence was common; one in ten women (10.3%) reported having ever experiencing it. However, nearly a quarter of all respondents reported experiences of emotional or physical IPV (23.0% and 22.9% respectively). Maternal experience of multiple forms of IPV ranged from 5.2% for all subtypes to 14.2% for emotional and physical violence ‘(see **Supplementary Figure 3**)’

Only 30.2% of respondents had utilized adequate ANC service for the last child (ANC-4). As maternal age and birth order of the last child increased, adequate ANC utilization decreased. Educational level, on the other hand, showed a direct positive relationship with adequate ANC utilization for the last child. Maternal age, whether the last child was wanted, and maternal experience of bad obstetric history were found to have no significant relationship with adequate ANC utilization in the chi-square test (**table 3**).

Table 3 : Background Characteristics of Respondents Stratified by Adequate ANC uptake for the last child.

S.No	Predictors	Adequate ANC Uptake (%) (N=2656, unless indicated)		Total (%)
		no	yes	
I	IPV subscales			
	Emotional IPV	X ² : 26.6 P= 0.00		
	no	67.7	32.3	77.0
	yes	76.7	23.3	23.0
	Sexual IPV	X ² : 22.0 P=0.00		
	no	68.8	31.2	89.7
	yes	78.0	22.0	10.3
	Physical IPV	X ² : 13.45 P= 0.54		
	no	68.7	31.3	77.1
	yes	73.2	26.8	22.9
II	Socio-demographics			
	Age	X ² : 15.32 P= 0.08		

	15-29	66.9	33.1	50.4
	30-39	71.5	28.5	39.9
	40-49	77.5	22.5	9.7
	Religion	X ² : 27.9 P= 0.01		
	Christians	67.0	33.0	60.6
	Muslim	72.8	27.2	37.2
	Others	93.6	6.4	2.2
	Region	X ² : 89.8 P= 0.000		
	Agrarian	70.7	29.3	91.5
	Pastoralist	77.7	22.3	5.8
	City dwellers	22.3	77.7	2.7
	Residence	X ² : 154.3 P= 0.000		
	Rural	73.7	26.3	88.1
	Urban	40.7	59.3	11.9
	Women education level	X ² : 175.5 P= 0.000		
	No formal education	77.0	23.0	64.3
	Primary	62.3	37.7	26.7
	Secondary	43.1	56.9	5.8
	Higher	34.8	65.2	3.3
	House hold wealth quintile	X ² : 185.9 P= 0.000		
	Poorest	82.9	17.1	20.9
	Poorer	76.5	23.5	22.5
	Middle	67.1	32.9	22.3
	Richer	70.0	30.0	18.7
	Richest	45.9	54.1	15.6
	Partner education level ^a	X ² : 151.0 P= 0.000		
	No formal education	78.5	21.5	48.6
	Primary	66.5	33.5	38.0
	Secondary	51.8	48.2	8.4
	Higher	40.2	59.8	5.0
III	Obstetric predictors			
	Last child was wanted	X ² : 9.3 P= 0.06		
	Yes	68.3	31.7	75.4
	No	74.3	25.7	24.6
	Bad obstetric history ^b	X ² : 0.03 P: 0.90		
	No	69.8	30.4	91.0
	Yes	69.3	30.7	9.0
	Number of living children	X ² : 55.4 P= 0.000		
	0-2	61.9	38.1	35.8
	3-5	71.7	28.3	42.1
	6+	78.6	21.4	22.2
	Birth order of last child	X ² : 70.7 P= 0.000		
	1	60.9	39.1	16.9

	2-3	65.0	35.0	30.2
	4-5	69.4	30.6	24.0
	6+	80.3	19.7	28.9
IV	Women empowerment predictors			
	Participation in household decision making ^c	X ² : 43.8	P=0.000	
	Yes	68.0	32.0	90.0
	No	87.0	13.0	10.0
	Health care access is a big problem	X ² : 41.3	P= 0.000	
	Yes	73.0	27.0	74.4
	No	60.3	39.7	25.6

Note: The **ANC up take** percent (%) and the Chi-square values are rounded to the nearest one decimal place, ^a N=2641, ^b Ever experiencing abortion, miscarriage, and/or still birth, ^c N=2615, P= p value of the adjusted F-statistics

Complex Sample Univariate Logistic Regression Analysis Result

In the complex samples univariate logistic regression, all the intimate partner violence sub-scales decreased adequate ANC utilization. Physical IPV, however, had a low effect size and was not statistically significant (**table 4**).

Table 4: Complex sample univariate logistic regression predicting adequate ANC utilization using Intimate Partner Violence Sub-Scales and Covariates

Predictors		Complex Sample Univariate Regression result		
		cOR	95% CI	
			lower	upper
I	IPV sub-scales			
	Emotional IPV subscale (0-3)	0.74*	0.63	0.88
	Sexual IPV subscale (0-3)	0.65*	0.50	0.80
	Physical IPV subscale (0-7)	0.94	0.84	1.05
II	Socio-demographic Predictors			
	Age, category (15-29, 30-39, 40-49)	0.78*	0.64	0.95
	Religion			
	Christian	1		
	Muslim	0.76	0.54	1.07
	Others	0.14*	0.04	0.48
	Region			
	Agrarian	1		
	Pastoralist	0.69*	0.52	0.92
	City Dwellers	8.40*	5.61	12.56
	Residence			
	Rural	1		
	Urban	4.08*	2.87	5.80
	Women education category (No, Primary, Secondary, Higher)	1.97*	1.68	2.32
	Household wealth quintile, category (Poorest, Poorer, Middle, Richer, Richest)	1.46*	1.33	1.60
	Partners education level, category (No, Primary, Secondary, Higher)	1.80*	1.54	2.09
III	Obstetric Predictors			
	The Last child was wanted			
	Yes	1		
	No	0.74	0.55	1.01
	Bad obstetric history ^a			
	No	1		

	Yes	1.02	0.71	1.47
	Number of living children, category (0-2, 3-5, 6+)	0.66*	0.56	0.78
	Birth order of last child, category (1, 2-3, 4-5, 6+)	0.73*	0.66	0.81
IV	Woman Empowerment Predicators			
	Participation in household decision			
	Yes	1		
	No	0.32*	0.19	0.52
	Health care access is a big problem			
	Yes	1		
	No	1.78*	1.38	2.29

Note; The numbers are rounded to the nearest two decimal places, ^a Ever experiencing abortion, miscarriage, and/or still birth. *Statistically significant at $P < 0.05$

Complex Sample Multivariate Logistic Regression Predicting ANC-4 Utilization.

Complex sample multivariate logistic regression (CSLOGISTIC) was done to measure the effect size of the main predictor variables (three IPV sub-scales) and related predictors (sociodemographic, obstetric and empowerment) on the uptake of ANC-4 for the last born child.

Initially, each IPV subscale (controlled for confounders) was tested for its effect on adequate ANC utilization for the last child. Then a full model complex samples analysis was done by adding all the IPV subscales and covariates into one multivariate model (full model, **table 5**). No variables were excluded from the multivariate model due to multi-collinearity since all VIFs were less than five.

The result from the full model regression indicated a dose-response relationship between IPV sub-scale scores and ANC-4. A unit increase in the **emotional** IPV score from 0 through 3 decreased the likelihood of ANC-4 by 22.0% (aOR=0.78, CI=0.64, 0.97). A unit increase in the **sexual** IPV score from 0 to 3 decreased ANC-4 by 32.0% (aOR=0.68, CI=0.50, 0.92). On the other hand, a unit increase in the **physical** IPV score from 0 to 7 increased ANC uptake slightly, although the change was not significant (aOR=1.15, CI=0.97, 1.35, **table 5**).

Table 5: Complex samples multivariate logistic regression model predicting adequate ANC utilization using Intimate Partner Violence Sub-Scales and covariates.

Predictors		Complex Sample Multivariate Logistic Regression- full model		
		aOR	95% CI	
			lower	upper
I	IPV Sub-Scales			
	Emotional IPV sub-scale (0-3)	0.78*	0.64	0.97
	Sexual IPV sub-scale (0-3)	0.68*	0.50	0.92
	Physical IPV sub-scale (0-7)	1.15	0.97	1.35
II	Socio-demographics			
	Age (15-29, 30-39, 40-49)	1.04	0.77	1.41
	Religion			
	Christians	1		
	Muslim	1.03	0.71	1.48
	Other	0.22*	0.06	0.78
	Region			

	Agrarian	1		
	Pastoralist	0.76	0.52	1.11
	City dwellers	2.81*	1.63	4.86
	Residence			
	Rural	1		
	Urban	1.37	0.77	2.43
	Woman education level (No, primary, secondary, higher)	1.22	0.95	1.55
	House hold wealth quintiles (Poorest, poorer, middle, richer, richest)	1.17*	1.03	1.32
	Partners education level (No, primary, secondary, higher)	1.26*	1.02	1.56
III	Obstetric predictors			
	The last child was wanted			
	Yes	1		
	No	0.81	0.58	1.15
	Bad obstetric history ^a			
	No	1		
	Yes	1.18	0.78	1.78
	Number of living children (0-2, 3-5, 6+)	1.00	0.70	1.45
	Birth order of the child (1, 2-3, 4-5, 6+)	0.90	0.70	1.15
IV	Women empowerment predictors			
	Participation in household decisions			
	Yes	1		
	No	0.44*	0.26	0.73
	Health care access is a big problem			
	Yes	1		
	No	1.07	0.79	1.45

Note; The numbers are rounded to the nearest two decimal places. ^a Ever experiencing abortion, miscarriage, and/ or still birth. *Statistically significant at P<0.05

DISCUSSION

This study measured the impact of three forms of maternal intimate partner violence on the uptake of adequate ANC (ANC-4). We modeled each IPV sub-scale (sexual, emotional, and physical) as continuous count data to quantify for any ‘dose-response’ relationship between the three forms of IPV and ANC-4 using complex sample logistic regression. *To our knowledge, no previous studies measured the dose-response relationship between each type of IPV and ANC-4.*

We identified a significant inverse dose-response relationship between both **emotional** and **sexual** IPV and adequate ANC service utilization for the last child born in the five years before the survey. Our finding that emotional violence deters ANC-4 utilization is not consistent with other studies^{108,137-138} nor is the finding for sexual violence.¹³⁶⁻¹³⁷ These studies indicated no significant association between IPV sub-scales and maternal health service utilization. However, the studies followed the usual way of dichotomizing IPV as a whole or for each subscale-as opposed to our continuous count data approach. Research indicates that lumping all-together maternal violence experience could potentially hamper the expression of subtle predictor-outcome relationship.¹⁴³ We believe that variation in conceptualization and coding of IPV partially explains the discrepancy of the research findings- as well as could be attributed to differences in sample size, type of study population, and sociocultural factors.

Our research *discovery of a predictive dose-response relationship between IPV sub-scales and ANC uptake provides a novel approach in quantifying IPV and demonstrating how both sexual and emotional IPV decrease ANC utilization.* Further, this study uniquely quantifies the differential impact of each form of IPV on ANC-4. The approach allows researchers to more clearly measure the relationship between various forms of IPV and health service utilization. Using ordinal IPV sub-scales advances existing science on IPV and health service utilization. Historically, researchers often lumped together maternal experience of violence into a single dichotomous yes/no variable.^{9,29,36,105,108,136,139}

The physical, psychological, social, and other negative impacts of intimate partner violence are not limited to the woman victim only. Children and other family members who lived through and experienced such a violent relationship may be affected by its direct and/or indirect

consequences.¹⁹⁻²¹ The finding in this study that IPV has a dose-response relationship with maternal ANC service utilization suggests, by extension, that other IPV-related health outcomes may also have a similar dose-response relationship with different forms of IPV.

Though not significant, a unit increase in physical IPV experience was found to increase the uptake of ANC-4. In contrast, emotional and sexual IPV decreased ANC-4. One possible explanation for such a contradicting outcome could be that physical harm from IPV may motivate mothers to seek medical help for themselves. Another possible explanation for such relationship may be the moderation effect of other covariates. If this were true, the effect of physical IPV on ANC utilization may be moderated by a third variable or complex set of other variables. Cultural and social influences may also play a role in the differential impact of various forms of IPV on ANC-4 uptake.

There are different theories and models that explain how IPV experience predispose the victim to a variety of untoward health conditions. Among others, the abuser's psychological control of the woman where the perpetrator makes the victim financially dependent or limits the ability to control her sexual and reproductive decision making is cited as one reason.⁹ In this study, the combination of high prevalence of IPV coupled with low utilization of adequate ANC suggests women in Ethiopia are experiencing multifaceted abuse. This warrants intensified work to increase empowerment, gender equity and creating community-level IPV awareness which could support ANC-4 uptake.

Existing literature to date defines "severe" IPV if the victim had experienced certain aspects of physical violence (i.e., having been kicked or dragged; strangled or burnt; or threatened with a knife/gun or other weapon)- although some authors consider any sexual violence as severe.^{9,36} However, the novel dose-response measurement of IPV using three sub-scales could expand the definition of severe IPV to account for both the number and type of IPV behaviors experienced. Future studies could test various combinations of IPV experiences and/or various dose cut-points for defining "severe" IPV. Additional studies could create short-forms for rapidly screening pregnant women for each form of IPV in routine clinical practice.

We found a 10% improvement in sensitivity when we modeled IPV and adequate ANC utilization for women who gave birth in the 12 months before the survey. Apart from the difference in sample size (2599 Vs 917) and magnitude of ANC-4 utilization (30.2 Vs 34.3 percent), this may partially be that for some women who gave birth in the five years before the survey, IPV might have occurred after delivery of the last child.

Strength and limitation of the study

This study used a nationally representative data from EDHS 2016. Hence, the finding from this research could be generalized to Ethiopia. The study assesses IPV's dose-response relationship with ANC-4 utilization, making it the first known study of the dose-response impact of IPV on a health outcome. Yet, since EDHS data are retrospective and cross-sectional, it is not possible to establish a definitive cause-effect relationship between IPV and ANC-4 uptake.

Conclusion

The finding of this study showed that as the number of maternal experience of emotional and sexual IPV goes up, the probability of accessing adequate ANC services (ANC-4) goes down. Consequently, the number and types of IPV (emotional, sexual and physical) should be assessed and responded to differently when used to predict adequate ANC.

Based on our finding of a dose-response relationship between IPV subscale and ANC-4, we believe that no woman victim of multiple dose and/or form of partner violence should be managed similarly with the woman who experienced less. We, therefore, suggest IPV exposure dose and exposure type require assessment in order to mobilize differential interventions in the prevention, management, and control activities of partner violence

Additional studies to assess for the presence of dose-response relationship between IPV sub-scales and other maternal-child health services/outcomes shall be conducted. Further research work to create “severe” IPV indicators and short-forms for screening for IPV in routine clinical practice are warranted.

Authors contribution: BM, JNC, AG, and ND were involved in the research conceptualization, original draft preparation, manuscript review and editing. BM and JNC were involved in formal analysis, interpretation of data, and project administration. BM, JNC, and ND were involved in developing methodology of the research. All authors read and approved the final manuscript.

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Ethical approval: The de-identified data used in this study is a sub-set of publicly available data from the DHS/ICF Marco International as part of the global DHS program.²⁵ Permission to use the data set was obtained from measure DHS/ICF International program by registering and submitting the study protocol. No individual-level data are available in EDHS. This nested study was approved by the Addis Ababa University school of nursing and midwifery, and by the College of Health Sciences Ethics Review Committee (# 09/2023, Date: October 25, 2023).

Data availability: The dataset used for this study is available in the DHS repository (<https://dhsprogram.com>) up on registration and submitting research protocols. For further information about the data, please visit: <https://dhsprogram.com/data/Access-Instructions.cfm>.

CHAPTER III: PAPER 2

Intimate Partner Violence Among Women in Ethiopia: Is Women Empowerment Protective?

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Abstract

Background: Intimate partner violence (IPV) is the most common form of violence against women (VAW). Close to 33% of ever-partnered women have experienced some form of IPV in Sub Sahara Africa (SSA). IPV could be prevented through different strategies including women empowerment. Empowerment enables women to make strategic life choices independently.

Method: We used data from the 2016 demographic and health survey Ethiopia (EDHS) for the study. We performed a complex sample cluster analysis to assess the relationship between women empowerment and IPV (emotional, sexual, and physical). Adjusted odds ratio (aOR) and 95% confidence interval (CI) was used to estimate effect size.

Result: A total of 3689 (weighted) respondents were included in the study. We found three empowerment clusters using the K-means cluster analysis. Women in the most empowered cluster were 69% less likely to experience emotional IPV compared to the least empowered cluster (**aOR: 0.31, CI: 0.17-0.53**). However, no significant relationship was found between women empowerment and sexual or physical partner violence.

Conclusion: Our study found that empowerment plays a crucial role in protecting women from experiencing emotional intimate partner violence (IPV). We recommend adopting comprehensive empowerment strategies that strengthen women's autonomy and enable them to live free from partner violence.

Key words: EMPOWERMENT, IPV, VAW, VIOLENCE, WOMEN.

INTRODUCTION

Violence against women (VAW) is a significant public health problem and a fundamental violation of women's rights³⁶. It is a manifestation of historically unequal power relations between men and women¹⁴⁴. Intimate partner violence (IPV) is the most common form of violence against women^{9,33}. Close to 33% of ever-partnered women aged 15-49 in SSA have experienced some form of intimate partner violence, compared to the global 27%³⁶. Intimate partner violence (IPV) refers to any behavior within an intimate relationship that causes physical, psychological, or sexual harm to those in the relationship^{9, 36}.

Women who experience IPV are more likely to have adverse health outcomes including unwanted pregnancy, abortions, still-birth, depression, HIV, and homicide and/or suicide^{10-11,18-19,21,53}. Children who witness IPV are also more likely to develop anxiety, depression, poor school performance, low self-esteem, and death in extreme cases.^{9,22,33}

Different theories and models explain the primary behavior drivers of violence perpetrators; ranging from patriarchy and male dominance of the feminist model, to prior experiences of violence and unequal resources in relationships of the sociological model.^{45,47-48,145} The social-ecologic model, however, provides a more comprehensive picture delineating violence triggering factors at individual, relationship, community, and societal levels.⁴⁹⁻⁵⁰

Partner violence is not an inevitable societal problem, however. The attitude, behavior, socioeconomic, and politico-cultural conditions that lead to violence can be changed through primary, secondary and tertiary prevention public health intervention measures.^{9,21,33} Women empowerment plays a vital role in this regard. Empowerment is a process of change by which those who have been denied the ability to make strategic life choices regain their autonomy^{22-23,111-112}. This involves making choices and decisions to shape one's social, economic and political life dimensions.^{22-23,111-112}

Empowerment is a complex multidimensional concept grouped under three pillars: (1) Resources; The financial, physical, human, and social capital that enable choice, (2) Agency; The capacity to make decisions about one's own life freely. Self-efficacy; The belief in one's ability to act effectively towards a goal, and (3) Context; The social arrangements, mainly norms and institutions

necessary to express agency and assert control over resources.^{22-23,111-112}. Empowerment entails removing the barriers to achieving these pillars. ^{22-23,111-112}

It is a contextual notion as well- because the sociocultural, political, and economic conditions vary across societies and over time. Thus, empowerment programs/indicator might not have a similar outcome across nations ¹¹³⁻¹¹⁴. This makes it difficult to have a standard measurement indicator and understand its magnitude globally ¹¹³⁻¹¹⁴. However, a recent report indicated that, on average, only 60.7 percent of women internationally are empowered to achieve their full potential ¹¹⁵. The equivalent women empowerment figure for SSA is 49.8 percent, compared to 76.3 percent for Europe and Northern America. The report covered 114 countries using ten indicators from five women empowerment dimensions ¹¹⁵. Women empowerment is one agenda of the 2030 Sustainable Development Goal 5- Achieve gender equality and empower all women and girls ^{22,111,113}

Women empowerment plays a vital role in the prevention and control efforts of partner violence. A systematic review and meta-analysis of 19 randomized controlled trials in low- and-middle income countries indicated women economic empowerment to have a significant deterring effect on all forms of IPV - emotional, sexual, and physical¹¹⁶.

A study done using 25 DHS data sets from 15 countries indicated women higher levels of education and increased household wealth significantly reduces IPV ¹¹⁷. The study used household wealth, education level, employment status, type of earning, and income related decision participation as women economic empowerment indicators.

Other studies also report similar finding. In Zimbabwe, economic empowerment and women freedom of movement was found to have a significant protective effect from all forms of emotional violence ¹¹⁸. A study in India indicated participation in household decision-making and mobile phone ownership significantly reduced IPV ¹¹⁹. The study used participation in major household decisions, employment and earning in cash, ownership of house/land, having a bank account, and owning a mobile phone as women empowerment indicators.

However, research findings on women empowerment and IPV are mixed. In other studies, employment and earning more than the partner ¹¹⁷, ownership of durable asset ¹¹⁹, participation in

a gender and entrepreneurship training program ¹²⁰, participation in decision making ¹²¹⁻¹²², and economic independence ¹²³, were found to significantly increase women risk of IPV.

Empowerment allows women to exercise their rights fully and independently, while IPV denies women of their right. Majority of women in Ethiopia, however, are far behind achieving their full empowerment potential and suffer from IPV. According to the 2016 EDHS report, 63% of reproductive age women in Ethiopia are not fully empowered with attitude towards wife beating- the respondents justify at least one wife beating specified reason. In addition, only 70.6% of currently married women participated in all three household decision making areas; own health, large house-hold purchase, and family visit. The report also indicated the current and ever experience of IPV among reproductive-age women was 27% and 34%, respectively ²⁵.

Ethiopia has adopted a number of women empowerment strategies. The 1997 Constitution, the National Policy on Women, the Family Law, the Growth and Transformation Plan (GTP), and the 2015 Proclamation- which requires women's issues be included in policies, laws, and development programs and projects- are among the national endeavors on women empowerment ²⁵. However, low women empowerment status and high IPV prevalence are still major public health concerns in the country.

Previous studies usually modeled women empowerment either with empowerment percentile or dichotomous empowerment indicator variables- mostly economic empowerment indicators. Our study, however, used a cluster based women empowerment approach utilizing national context variables classified in to four domain structures using the most recent EDHS data set. To the best of our knowledge, no previous research addressed the relationship between women empowerment and IPV using a similar approach.

Material and Method

Source of data

We used data from the 2016 EDHS for this study ²⁵. The data set is de-identified, de-linked and available for public use. Data collection was conducted from January 18 to June 27, 2016. The survey employed multistage stratified cluster sampling technique to collect data in two stages. A total of 645 (202 urban and 443 rural) enumeration areas (EAs) were selected independently in each stratum in the first stage with probability proportional to EA size. House-hold listing and selection of a fixed number of 28 households per cluster was done in the second stage ²⁵. Face-to-face interview data collection technique was employed using computer-assisted personal interviewing data collection system (CAPI).

The target groups included women aged 15-49 across Ethiopia. The survey interviewed a total of 15,683 women and achieved a 95% response rate ²⁵. With regard to women empowerment, all women were eligible for the attitude towards wife beating empowerment information; currently married or in-union women were the targets to collect data on participation in house-hold decision making. Partner violence related information was collected from currently and/ or ever married/in-union women. Only one woman per household was selected for the IPV interview using specially constructed weights to adjust for the selection and produce a nationally representative sub-sample for the violence module ²⁵.

The 2016 EDHS is the 4th and most recent standard demographic and health survey (DHS) available for public use. Ethiopia has conducted Mini DHS and collected information on key performance indicators in 2019. However, the survey did not collect data on domestic violence.

Measurement of variables

Outcome measurement

The outcome variable for this study is maternal experience of partner violence. The 2016 EDHS employed 13 measurement items- divided in three sub scales-to quantify IPV for currently or ever partnered women. Maternal experience of **emotional violence**: has three items; 1. Say or do something to humiliate you (the woman) in front of others, 2. Threaten to hurt or harm you or someone close to you, and 3. Insult you or make you feel bad about yourself. The **sexual violence** sub-scale also has three items; 1. Physically force you to have sexual intercourse with him even when you did not want to, 2. Physically force you to perform any other sexual acts you did not

want to and, 3. Force you with threats or in any other way to perform sexual acts you did not want to. The **physical violence** sub-scale has seven items; 1. Push you, shake you, or throw something at you, 2. Slap you, 3. Twist your arm or pull your hair, 4. Punch you with his fist or with something that could hurt you, 5. Kick you, drag you, or beat you up, 6. Try to choke you or burn you on purpose, and 7. Threaten or attack you with a knife, gun, or any other weapon. The items in each sub-scale were then merged to produce a dichotomous ‘no’ (value ‘0’) or ‘yes’ (value ‘1’) IPV indicator index.

Predictor variables

Main predictor variable

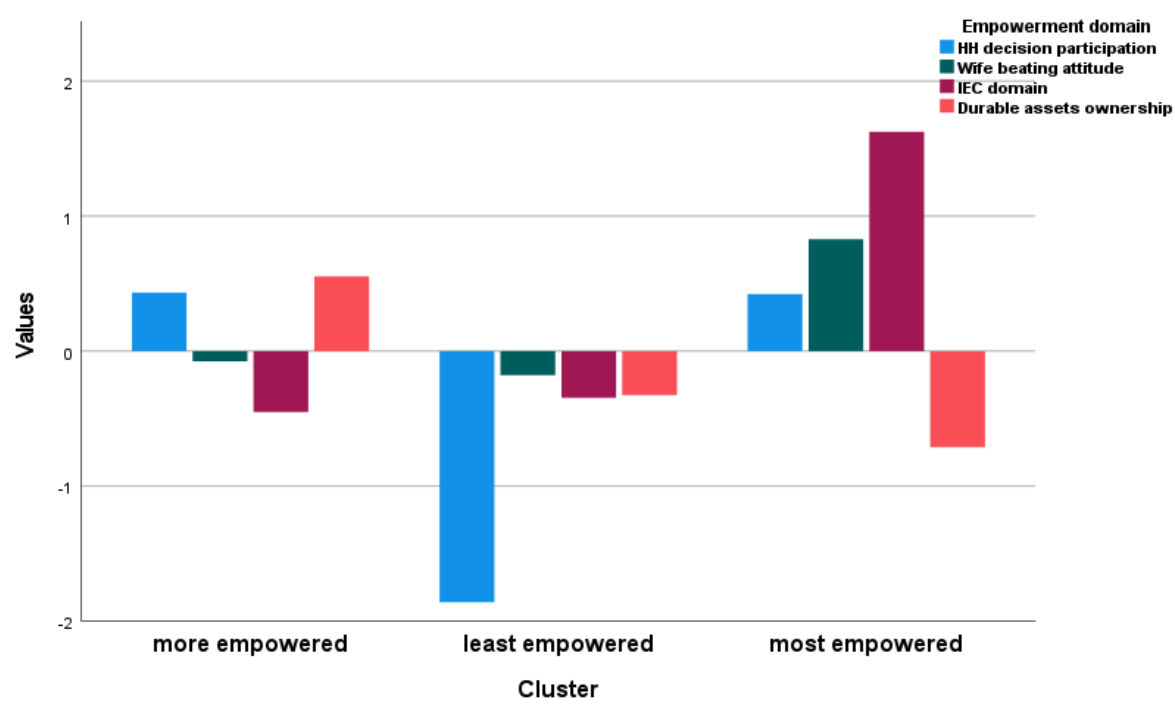
The main predictor variable for this study is women empowerment. Based on the literature review and relevance to Ethiopia, we initially identified 21 empowerment indicator variables to be used for this study. Data screening and transformation was done to test for adequacy of each variable. Following the data management, Principal Component Analysis (PCA) was done using oblimin rotation to identify the components and variables that aggregate the evidence within each women empowerment domain. Correlation analysis was done to test if the variables were fit to be used for PCA. The PCA clustered the variables into four empowerment components (**table 6**). Six variables (Woman participates in decisions on spending partner earning, participates in decisions on spending own earning, woman reads newspaper/magazine at least once a week, is employed in regular paid job, is covered by health insurance, and whether the husband helps with household chores) were dropped off from inclusion in subsequent analysis mainly due to small Eigen-value (< 0.3) in the PCA communalities¹³². Accordingly, the number of empowerment indicator variables was reduced to 15 (**table 6**).

Table 6: Principal Component Analysis (PCA) based woman empowerment domains and empowerment variable definitions.

Empowerment domains and variable definition		
Domain	Indicator	Definition; Empowered Woman
Household Decision Making. # 03 item	Decision on large household purchases	The woman participates in decisions on large household purchases alone or jointly with her partner
	Decision on own health care	The woman participates in decisions on her own health care alone or jointly with her partner
	Decision on visit to family/relatives	The woman participates in decisions on visit to her family or relatives alone or jointly with her partner
Attitude towards wife-beating. # 05 item	Woman argues with her husband	The woman thinks that wife-beating is not justified if the woman argues with her husband
	Woman neglects the children	The woman thinks that wife beating is not justified if the woman neglects the children
	Woman goes out without telling her husband	The woman thinks that wife beating is not justified if the woman goes out without telling her husband
	Woman burns food	The woman thinks that wife beating is not justified if the woman burns the food
	Woman refuses to have sex with her husband	The woman thinks that wife beating is not justified if the woman refuses to have sex with her husband
Information Education and Communication (IEC) domain. # 05 item	Television	The woman watch TV sometimes
	Education level	The woman's education level is secondary and above
	Radio	The woman listens to radio sometimes
	Bank account	The woman has a bank account
	Cell-phone	The woman has cellphone
Durable asset ownership. # 02 item	House	The woman owns house alone or jointly with her partner
	Land	The woman owns Land alone or jointly with her partner

The variables in each component were then computed to form a domain based women empowerment indicators; participation in household decision domain had a scale ranging from 0 -3, attitude towards wife beating 0-5, IEC 0-5, and ownership of durable assets domain scale 0-2. The domains were then standardized to make appropriate comparisons. This was followed by k-means cluster analysis to segment homogenous cases in to empowerment clusters (fig 3).

Fig 3: Women Empowerment Clusters



Key: HH; Household, IEC: Information, education, and communication

The cluster analysis ANOVA table and the post hoc Tukey’s HSD test was used to iteratively fix the number of clusters to three (appendix 1).

Co-Variates

Drawing from the theories of violence and prior research findings, the following variables; partner drinks alcohol (no, yes), woman afraid her partner (no, yes), and woman father ever beat her mother (no, yes) were included as covariates in addition to the women Sociodemographics. The covariate, ‘woman father ever beat her mother’, was rephrased to ‘childhood violence experience’ for this study.

Statistical analysis

Following the K-means clustering, complex sample analysis plan was created using the sample weight for domestic violence, sample strata for sampling errors, and the clusters variable- in-line with how the EDHS data was collected ²⁵. Then, complex sample descriptive cross tabulations stratified by each outcome IPV subscale (emotional, sexual, and physical) was done.

To measure the effect size of each predictor variable, complex samples logistic regression analysis model (CSLOGISTIC) with the corresponding odds-ratio (OR) and 95% confidence interval (CI) was employed. Initially, only women empowerment clusters were tested for their effect on each IPV subscale (separately for emotional, sexual, and physical violence). This was followed by a separate full model analysis for each IPV sub-scale by adding the covariates to the main predictor variable. Taylor Series Linearization variance estimation method was used to produce design-adjusted standard errors. No observation deletion or suppression was made during analysis ¹³⁵.

Only women currently in union or living with a man were involved for the EDHS assessment of the empowerment indicator- participation in household decision making ²⁵. Accordingly, the analysis in this study was limited to this sub-population group. Data analysis was done using statistical software for social sciences (SPSS) version 27.

RESULT

Description of respondents by empowerment and IPV experience

A total of 3897(unweighted) mothers currently married or living with a partner were included in the descriptive analysis. Majority (64.3%) of the respondents were in the middle (more empowered) cluster, while 16.0% were in the most empowered cluster (**table 7**). Maternal experience of violence was 9.5, 21.9, and 22.7 percent for sexual, physical, and emotional IPV, respectively. Women in the most empowered cluster had the lowest violence experience in all the three IPV subscales. Moving from the highest to the lowest empowerment clusters, maternal experience of violence showed an increasing trend for all IPV subscales (**table 7**).

Table 7: Description of respondents by empowerment and intimate partner violence experience

S.No	Descriptive features	Sample size N(%)	Emotional IPV yes (%)	Sexual IPV yes (%)	Physical IPV yes (%)
I	Women empowerment clusters				
	Most empowered	625(16.0)	11.0	4.6	12.8
	More empowered	2504(64.3)	23.5	10.4	23.4
	Least empowered	768(19.7)	29.9	10.8	24.4
II	IPV correlates				
	Woman afraid her partner				
	No	1474	12.4	4.4	11.4
	Yes	2423	29.0	12.7	28.3
	Childhood violence experience				
	No	2625	17.9	8.0	17.1
	Yes	1064	34.4	12.5	34.4
	Partner drinks alcohol				
	No	2750	18.9	7.6	18.2
	Yes	1147	31.9	14.2	30.7
III	Women sociodemographic				
	Age group				
	15-29	1717	19.1	9.2	21.2
	30-39	1458	24.5	9.4	22.2
	40-49	722	27.8	10.6	23.0
	Region				
	Agrarian	3540	23.5	10.2	22.7
	Pastoralists	207	12.6	2.4	10.5
	City dweller	150	17.5	3.5	18.0
	Residence				
	Rural	3265	24.1	10.6	23.7

	Urban	632	15.7	3.9	12.4
	Wealth index				
	Lower	1540	25.2	12.7	24.1
	Middle	799	24.9	10.5	24.7
	Higher	1558	19.2	5.9	18.3

Univariate CSLOGISTIC regression analysis

In this analysis, the effect size of the main predictor variable was assessed by adding to the model only the women empowerment clusters with each IPV subscale. The first CSLOGISTIC univariate model tested the effect of the main predictor variable on emotional IPV, the second on sexual, and the third on physical IPV. The result showed women in the most empowered cluster enjoyed a significant protection from all IPV sub-scales. These women were more than 50% less likely to experience any of the partner violence sub-subscales compared to women from the least empowered cluster (**table 8**).

Table 8: Univariate CSLOGISTIC regression analysis result on the relationship between women empowerment and IPV subscales.

Empowerment clusters	Univariate CSLOGISTIC regression models					
	Emotional IPV		Sexual IPV		Physical IPV	
	COR	95% CI	COR	95% CI	COR	95% CI
Most empowered	0.29*	0.19-0.44	0.39*	0.19-0.82	0.45*	0.31-0.67
More empowered	0.72*	0.54-0.96	0.96	0.63-1.47	0.95	0.71-1.28
Least empowered	1.00		1.00		1.00	
Numbers rounded to two decimals						

*Statistically significant at $P < 0.05$.

Multivariate CSLOGISTIC regression analysis

A total of 3689 (weighted) women currently married or living with a partner were used in the CSLOGISTIC cluster analysis with a 5% missingness rate. We performed three separate multivariate logistic regression analysis and assessed the relationship between women empowerment and each IPV sub-subscale controlling for the covariates: model I for emotional IPV, model II for sexual, and model III for physical IPV. Women empowerment was found to have a significant protective effect on emotional IPV. Women in the most empowered cluster were

69% less likely to experience emotional IPV compared to the least empowered cluster counterparts (**aOR: 0.31, CI: 0.17-0.53**). However, we found no significant relationship between women empowerment and sexual or physical partner violence.

The finding for the covariates: woman afraid her partner, childhood violence experience, and partner drinks alcohol was unprecedented. Women empowered with either of the covariates (who said ‘no’ for either of the variable dichotomies) were significantly protected from all IPV subscales (**table 9**).

Table 9: Multivariate CSLOGISTIC regression analysis result on the relationship between women empowerment and IPV subscales.

S.No	Predictor	Multivariate CSLOGISTIC regression models					
		Emotional IPV		Sexual IPV		Physical IPV	
		aOR	95% CI	aOR	95% CI	aOR	95% CI
I	Empowerment clusters						
	Most empowered	0.31*	0.17-0.53	1.02	0.42-2.46	0.81	0.50-1.30
	More empowered	0.82	0.60-1.12	1.12	0.70-1.77	1.21	0.88-1.66
	Least empowered	1.00		1.00		1.00	
II	IPV correlates						
	Woman afraid partner						
	No	0.34*	0.25-0.47	0.29*	0.18-0.45	0.29*	0.20-0.42
	Yes	1.00		1.00		1.00	
	Childhood violence experience						
	No	0.43*	0.33-0.56	0.66*	0.44-0.98	0.42*	0.32-0.55
	Yes	1.00		1.00		1.00	
	Partner drinks alcohol						
	No	0.38*	0.29-0.49	0.40*	0.27-0.58	0.38*	0.29-0.50
	Yes	1.00		1.00		1.00	
III	Sociodemographics						
	Age group						
	15-29	0.66*	0.48-0.91	0.94	0.57-1.54	1.05	0.72-1.54
	30-39	0.85	0.61-1.19	0.89	0.55-1.46	0.99	0.65-1.50
	40-49	1.00		1.00		1.00	
	Region						
	Agrarian	0.76	0.46-1.24	1.99	0.79-5.0	0.57*	0.33-0.99
	Pastoralists	0.50*	0.29-0.85	0.60	0.22-1.63	0.31*	0.17-0.58
	City dweller	1.00		1.00		1.00	
	Residence						
	Rural	0.69	0.42-1.11	1.31	0.53-3.19	1.42	0.85-2.37
	Urban	1.00		1.00		1.00	
	Wealth index						
	Lower	1.23	0.85-1.78	1.99*	1.24-3.20	1.25	0.90-1.73
	Middle	1.13	0.75-1.71	1.47	0.87-2.49	1.15	0.78-1.68
	Higher	1.00		1.00		1.00	

*Statistically significant at P<0.05.

DISCUSSION

We performed a complex sample cluster analysis to assess whether women empowerment has a protective effect on maternal experience of intimate partner violence(IPV). We identified three clusters using the K-means cluster analysis with four standardized empowerment domains- participation in household decision making, attitude towards wife beating, IEC, and ownership of durable assets.

Only 16% of respondents were from the most empowered cluster. Women in this cluster were empowered with three of the four empowerment domains (participation in household decision making, attitude towards wife beating, and information, education and communication (IEC). The group had the highest IEC domain empowerment and the least durable asset ownership related empowerment compared to the other two groups. Women in the more empowered cluster were empowered with participation in household decision making and durable asset ownership. In the least empowered cluster, women were disempowered/least empowered with all domains. In this cluster, participation in household decision making takes the highest tall below zero compared to the other two groups.

Moving from the most empowered to the least empowered cluster, maternal experience of IPV showed an increasing trend for all the subscales in the descriptive statistics. This observation was supported by the univariate CSLOGISTIC regression where women in the most empowered cluster were found to be significantly protected from all forms of IPV subscales, compared to the least empowered cluster. Our finding is in-line with other studies that indicated women empowerment deters maternal experience of IPV.

The result from the multivariate CSLOGISTIC regression analysis showed women in the most empowered cluster are significantly protected from experiencing emotional IPV compared to those in the least empowered cluster. This finding is consistent with the studies that indicated women empowerment to significantly protect women from emotional IPV ^{116,118}.

However, our finding is different from other studies ^{117, 119-123}. These studies indicated employment and earning more than the partner, ownership of durable asset, participation in a gender and entrepreneurship training program, participation in decision making, and economic independence significantly increased women risk of IPV. The variation in the findings could be attributed

partially to the difference in women empowerment conceptualization and coding- While we employed cluster based empowerment category approach utilizing 15 empowerment variables structured in four domains, most of the above studies used few dichotomous variables as women empowerment indicator. The other possible explanation is the contextual nature of empowerment; women empowerment indicator variables could have different results across nations. The variation in findings could also be due-to the difference in the type of study population, sample size, and magnitude of the outcome variable.

We found no significant association between women empowerment and maternal experience of sexual and physical IPV. Other studies, however, indicated women empowered with participation in household decision making and attitude towards wife beating were significantly more likely to experience sexual and/or physical partner violence ¹²¹⁻¹²². Among others, the complex and contextual nature of empowerment may underlie the difference in findings.

Our study also indicated that women who are not afraid of their partner, or whose partner does not drink alcohol, or those who had no childhood violence experience are significantly protected from all forms of IPV subscales. Although the variables are commonly cited to have significant violence protection effect, that each predictor protects all forms of partner violence is supreme. The finding suggests women empowerment program should also focus on building maternal self-confidence and male partner awareness creation on violence and the untoward effects of alcohol.

Most of the research studies we reviewed assessed the effect of women economic empowerment on IPV. This is so because many women empowerment programs also focus on economic autonomy. We believe that maternal economic wellbeing serves multiple purposes- including the decision whether to leave the violent partner. However, we would like to underscore that the multidimensional nature of empowerment should be addressed in women empowerment programs as well.

Strength and limitation of the study

We used a complex sample cluster analysis to assess the relationship between women empowerment and maternal experience of intimate partner violence for the three sub-subscales. To our knowledge, this is the first ever study done utilizing a different conceptualization and coding of women empowerment approach using a national level data. Because our study is based on a cross-sectional survey data, we cannot establish a cause and effect relationship.

Conclusion

Our finding that empowerment protects women from emotional partner violence and that the most empowered cluster had the smallest number of respondents, calls for the implementation of more comprehensive empowerment strategies and programs that could empower women more and enable them to live free from partner violence. We believe that our finding would help scholars and policy makers to better understand the link between women empowerment and intimate partner violence. More research on empowerment and IPV is warranted to further uncover the relationship.

Authors contribution: BM, JNC, AG, and ND were involved in the research conceptualization, original draft preparation, manuscript review and editing. BM and JNC were involved in formal analysis, interpretation of data, and project administration. BM, JNC, and ND were involved in developing methodology of the research. All authors read and approved the final manuscript.

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Ethical approval: The de-identified data used in this study is a sub-set of publicly available data from the DHS/ICF Marco International as part of the global DHS program ²⁵. Permission to use the data set was obtained from measure DHS/ICF International program by registering and submitting the study protocol. No individual-level data are available in EDHS. This nested study was approved by the Addis Ababa University school of nursing and midwifery, and by the College of Health Sciences Ethics Review Committee (# 09/2023, Date: October 25, 2023).

Data availability: The dataset used for this study is available in the DHS repository (<https://dhsprogram.com>) up on registration and submitting research protocols. For further information about the data, please visit: <https://dhsprogram.com/data/Access-Instructions.cfm>.

CHAPTER IV: PAPER 3

Women Empowerment and Healthcare Utilization for Childhood Illnesses: Evidence From Ethiopia.

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Abstract:

Background: Five million children under-five (U5) died globally in 2021, the majority (56%) in Sub-Saharan Africa (SSA). Much of the U5 deaths could be prevented through early detection and treatment of cases. However, healthcare utilization for childhood illnesses remains low in the region. The aim of this study was to assess the relationship between women empowerment and healthcare utilization for childhood illnesses.

Method: The main predictor variable for this study was women empowerment, and the outcome variable was healthcare utilization for childhood illnesses. The data source for the study was the 2016 Ethiopia demographic and health survey(EDHS) dataset. Complex sample ordinal regression analysis was employed, controlling for confounders. Adjusted cumulative odds ratio (cu-OR) and 95% confidence interval(CI) was computed to estimate effect size.

Result: A total of 2101 (weighted) cases of children U5 were included in this study. Children whose mothers were empowered with a wife-beating attitude were 59% more likely to get healthcare towards all U5 illnesses (β ; 0.46, cu-OR 1.59, $P < 0.01$). Children whose mothers had no healthcare access problem were also more likely to receive health services for all U5 illnesses (β ; 0.42, cu-OR 1.52, $P = 0.01$).

Conclusion: Women empowerment has a significant effect on healthcare utilization for under-five illnesses. The finding indicates empowering women, sooner or later, is empowering the family.

Key words: EMPOWERMENT, HEALTHCARE SEEKING, UNDER-FIVE CHILDREN, UNDER-FIVE ILLNESS, WOMEN

Introduction

Child mortality in Sub-Saharan Africa (SSA) continues to be a persistent challenge ^{4, 27-28}. Five million children under five (U5) died worldwide in 2021⁴. Fifty-six percent of the deaths occurred in SSA with an average under-five mortality rate of 74 deaths per 1,000 live births ⁴. Most childhood deaths occur from preventable causes. The infectious diseases pneumonia (15%), diarrhoea (8%), and malaria (5%) remain the leading causes of U5 mortality globally ^{4, 27-28}.

Much of the U5 deaths from these illnesses could be prevented through early detection and treatment of cases. An ecological study to identify correlates of child mortality in 82 developing countries indicated that healthcare seeking for acute respiratory infections (ARI) (correlation coefficient:-0.48), provision of oral rehydration salt (ORS) for diarrhea (correlation coefficient:-0.52), and anti-malaria given for children with fever(correlation coefficient: -0.56), had a significant protective effect on childhood mortality ⁹³.

However, the prevalence of healthcare seeking* for U5 illnesses remains low in high-burden countries like SSA ^{4, 27-28,72}. (*:Health/care seeking and health/care service utilization are used interchangeably for this study. Similarly, respondents, mother, women, and caretaker are interchangeable). The 2021 UNICEF estimate for the SSA region indicated 46% and 60% care-seeking prevalence for children with ARI symptoms and fever, respectively ⁷². The report showed that only 37% of children with diarrhea received ORS ⁷². An ecological study in developing countries indicated that 49% of child caregivers sought care for childhood ARI symptoms from a health institution, and 39% of children with diarrhoea received ORS ⁹³. According to the study, only 13% of children with fever were given anti-malaria ⁹³. Studies in Nigeria and Kenya also indicated 21.6% and 30.4% care-seeking prevalence for childhood illnesses, respectively ⁹⁴⁻⁹⁵. These studies showed that maternal obstetric factors, service accessibility, service quality, and cost were significant predictors of healthcare seeking for U5 illnesses.

Research indicates that women empowerment has a significant effect on the health and general well-being of children. Empowerment is a process of change by which those who have been denied the ability to make strategic life choices- the powerless- regain their autonomy ¹¹¹⁻¹¹³. It is a multidimensional complex concept grouped under three dimension pillars: (1) **Resources**; The financial, physical, human, and social capital that enable choice, (2) **Agency**; The capacity to make decisions about one's own life freely, and **Self-efficacy**; The belief in one's ability to act effectively

towards a goal, and (3) **Context**; The social arrangements, mainly norms and institutions necessary to express agency and assert control over resources ¹¹¹⁻¹¹³. Empowerment involves removing barriers and creating enabling environment for women to own and use these pillars¹¹¹⁻¹¹³

Women empowerment is a contextual concept as well - an empowerment indicator in one country/culture might not have a similar empowering effect in another. This feature of empowerment poses a challenge to develop standard measurement indicators that could be used to understand the magnitude, determinants, and outcome of women empowerment at national or global level ¹¹⁴⁻¹¹⁵. Nonetheless, a recent international report indicated that only 60.7% of women are empowered to achieve their full potential globally ¹¹⁵. The equivalent figure for SSA is 49.8%, compared to 76.3% for Europe and Northern America. The report covered 114 countries using ten indicators from five women empowerment dimensions ¹¹⁵. Women empowerment is one agenda of the 2030 Sustainable Development Goal 5- Achieve gender equality and empower all women and girls ¹¹³.

Research on the relationship between women empowerment and care seeking for childhood health conditions are limited, and show mixed findings. A study done using the Institute for Health Metrics and Evaluation's (IHME) database of 161 countries indicated that women's political empowerment has relevant effect on immunization for low-income and least developed countries ¹²⁴. A study in Zimbabwe, however, found no significant association between women empowerment and childhood vaccination, and treatment for diarrhea ¹¹⁴.

Nonetheless, several other studies have assessed the effect of women empowerment on the nutritional status of children. A systematic review of studies in SSA ¹²⁵ and another comparative study in the region ¹²⁶ indicated women empowerment has a significant positive effect on childhood anthropometric indicators. A study in Gambia showed women who reported accepting wife beating had 69% and 66% greater odds of having stunted and underweight children, respectively ¹²⁷. In Peru, a study indicated that low level of women's autonomy was significantly associated with a higher probability of anemia in U5 children ¹²⁸. Studies conducted in Ethiopia also indicated that women empowerment had a significant protective effect on childhood malnutrition ¹²⁹⁻¹³⁰.

Although Ethiopia has reduced U5 mortality by more than 75% since 1990 ⁴, it is still categorized among the global high-burden states ^{4,25}. It is one of the five countries where half of all under-five deaths occurred in 2018 ⁴. In 2021 alone, 178,000 children U5 died in the country ⁴

Yet, the prevalence of healthcare utilization for U5 illnesses remains low in Ethiopia ^{25,72}. The 2016 national demographic and health survey report indicated that among U5 children in the country, 7% had ARI symptoms, 14% had fever, and 12% had diarrhea in the two weeks before the survey ²⁵. According to the report, treatment was sought for 31%, 35%, and 44% of children with ARI symptoms, fever, and diarrhea, in that order. The country also has a lower level of women empowerment. The EDHS 2016 report indicated that only 37% of all women and 70.6% of currently married women were fully empowered with attitudes towards wife beating, and participation in household decision making, respectively ²⁵.

Ethiopia has adopted several child survival programmatic strategies, including the integrated management of newborn and childhood illnesses (IMNCI) approach. The health sector transformation plan, the National Newborn and Child Development Strategy 2021–2025, and the implementation of a national action plan that targeted pneumonia and diarrhea- the two major contributors(25%) of U5 mortality in the country- are among the continued similar national endeavours ^{25, 146}. Nonetheless, Ethiopia is known for its high U5 mortality rate, low level of healthcare seeking for childhood illnesses, and a lower prevalence of women empowerment.

Most studies done on the relationship between women empowerment and child health, employed childhood anthropometric indicators as the outcome variable. This study, however, aims to assess the association of women empowerment with healthcare seeking for the U5 illnesses of diarrhea, fever, and ARI symptoms- the three major causes of U5 mortality. To our knowledge, no previous study has examined the relationship between women empowerment and healthcare seeking for U5 illnesses.

Method and Material

Source of Data

This study employed a retrospective cross-sectional survey data analysis using Kids Recode (KR) dataset from the 2016 EDHS ²⁵. All women aged 15-49 were eligible to be interviewed. The sampling frame for the survey was the 2007 population and housing census (PHC) frame, which contains a complete list of all census enumeration areas (EA). The sample was stratified (urban-rural) and selected in two stages. At the first stage of sampling, a total of 645(202 urban, 443 rural) EAs were selected using probability proportional to size selection technique. A fixed number of 28 households per cluster was chosen in the second stage.

Data collection took place from January 18, 2016, to June 27, 2016. It was done with a face-to-face interview using a computer-assisted personal interviewing data collection system (CAPI). A total of 15,683 women were interviewed, with a 95% response rate. Information on the health status of children was collected from these women. The survey used specially constructed weights for the sample selection. The women individual sample weight was used for this study ²⁵. Ethiopia conducted mini-DHS in 2019. However, the survey did not collect data on women empowerment and childhood illnesses.

Measurement and variables

Outcome variable

The outcome variable for this study is utilization of healthcare services for the U5 illnesses of diarrhea, fever, and ARI symptoms, which occurred in the two weeks before the 2016 EDHS. Initially, health seeking for each U5 illness was recoded as 'yes'(value '01'), if women sought health care, and 'no'(value '0') otherwise. The result was then merged to produce the total number of U5 illnesses women sought healthcare. The value ranges from 0-3 (value '0'- women did not seek health care for any U5 illness, and '3'- women sought healthcare for all illnesses).

Predictor variables

The main predictor variable for this study was women empowerment. Based on literature review and relevance to Ethiopia, 21 variables were identified as women empowerment indicators initially. Then, data screening and transformation was done to test for adequacy of each selected variable. Five variables; respondent participates in decision on spending husband earning,

participates in decisions on spending own earning, is employed in regular paid job, is covered by health insurance, and whether the husband helps with household chores were excluded from this study mainly due-to small sample size, and associated high missing values. Accordingly, the total number of women empowerment indicator variables was reduced to sixteen.

Following the data management, Principal Component Analysis (PCA) was done using oblimin rotation to identify the components and the variables that aggregate the evidence within each women empowerment domain. Correlation analysis was done to test if the variables were fit to be used for PCA. The PCA (supplemented by parallel analysis) clustered the variables in to four empowerment components; decision making, attitude towards wife beating, information education and communication (IEC), and durable asset ownership (**table 10**).

Table 10: Domain based women empowerment indicator variables and definition

Empowerment indicators and definition		
Domain	Indicator	Definition –Empowered
Decision making # 03 items	Decision on large household purchase	The woman participates in decisions on large household purchases alone or jointly with her partner
	Decision on own health care	The woman participates in decisions on her own health care alone or jointly with her partner
	Decision on visit to family/relatives	The woman participates in decisions on visit to her family or relatives alone or jointly with her partner
Attitude towards wife-beating #05 items	Woman argues with her husband	The woman thinks that wife-beating is not justified if the woman argues with her husband
	Woman neglects the children	The woman thinks that wife beating is not justified if the woman neglects the children
	Woman goes out without telling her husband	The woman thinks that wife beating is not justified if the woman goes out without telling her husband
	Woman burns food	The woman thinks that wife beating is not justified if the woman burns food
	Woman refuses to have sex with her husband	The woman thinks that wife beating is not justified if the woman refuses to have sex with her husband
Information, education, and communication (IEC) indicators #06 items	News paper	The woman reads newspaper sometimes
	Television	Watch TV sometimes
	Education level	Education level secondary and above
	Radio	Listens to radio sometimes
	Bank account	Has a bank account
	Cell-phone	Has cellphone
Durable asset ownership #02 items	House	Owns house alone or jointly with her partner
	Land	Owns Land alone or jointly with her partner

Items in each domain were then merged and transformed into dichotomous yes/no variables to produce domain-based women empowerment indicators. For this study, a woman is considered empowered if she is empowered with all items in each domain (fully empowered). For example, merger of the three ‘participation in decision making’ women empowerment indicator items produces a scale ranging from 0-3 (0,1,2,3). Value 0-2 (0,1,2) was recoded as ‘0’ (not empowered), and value ‘3’ was recoded as ‘01’- empowered.

Covariates

Based on the literature review, maternal and child sociodemographic variables (age of the child, sex of child, residence, house hold wealth), maternal obstetric factors (number of children living in the house, desire for more children), and the socioeconomic factor (access to health care is not a big problem) were included as covariate variables. Whether ‘access to health care’ is not a problem was converted to a dichotomous variable by amalgamating getting medical help problems related to distance, money, permission, and women not wanting to go alone. It was then assigned ‘yes’ (value ‘01’) if the respondent had no problem, and ‘no’ (value ‘0’) if she had at least one such problem. Selection of the covariates was determined by availability of the variable in the dataset.

Statistical analysis

Following the Principal Component Analysis, a complex sample analysis plan was made specifying the sample weight for women individuals, sample strata for sampling errors, and the clusters variable based on the EDHS sample design information ^{25,134}. Complex sample frequency, descriptive, and crosstab were done to describe the sample by background characteristics and health care seeking for childhood illnesses. The bivariate chi-square test was used to assess for the presence of statistically significant ($p < 0.05$) differences in health service utilization for childhood illnesses.

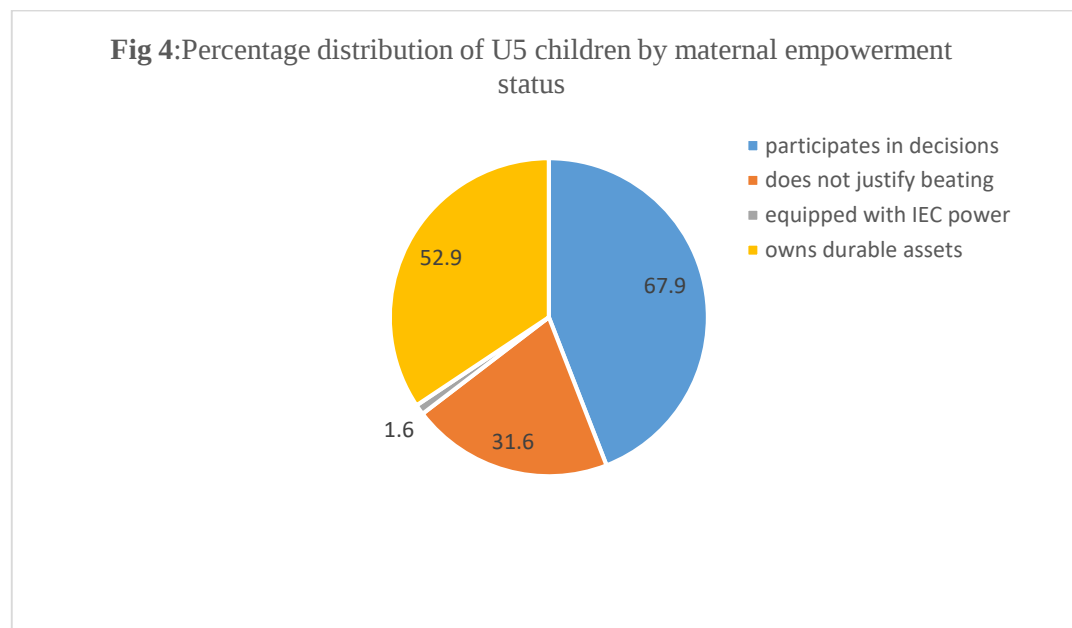
Univariate and multivariate complex samples ordinal regression analysis (CSORDINAL) was done to measure the predictors effect size on the outcome variable, with the corresponding cumulative odds ratio (cu-OR) and 95% confidence intervals (CIs). Taylor series linearization method was used for variance estimation. No observation deletion or suppression was made in the analysis ¹³⁵. Data analysis was done using Statistical Software for Social Sciences (SPSS) version 27.

The EDHS collected data from women currently married or living with a man for its assessment of the women empowerment indicator ‘participation in household decision making’. Accordingly, our study was limited to this sub-population of respondents.

RESULT

Descriptive analysis

There were 9894(unweighted) children U5 living with mothers currently married or in union. Majority (67.9%) of the children had mothers fully empowered with household decision making, while only 1.6% were from women fully empowered with the information, education and communication(IEC) domain of empowerment(**fig 4**).



Among these U5 children, 11.7% (1157) had diarrhea, 14.0%(1390) had fever, and 6.6% (656) had acute respiratory infection symptoms (ARI) in the two weeks before the demographic and health survey. Healthcare seeking was made for 44.5% of children with diarrhea, 35.3% children with fever, and 29.6% of children with ARI symptoms (**table 11**).

Table 11: Description of the study sample by healthcare utilization for U5 illnesses

S.No	Descriptive features	Percent children received care by type of U5 illness		
		Diarrhea n =1157	Fever n=1390	ARI n=656
1	Healthcare seeking	44.5	35.3	29.6
2	Healthcare sought on the same or next day		14.9	
3	ORS given	29.1		
4	Zinc given	32.8		
5	Antibiotic given		28.5	
Numbers rounded to one deimal place				

Note: ARI; acute respiratory infections, ORS; oral rehydration salt, the blank boxes are for which there is no data.

Merging maternal healthcare seeking for each U5 illness (diarrhea, fever, and ARI) returned 2268(unweighted) cases of U5 children; because it is the mother who sought healthcare for these children, the number (2268) also represents mother-child pairs of the cases. While 61.9% of the cases received no healthcare, 2.9% received healthcare for three childhood illnesses(**table 12**). Among these children, 66.7%(1513) were encountered with one childhood illness, while 7.9% (179) experienced all three illnesses in the two weeks before the survey. As the number of U5 illnesses encountered increases, maternal utilization of healthcare for at least 01 childhood illness increases as well(**table 12**).

Table 12: Description of the sample by number of U5 illnesses encountered and number of diseases respondents sought healthcare

Number of U5 illnesses encountered	Number of U5 Illnesses women sought healthcare (%)				Total Number of cases
	0	1	2	3	
01	68.5	31.5			1513
02	52.8	13.5	33.7		576
03	35.2	21.3	6.8	36.7	179
Total	61.9	26.1	9.1	2.9	2268

Among the 2268 cases of children, 51.9% were male and 89.3% were rural residents. The magnitude of women empowerment, stratified by healthcare seeking for U5 illness, showed a slight change compared to the magnitude from the complex sample descriptive frequency. In the chi-square test, women empowerment with attitude towards wife beating and ownership of durable assets domain showed a significant relationship with healthcare seeking for U5 illnesses (**table 13**).

Table 13. Description of the study sample by background characteristics and the number of U5 illnesses respondent sought healthcare

Predictors		Number of U5 illnesses women sought healthcare (%). N=2268 unless indicated				Total Sample (%)
		0	1	2	3	
I	Empowerment Indicators					
	Participation in household decisions	X ² : 1.1 P= 0.91				
	no	63.1	24.4	9.5	2.9	36.0
	yes	61.6	26.6	9.0	2.9	64.0
	Doesn't justify wife beating	X ² : 39.4 P= 0.00				
	no	66.3	24.1	7.4	2.2	68.3
	yes	52.4	30.5	12.8	4.4	31.7
	Equipped with IEC power	X ² : 2.2 P= 0.57				
	no	62.3	25.8	9.1	2.9	98.6
	yes	53.3	26.9	16.8	3.0	1.4
	Respondent owns durable assets	X ² : 20.8 P= 0.01				
	no	57.5	30.1	9.1	3.3	48.7
	yes	66.5	21.7	9.2	2.6	51.3
III	Sociodemographic Indicators					
	Age of child	X ² : 20.7 P= 0.11				
	0-11	57.1	29.4	10.0	3.5	24.7
	12-35	60.1	26.7	10.3	2.9	44.7
	36-59	69.2	21.5	7.0	2.4	30.6
	Sex of child	X ² : 0.72 P= 0.94				

	male	61.3	26.5	9.4	2.9	51.9
	female	63.0	25.0	9.0	2.9	48.1
	Residence	X ² : 50.5 P= 0.000				
	rural	64.8	23.8	8.5	2.9	89.3
	urban	40.1	42.2	14.7	3.1	10.7
	Household wealth status	X ² : 53.5 P= 0.00				
	lower	67.7	22.8	7.2	2.2	43.0
	middle	66.5	21.8	7.0	4.8	21.4
	higher	52.7	31.7	12.9	2.7	35.6
	Health care access is not a problem	X ² : 54.5 P= 0.000				
	no	66.1	22.7	8.0	3.2	77.4
	yes	48.4	36.4	13.3	1.9	22.6
	Number of U5 in the house (n= 2229)	X ² : 24.6 P= 0.04				
	01	55.9	30.4	10.2	3.5	42.3
	02	66.6	22.3	8.7	2.4	42.8
	3-6	67.2	22.3	8.1	2.3	14.9
	Desire for more children (n=2139)	X ² : 4.8 P= 0.50				
	no	64.7	23.9	8.8	2.6	38.0
	yes	59.7	27.3	10.0	3.1	62.0

Note: IEC; information, education and communication, the Chi-square values are rounded to the nearest one decimal place

CSORDINAL Univariate Regression

Children whose mothers were empowered with attitude towards wife beating had an increased probability of receiving healthcare towards all childhood illnesses in the univariate regression(β ; 0.60, cu-OR 1.82, $P < 0.01$). Maternal ownership of durable assets, however, was found to have opposite effect (β , -0.34, cu-OR 0.71, $P = 0.01$) (table 14).

Table 14: CSORDINAL Univariate Regression analysis result on the relationship between women empowerment and health care utilization for U5 illnesses

Predictors		β	CSORDINAL Univariate Regression				
			cu-OR	95% CI		TPL-p.value	
				lower	upper		
I	Empowerment Indicators						
	Participation in household decisions		0.07	1			0.95
	no			1.08	0.82	1.41	
	yes						
	Doesn't justify wife beating		0.60	1			0.92
	no			1.82*	1.40	2.40	
	yes						
	Equipped with IEC power		0.44	1			0.61
	no			1.55	0.55	4.33	
	yes						
	Respondent owns durable assets		-0.34	1			0.31
	no			0.71*	0.56	0.91	
	yes						
III	Sociodemographic Indicators						
	Age of child		-0.48	1			0.99
	0-11			0.62*	0.44	0.87	
	12-35			0.89	0.66	1.21	
	36-59						
	Sex of child		-0.06	1			0.95
	male			0.94	0.73	1.21	
	female						
	Residence		0.91	1			0.05
	rural			2.50*	1.81	3.44	
	urban						
	Household wealth status (Lower, middle, higher)		0.32	1.37*	1.18	1.60	0.41

	Health care access is not a problem					
	no	0.66	1			0.03
	yes		1.93*	1.47	2.55	
	Number of U5 in the house (01, 02, 3-6)	-0.29	0.75*	0.62	0.91	0.68
	Desire for more children					
	no	0.21	1			0.95
	yes		1.23	0.92	1.65	

Note: cu-OR;Cumulative Odds Ratio, TPL; test of parallel lines, IEC; information education and communication, *Statistically significant at P<0.05, numbers rounded to the nearest two decimals

CSORDINAL Multivariate Regression

A total of 2101 cases of children were included in the CSORDINAL multivariate model- with a 7.4% missingness rate. Children whose mothers were empowered with attitude towards wife beating were found to have 59% more probability of receiving healthcare services towards all the U5 illnesses (β ; 0.46, cu-OR 1.59, $P < 0.01$). Children of mothers with no healthcare access problem were also more likely to get health services for all U5 illnesses (β ; 0.42, cu-OR 1.52, $P = 0.01$)(table 15).

Table 15: CSORDINAL Multivariate Regression analysis result on the relationship between women empowerment and health care utilization for U5 illnesses

Predictors		β	CSORDINAL- Multivariate Regression				
			cu-OR	95% CI			
				lower	upper		
I	Empowerment Indicators						
	Participation in household decisions						
	no	-0.05	1				
	yes		0.95	0.72	1.23		
	Doesn't justify wife beating						
	no	0.46	1				
	yes		1.59*	1.20	2.10		
	Equipped with IEC power						
	no	-0.48	1				
	yes		0.62	0.21	1.85		
	Respondent owns durable assets						
	no	-0.26	1				

	yes		0.77	0.59	1.02
III	Sociodemographic Indicators				
	Age of child				
	0-11		1		
	12-35	-0.39	0.67*	0.47	0.97
	36-59	-0.06	0.94	0.68	1.31
	Sex of child				
	male	-0.11	1		
	female		0.90	0.69	1.17
	Residence				
	rural	0.38	1		
	urban		1.46	0.91	2.35
	Household wealth (Lower, middle, higher)	0.12	1.13	0.91	1.37
	Health care access is not a problem				
	no	0.42	1		
	yes		1.52*	1.10	2.09
	Number of U5 in the house (01, 02, 3-6)	-0.16	0.85	0.71	1.03
	Desire for more children				
	no	0.11	1		
	yes		1.12	0.83	1.49

Note: cu-OR; Cumulative odds ratio, IEC; information education and communication, P.value for test of parallel lines = 0.07, *Statistically significant at P<0.05, numbers are rounded to nearest two decimal places.

DISCUSSION

This study assessed the relationship between women empowerment and healthcare seeking for the U5 illnesses of diarrhea, fever, and ARI symptoms; the three common causes of childhood mortality. Our finding indicated that prevalence of care seeking for childhood illnesses ranges from 30% to 45%. Less than 33% of the children received ORS, Zinc, or antibiotics for their illnesses. The prevalence of healthcare seeking in our study is lower than the UNICEF report for SSA(46%-60%) ⁷², and the ecological study report for the region(49%) ⁹³. However, our finding is better than similar research findings from Nigeria and Kenya ⁹⁴⁻⁹⁵. The rationale for the variation in findings could be due to the difference in health awareness, socioeconomic, and empowerment status of women.

The result from the CSORDINAL multivariate analysis showed that women empowerment with attitude towards wife beating has a positive effect on healthcare utilization towards all U5 diseases. This is inline with other studies, ¹²⁵⁻¹³⁰ which indicated women empowerment to have a protective effect on childhood malnutrition. However, the outcome variable for our study was health seeking for U5 illnesses. Hence, caution should be taken when comparing.

The women empowerment indicators; participation in household decision making, ownership of durable assets, and information, education, and communication(IEC) power, were found to have no significant association with health seeking for U5 illnesses in the final multivariate model. This finding is similar to a study from Zimbabwe ¹¹⁴, which indicated that women empowerment with decision making or maternal ownership of durable assets had no significant association with both childhood vaccination uptake, and treatment for diarrhea.

The research findings above, however, deviate from the underlying theoretical foundation of women empowerment ¹¹¹⁻¹¹³. The absence of standard measurement indicators of empowerment may contribute to the deviation of the research findings, in general. Another possible explanation for the finding related to the empowerment indicator ‘participation in household decision making’ may lie in the definition of the indicator itself. A woman is said to be empowered if she makes decisions alone or jointly with her partner. Joint decision-making could be considered communicative, participatory, and equitable. However, the degree of women involvement that qualifies a ‘joint decision’ making can not be quantified objectively. This could introduce research bias. Accordingly, we suggest that, though some household issues require couple’s joint decision making, independent decision making by the women alone should be considered as women

empowerment indicator. Social desirability bias; the respondent answers as if she were participating in household decision making, while she did not in reality, might be another source of bias for the findings.

Some authors classify women empowerment variables as empowerment indicators and empowerment enablers: participation in household decision making and attitude towards wife beating are usually considered as empowerment indicators by researchers ^{114-115,141}. Our finding that maternal ownership of durable assets and IEC power had no significant association with care seeking for U5 illnesses could indicate that owning empowerment enablers does not directly translate to women empowerment. Especially in Africa, that a woman in union owns durable assets doesn't necessarily mean that she is able to give-away, rent-out, sell, or buy more assets alone or jointly. Less than two percent of the respondents in this study were fully empowered with the IEC domain of women empowerment. This low level of women empowerment status could affect the power of the test as well.

Our study found that a unit increase in age of children aged 12-35 months significantly decreases the probability of healthcare seeking towards all U5 illnesses, compared to children aged 0-11 months. However not significant, a similar decreasing trend was observed for children aged 36-59 months, compared to the 0-11 months age group. This may indicate that mothers are more sensitive to the illness of their younger kids compared to the older age groups.

As the number of U5 children living in the household increases, healthcare seeking was found to decrease significantly. This may be due to the higher socioeconomic demand related to providing care for many children in the house. The study also showed that respondents with no healthcare access problem were more likely to seek care towards all U5 illnesses.

Strength and limitation of the study

This study tried to address the research gap on the relationship between women empowerment and healthcare seeking for the U5 illnesses of diarrhea, ARI symptoms, and fever- the three major causes of U5 mortality. This makes our research to be the first in its kind. We extracted data from the EDHS 2016 Kids Recode dataset for this study. The findings could, therefore, be inferred to the health seeking behavior of mothers for U5 illnesses in Ethiopia. Lack of standard women empowerment indicators to use constitutes the limitations of this study. We can not also establish a cause-and-effect relationship from a cross-sectional research design.

Conclusion

This study revealed that women empowerment has a significant association with maternal healthcare seeking for U5 illnesses. The finding indicates disempowerment not only affects the life of the victim, but also significant others in the household, including children. It implies that empowering women is empowering the family, sooner or later. Hence, for women to make autonomous strategic life decisions, including healthcare seeking for children, significant attention should be given to women empowerment. We believe that understanding and addressing deterrents of maternal healthcare seeking behavior more, could contribute significantly to the prevention and control of childhood mortality in SSA.

Authors contribution: BM, JNC, AG, and ND did the research conceptualization, original draft preparation, manuscript review and editing. Formal analysis, interpretation of data, and project administration involved BM and JNC . BM, JNC, and ND developed methodology of the research. All authors read and approved the final manuscript.

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Ethical statement

The study used publicly available, de-identified, and de-linked kids recode EDHS dataset from the DHS/ICF Marco International data repository ²⁵. Online registration and submission of study protocol was made to obtain permission to use the data set from measure DHS/ICF International program. The Addis Ababa University School of Nursing and Midwifery, and the College of Health Sciences Ethics Review Committee, reviewed and approved the study protocol (# 09/2023, Date: October 25, 2023).

Data availability:The dataset used for this study is available @: <https://dhsprogram.com>. Accessing the dataset requires registration and submitting research protocols. Further information about the data could be found @: <https://dhsprogram.com/data/Access-Instructions.cfm>.

CHAPTER V

INTEGRATIVE SUMMARY

Sub-Saharan Africa is the major contributor of the global maternal and child mortality. Adequate utilization of MCH services could avoid this global catastrophic health outcome. Yet, maternal utilization of these services remains low in SSA. Studies indicate IPV deters MCH service utilization and predispose women and children to unfavorable health outcomes, including death. One mechanism by which IPV leads to these negative outcomes is through denying women autonomy. IPV is the most common form of violence against women and is considered a violation of basic women rights.

We used the 2016 EDHS data set for our study. Women aged 15-49 were the survey target groups. The survey data was collected in conformity with the international and national ethical guidelines. No harm would be inflicted up on the study subjects for the data set has no any identifying link to the survey respondents.

We employed a complex sample analysis that accounted for the complex nature of demographic and health survey data sets. In all papers data screening (for outliers, missing values) and data management was done before the analysis. As part of the data management, we performed EFA/PCA for our 2nd and 3rd research aims, after identifying women empowerment indicator variables. Women currently married or in union were our study subjects.

This dissertation addressed three research questions on the association of intimate partner violence, maternal healthcare utilization, and women empowerment. The first research paper addressed the relationship between IPV and adequate ANC service utilization for the last child borne in the five years before the EDHS, the 2nd research work was on IPV and women empowerment, and our third paper was on the relationship between empowerment and healthcare utilization for under-five illnesses.

We indicated an inverse dose-response relationship between IPV and adequate ANC utilization. Consequently, the number and types of IPV (emotional, sexual and physical) should be assessed and responded to differently when used to predict health outcomes, including ANC utilization

The dose-response relationship between IPV subscale and ANC-4 implies that no a woman victim of multiple dose and/or form of partner violence should be managed similarly with the woman who experienced less. Accordingly, IPV exposure dose and exposure type require assessment in order to mobilize differential interventions in the prevention, management, and control activities of partner violence. This would give a sound and fair management approach to women victims of intimate partner abuse.

We indicated that empowerment protects women from intimate partner violence and has a significant positive effect on healthcare seeking for U5 illnesses. This indicates disempowerment not only affects the life of the victim, but also significant others in the household, including children. It implies that empowering women is empowering the family, sooner or later. Hence, special attention should be given to women empowerment. Autonomous women make strategic life decisions independently, including care seeking for U5 children.

We believe that our findings would help scholars and policy makers to better understand the link between intimate partner violence, women empowerment, and health service utilization.

Implications for Policy and Practice

Policy Implications

Intimate partner violence is a prevalent, yet preventable, public health problem in Ethiopia. The attitude, behavior, and social norms that lead to violence can be changed. This calls for the implementation of more effective IPV prevention Policies and Programs. Most violence related policies and programs in Ethiopia focus on sexual IPV. The Ministry of Health (MoH) should incorporate more comprehensive IPV prevention, screening, and management strategies in place

Empowerment not only protects women from experiencing IPV, but also increases maternal consumption of healthcare services. Empowering women is empowering the family, sooner or later. However, only a small fraction of women in Ethiopia are empowered fully to their potential. There is a need for the implementation of more women empowerment strategies and programs that are tested and proven effective in low and middle income countries, including but not limited to, economic and social empowerment.

In general, in addition to addressing the immediate needs of IPV victims (medical treatment, psychosocial support, law-enforcement, etc.), the implementation of effective IPV prevention and women empowerment policies, strategies, programs, and guidelines should receive due attention by stakeholders. Review and enforcement of existing laws or amending new ones should be carried out. The development of violence rehabilitation center, including shelter system, should be considered as well.

Healthcare Practices

Although universal screening for IPV might not be feasible, screening of suspected women should receive due attention during ANC contact. Violence exposure dose and exposure type should be included in the assessment of women suspected of intimate partner abuse. This way, we can implement a differential management approach to the victims

Healthcare workers should maintain privacy, and provide compassionate and respectful care during screening and management of abused women. This could help women to discuss violence related issues freely with the care provider later. Health institutions and health care workers should

implement more effective health awareness programs focusing on intimate partner violence prevention and women empowerment

Community Practice

Violence does not degrade the rights and health status of the victim women only. It affects the family as a whole, including children. Community based IPV awareness programs and community mobilization should be carried out to dispel myths, misconceptions, and transform violence related harmful practices and social norms. Such programs should give due emphasis to male involvement.

Implication for Women

Women should take the lead and get involved in the development and implementation of violence prevention and women empowerment policies, strategies, and programs. They should also develop a culture of intolerance to violence, in any form or state.

However difficult, at times, leaving a violent relationship may be the ultimate decision women have to make. Therefore, they should build the self-efficacy and confidence that would enable them to lead an independent life free of coercion.

Research Implication

Our research findings indicated that sexual and emotional intimate partner violence negatively affects ANC service utilization. Physical IPV, however, had no significant association with the outcome. We also indicated that women empowerment with attitude towards wife beating had a positive effect on maternal healthcare seeking practice for U5 illnesses. Participation in household decision making, ownership of durable assets, and women IEC power were found to have no significant relationship with healthcare seeking.

The above research findings of ‘no associations’ contradicts the theoretical conceptions of IPV, and women empowerment. The rationale for this discrepancy could not be limited to the explanations we outlined. We recommend further research to consolidate our findings and/or provide a new insight into the relationships of IPV, women empowerment, and healthcare utilization. For

example, a research to examine our explanation of the rational for the absence of a significant relationship between women empowerment with household decision making and healthcare seeking for childhood illnesses is worth mentioning; we argued that the reason for this finding could be attributed to the definition of the empowerment indicator, participation in decision making.

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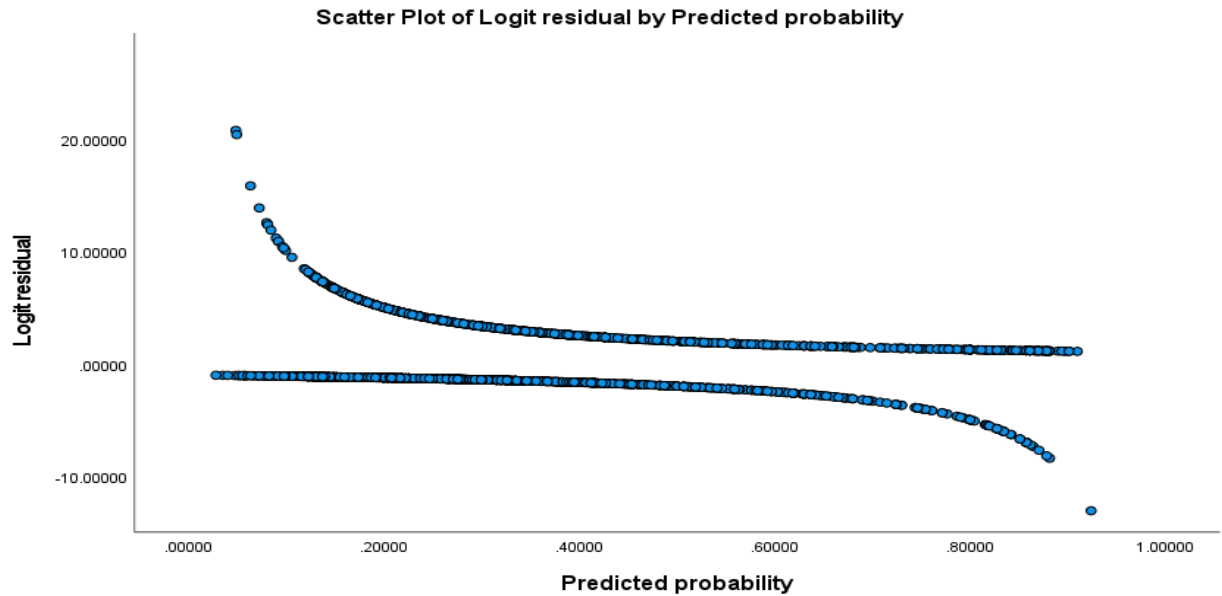
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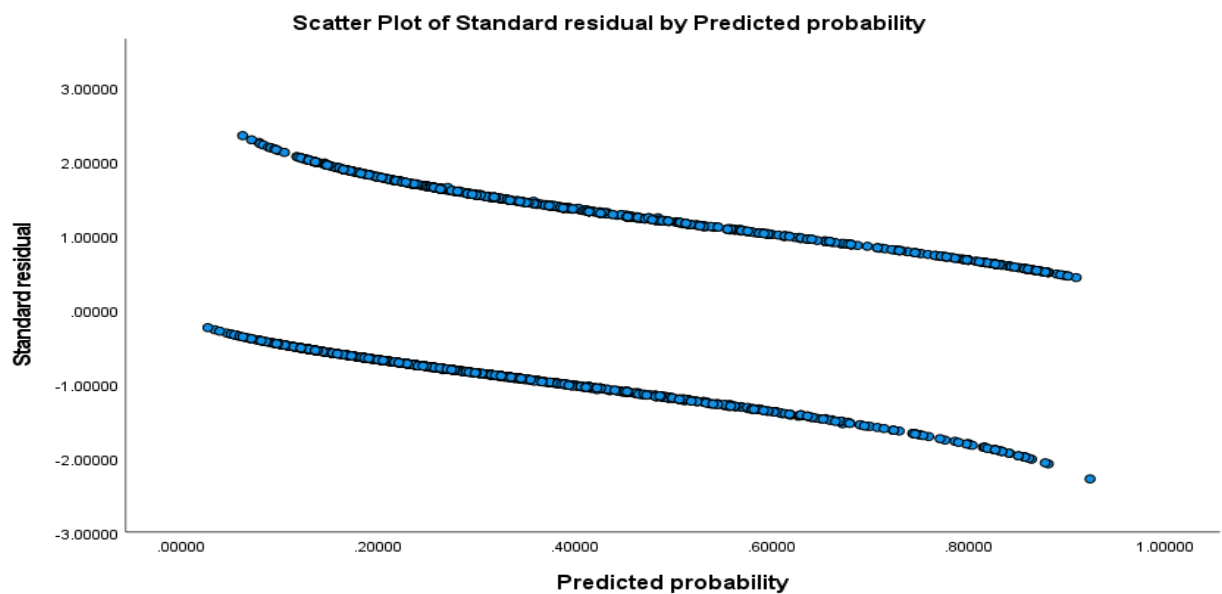
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APPENDIXES

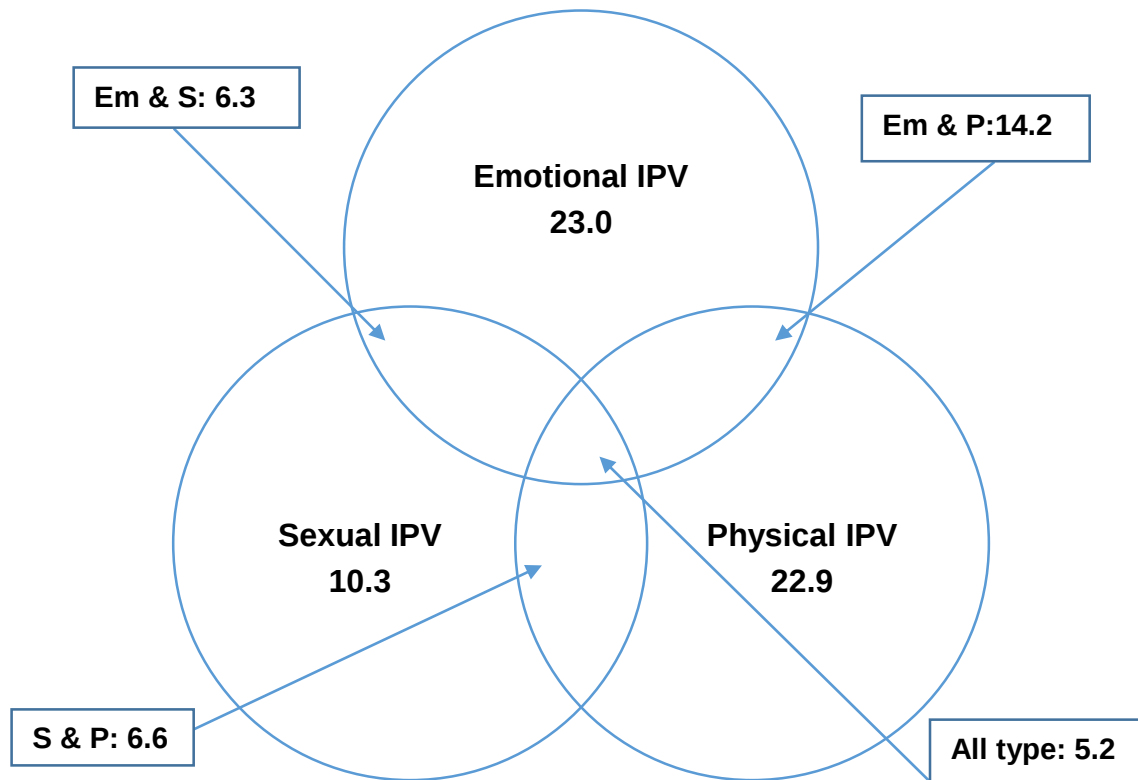
1. Scatter plot of Logit residual by Predicted probability: IPV experience treated as continuous variable



2. Scatter plot of standard residual by Predicted probability: IPV experience treated as continuous variable



3. Venn diagram showing the prevalence of maternal experience of IPV.



Key: Em: Emotional IPV, S: Sexual IPV, P: Physical IPV

4. Post Hoc Tukey's Honest Significant Difference (HSD) test for the women empowerment k-means cluster analysis.

Multiple Comparisons

Dependent Variable: Distance of Case from its Classification Cluster Center

Tukey HSD				
(I) Cluster Number of Case	(J) Cluster Number of Case	Mean Difference (I-J)	Std. Error	Sig.
1	2	-0.08*	0.01	0.00
	3	0.23*	0.02	0.00
2	1	0.08*	0.01	0.00
	3	0.31*	0.02	0.00
3	1	-0.23*	0.02	0.00
	2	-0.31*	0.02	0.00

*. The mean difference is significant at the 0.05 level. Numbers rounded to two decimals

5. Sensitivity and Receiver Operating Curve(ROC) analysis result for women who delivered in the five year **versus** last 12 months before the 2016 Ethiopia demographic and health survey(EDHS)

5.1. **Sensitivity:** deliveries occurred in the five years before the EDHS

Final classification table

Observed	Predicted		Percent Correct
	no	yes	
no	1747.3	94.5	94.9
yes	615.8	182.6	22.9
Overall Percent	89.5	10.5	73.1

Subpopulation: Currently/formerly/never in union = Currently in union/living with a man
 Dependent Variable: Whether woman had adequate ANC(≥ 4) for births in the five years before the EDHS (reference category = no). *Numbers rounded to the nearest one decimal place*

5.2. **Sensitivity:** deliveries occurred in the 12 months before the EDHS survey

Final classification table

Observed	Predicted		Percent Correct
	no	yes	
no	539.6	60.6	89.9
yes	208.1	105.0	33.5
Overall Percent	81.9	18.1	70.6

Subpopulation: Currently/formerly/never in union = Currently in union/living with a man
 Dependent Variable: Woman had adequate ANC (≥ 4) for births a year before the EDHS (reference category = no). *Numbers rounded to the nearest one decimal place*

5.3. **Area under the curve:** births occurred in the five years before the EDHS

Area under the curve

Test Result Variable(s): Predicted probability

Area	Std. Error ^a	Asymptotic	Asymptotic 95% Confidence Interval	
		Sig. ^b	Lower Bound	Upper Bound
0.71	0.01	0.00	0.69	0.73

The test result variable(s): Predicted probability has at least one tie between the positive actual state group and the negative actual state group. Statistics may be biased.

a. Under the nonparametric assumption, b. Null hypothesis: true area = 0.5

Numbers rounded to two decimals

5.4. Area under the curve: births occurred in the 12 months before the EDHS

Area under the curve

Test Result Variable(s): Predicted probability

Area	Std. Error ^a	Asymptotic	Asymptotic 95% Confidence Interval	
		Sig. ^b	Lower Bound	Upper Bound
0.72	0.02	0.00	0.68	0.75

The test result variable(s): Predicted probability has at least one tie between the positive actual state group and the negative actual state group. Statistics may be biased.

a. Under the nonparametric assumption, b. Null hypothesis: true area = 0.5

Numbers rounded to two decimals

Biographic sketch: **Bazie Mekonnen**

PERSONAL DATA:

Last Name: BERIHUN

First Name: BAZIE

Middle Name / Other Names: MEKONNEN

Physical Street Address for courier delivery: Nefas-silk Lafto Subcity, Kebele. 01, House No: 68/15

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Email : bazie.mekonnen@aau.edu.et or mekonnenbazie@yahoo.com

Marital Status: Married

Date of Birth: 25/August/1975

Gender: Male

Country of Origin: Ethiopia

Present Nationality: Ethiopian

Languages and Fluency Level:

1. English fluent
 2. Amharic fluent (mother's tongue)
-

EDUCATION:

- Ph.D. Nursing (waiting for dissertation defense), Addis Ababa University/Emory University joint program, from 2017 to present
 - Masters Degree in Reproductive Health, Addis Ababa University, 09/2006 to 07/2008
 - BSC Degree in Nursing, Jimma University, 09/2001 to 07 /2003
 - Diploma in Clinical Nursing, Gondar University, 09/1993 to 02/1996
-

WORK HISTORY:

Job Title, Organization, Address, **Start and End Date (Mo/Year)**, Name of Supervisor

I. Lecturer, Addis Ababa University, Addis Ababa, Ethiopia, 12/ 2003 to present.

Duties and accomplishments

- Worked as Midwifery unit head from December 2013 to August 2016
- Deliver courses including RH/EPI, Communicable disease, for undergraduate and graduate level Nursing and Midwifery students.
- Research advisor for graduate and undergraduate level students of both tracks
- Supervise students and discuss about EPI/RI during their clinical and rural health practice attachments; vaccine administration skill, cold chain management system, plan/achievement and RI coverage by the health institution, and EPI related challenges and possible solutions
- Participate in different committee works
- Provide training for health cadres on EPI, HIV/STI, and other health issues
- Provide/participate in community services within and outside of the university
- Conduct research

II. MCH expert and, Focal person for the polio eradication program, Habru Woreda Health department, Amhara National Regional state. Duration; July 1998 to Aug 2001
Supervisors: Dr. Fisiha Abebaw, S/r Abrehet Tadesse

Duties and accomplishments

- Participate in and lead the development of annual plan of RI activities
- Provide regular supportive supervision for the health institutions
- Provide training for the health cadres on EPI/RI and surveillance of VPDs diseases
- Provide technical support during SIAs micro-plan development
- Participate in epidemic investigation and epidemic response of VPDs diseases
- Participate in the planning and implementation of community mobilization
- Participate in the evaluation of plan/achievement and coverage of RI activities
- Discuss RI related challenges, opportunities, and lessons learnt, and incorporate best practices in the next plan.
- Recognise HIs with good performance- provide certificate and or other incentives as appropriate.
- Compile and report RI/MCH performance achievement to the zonal health department

AFP focal person related duties and accomplishments

- Provide training for health cadres on Polio, AFP surveillance, and epidemic investigation and response of VPDs
- Participate in micro-plan development for the implementation of SIAs
- Provide technical support on the implementation of AFP surveillance and sample collection
- Provide supportive supervision related to polio/AFP surveillance for the HIs operating in the catchment areas
- Facilitate proper transportation of stool samples of AFP suspected cases
- Participate in active surveillance of villages of AFP suspected cases, as needed
- Plan for and participate in community awareness program activities related to AFP/Polio surveillance
- Participate in community mobilization during the implementation of SIAs
- Implement inter-sectoral collaboration approach to mobilize the community for AFP surveillance- using personnel mainly from the departments of health, education, agriculture, and woreda administration
- Conduct regular review meeting with the team (representatives from each sector) and plan the way forward
- Compile and report performance achievement of AFP related activities to the AFP focal person of the zonal health department

III. Head, Meket Health Center, Amhara National Regional State, Meket Woreda

Supervisor: Temesgen Assefa, Meket Woreda health department head,

Duration: May, 1996- to- July, 1998

Duties and accomplishments

- Develop annual plan with the staffs of the health center and HIs under my supervision
- Develop monthly operational plan for the HC
- Lead the day-to-day activities of the HC, technical and administrative
- Provide supportive supervision for the HI on quarterly basis
- Evaluate the performance (plan/achievement and coverage) of the health center and HIs
- Participate in outreach EPI activities and administer vaccines
- Plan and conduct community mobilization for RI, SIAs
- Lead the epidemic investigation team, perform epidemic investigation and implement appropriate response
- Compile and submit monthly, quarterly, and annual plan/achievement reports to the woreda health department

TRAINING AND PROFESSIONAL DEVELOPMENT:

- Nursing Care Practice Operational Standards Training of Trainers (TOT), FMOH in collaboration with ICAP-Columbia University program, Nov 1-8/2013
- Comprehensive Abortion Care and contraceptive Services (TOT), May 28-June 8, 2012, Ipas Ethiopia
- National Comprehensive HIV Care/ART training (TOT), Addis Ababa University March Project, Addis Ababa, Ethiopia, 01/ 24/2011 to 02/09/2011
- Safe mother hood for African health care workers, Suzanne Mubarak Regional Center For Women's Health And Development, Alexandria, Egypt, 08/23/2010 to 09/08/2010
- Effective Teaching Skills Training, Jhpiego Ethiopia, Addis Ababa, Ethiopia, 01/12/2009 to 01/16/2009
- HIV/AIDS Knowledge update on PMTCT and ART, Jhpiego Ethiopia, Addis Ababa, Ethiopia, 09/01/2008 to 09/05/2008
- Comprehensive HIV Training, I-TECH Ethiopia, Addis Ababa, Ethiopia, 08/20/2007 to 08/31/2007
- Reproductive health /Skills based family planning, Addis Ababa University/EPHTI, Addis Ababa Ethiopia, 04/11/2005 to 04/23/2005
- Acute Flaccid Paralysis/Polio, South wollo zone health department, Mersa, Ethiopia, 02/20/2001 to 03/05/2001
- STIs diagnosis and management (syndromic approach), South wollo zone health department, Woldia, Ethiopia, 08/15/2000 to 08/25/2000
- Epidemic Control and Prevention, Gondar University, Gondar, Ethiopia, 10/25/1997 to 11/05/1997
- Cold Chain Management System , South wollo zone health department, Woldia, Ethiopia, 02/10/1997 to 02/17/1997
- Expanded program on immunization, South wollo zone health department, Woldia, Ethiopia, 08/15/1996 to 08/28/1996

LIST OF PUBLICATIONS

1. Bazie Mekonnen, Abebe Gebremariam, Negussie Deyessa, John N Cranmer. Intimate partner violence and maternal antenatal care utilization: is there a dose-response relationship? Findings from the Ethiopian National Demographic and Health Survey. International Health. 2025;ihaf003. Available @ <https://doi.org/10.1093/inthealth/ihaf003>
2. Bazie Mekonnen, Abebe Gebremariam, Negussie Deyessa, John N Cranmer. Women Empowerment and Healthcare Utilization for Childhood Illnesses: Evidence From Ethiopia. International Health. 2025; ihaf062. Available @: <https://doi.org/10.1093/inthealth/ihaf062>

3. Ayele SG, Mekonnen B, Deribe L, et al. Prevalence of modern contraceptive discontinuation and associated factors among married reproductive age group women in Debre Berhan town, Ethiopia: a community-based crosssectional study. *BMJ Open* 2024;14:e066605. doi:10.1136/ bmjopen-2022-066605
4. Senait Belay Getahun, Semarya Berhe, Bazie Mekonnen & Getnet Melaku (2023). Reasons for Not Seeking Healthcare Among Students with Dysmenorrhea: A Qualitative Study, *International Journal of Women's Health*, , 1733-1744, DOI: 10.2147/IJWH.S437233
5. Tarekegne AA, Giru BW, Mekonnen B. Person-centered maternity care during childbirth and associated factors at selected public hospitals in Addis Ababa, Ethiopia, 2021: a cross-sectional study. *Reprod Health*. 2022 Oct 4;19(1):199. doi: 10.1186/s12978-022-01503-w. PMID: 36195884; PMCID: PMC9531385.
6. Rebuma Muleta Gutema, Bazie Mekonnen and Addishiwot Fantahun (2021). Assessment of pregnant women preference of Midwives gender for birth attendant and associated factors, a facility based cross-sectional study, Ambo town, Ethiopia. *International journal of women health and wellness*.
7. Kebreab Paulose, Nefsu Awoke, Bazie Mekonnen and Aseb Arba (2020). Male involvement in birth preparedness and complication readiness for emergency referral at Sodo town of Wolita zone, south Ethiopia, A cross-sectional study. *BMC pregnancy and child birth*.
8. Bajrond Eshetu, Yitagesu Sintayehu, Worknesh Daba and Bazie Mekonnen (2019). Birth outcomes among diabetes mothers who delivered in Tikur Anbassa specialized hospital, Addis Ababa Ethiopia. *Advances in medicine*.
9. Tesfaye Yitna , Baze Mekonnen, Feleke Hailemichael , Birhanu Wondimeneh and Antehun Alemayehu (2018). Essential newborn care practices and associated factors among home delivered mothers in Damot pulasa Woreda, southern Ethiopia. *Reproductive Health (BMC)*
10. Alula Seyum Buda, Dejene Ermias Mekengo, Terefe Markos Lodebo, Abinet Arega Sadore and Bazie Mekonnen (2018). Knowledge, attitude and practice on hand washing and associated factors among public primary school children in Hosanna town, Southern Ethiopia. *Journal of Public Health and Epidemiology*
11. Hailemariam Berhe, Bazie Mekonnen , Alemayehu Bayray and Haftu Berhe (2013). Determinants of breast feeding practices among mothers attending public health facilities, mekelle, northern ethiopia; a cross sectional study. *International Journal of Pharmaceutical Sciences and Research*. Bazie Town. (VDM Verlag/Amazon Publishing)
12. Bazie Mekonnen (2011). HIV sero-status disclosure among clients attending ART clinics: The case in Amhara National Regional State, Bahirdar (BOOK).

LIST OF RESEARCH TITLES ADVISED FOR POSTGRADUATE STUDENTS

S. No.	Research title	Year of advisement
1	Person-Centered Maternity Care during Child Birth and Associated Factors at Public Hospital in Addis Ababa, Ethiopia.	2021
2.	Knowledge, Practice and Associated Factors with Menstrual Hygiene Management among Mekdela Secondary School Girls, Amhara Region, North East Ethiopia.	2020
3.	Assessment of Knowledge, Attitude and Practice of Immediate Post-Partum Intrauterine Contraceptive Device and Associated Factors among home delivered Post-Partum Women at Selected Government Hospital in Addis Ababa, Ethiopia.	2019
4.	Pregnant Mothers' Preference of Midwife Gender for Birth Attendant and Associated Factors at Health Institutions in Ambo Town, Oromia Region, Ethiopia.	2018
5.	Assessment of factors that lead to delay for the diagnosis and treatment of cervical cancer among patients attending Tikur Anbessa specialized hospital radiotherapy center, Addis Ababa, Ethiopia.	2017
6.	Assessment of male involvement in birth preparedness and complication readiness for emergency referral at Wolita zone, Sodo town, SNNPR, Ethiopia.	2017
7.	Patterns and Associated Factors of Selected Essential New-Born Care Practices among Mothers' 15-49 Years of Age who Gave Birth at Home in Damot Pulsas District, South Ethiopia.	2016
8	Knowledge attitude and practice on hand washing and associated factors among public primary school children in Hosanna town, SNNPR, Ethiopia.	2016
9	Assessment of knowledge and attitudes of pregnant women on the benefits of antenatal care utilization in Addis Ababa, Ethiopia.	2015
10	Assessment of attitude of parents towards their girl children's education in Bure worda, West gojjam, Ethiopia.	2014
11	Assessment of knowledge attitude and practice of mothers of children under two years of age towards the weaning progress, northwest Ethiopia, Amhara regional state, east gojjam zone , Amanuel town.	2014
12	Assessment of the prevalence of premarital sex and unprotected sexual practices among secondary school adolescent students in Sebeta town , Oromia regional state, Ethiopia.	2014
13	Age at sexual initiation and factors associated with it among secondary school youths in Addis Ababa.	2013
14	Assessment of uptake of PIHTC among TB patients in selected health centers in South west shoa zone, Oromia, Ethiopia	2012

15	Determinants of breast-feeding practices among mothers attending public health facilities, Mekelle, Northern Ethiopia; a cross sectional study.	2011
16	A Community Based Cross-Sectional Study on Assessment of Skilled Birth Attendant Utilization among Women of Child Bearing Age in SNNP Region, Gedio Zone, Yirgachefe Town.	2011
17	Determinants of Nurses Job Satisfaction in Government Hospitals in Addis Ababa, Ethiopia.	2010

PARTICIPATION IN AAU AFFAIRS

- Unit head for undergraduate midwifery program- from July 2014 to August 2016
- Acting dean for the school of allied health sciences- September 2015 to March 2016
- Grand purchase approval committee member, college of health science–July 2011to December 2011
- TASH reform council member –November 2015
- Administration and Finance sub-committee member for CHS and TASH-November 2015
- Feasibility study committee member for the potential transfer of nursing school from black lion to Sefere-selam campus -August 2014
- Staff recruitment committee member for midwifery department –March 2015
- Modular curriculum development committee member for midwifery program- July 2012
- Strategic plan development committee member for Nursing school- June 2016
- MSc Nursing entrance exam preparation Committee-July 2015
- Pre-internship exam preparation committee for nurses (theory and OSCE)-January 2016
- Entrance exam preparation Committee for upgrading BSc Midwifery-July 2015
- Comprehensive theory and practical exam/OSCE preparation committee- 014/2015
- Maternity and RH nursing MSC entrance exam preparation committee Member-September 2018
- Remedial exam preparation committee for graduating Midwifery students –November 2014
- Upgrading Midwifery entrance exam preparation committee –November 2015
- Junior Nurse recruitment exam committee for BLH-November 2014

PARTICIPATION IN COMMUNITY SERVICES/PROFESSIONAL ACTIVITIES

- Executive committee chairman for Jemo-03. blocks 64-68, Dessiet condominium residents PLC.
- Provided training on RH and assertiveness skills for newly coming AAU students from 2013-2014.
- Member of the Ethiopian Nurses Association (ENA) since 2013.
- Research Reviewer

Biographical sketch: **Professor Negussie Deyessa**

OMB No. 0925-0001 and 0925-0002 (Rev. 10/2021 Approved Through 09/30/2024)

BIOGRAPHICAL SKETCH

NAME: **Negussie Deyessa Kabeta**

Email: negdaysun@gmail.com, negussie.deyessa@aau.edu.et, Phone No +251911400059 Sex: Male

eRA COMMONS USER NAME: NEGUSSIEDEY

POSITION TITLE: Professor of Epidemiology

EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
Addis Ababa University Gondar College of Medical Science	M.D	07/ 1989	Medicine Doctor
Addis Ababa University Medical Faculty	MPH	07/ 1996	Public Health
Umea University	Ph.D.	09/ 2010	In Epidemiology

A. Personal Statement

Prof. Negussie Deyessa is a senior researcher and lecturer with the rank of full Professor in Epidemiology and works in the Department of Preventive Medicine, School of Public Health, College of Health Sciences, Addis Ababa University. I also have worked as an Operational Research consultant for the Ethiopian Core Group Polio Project. I have got my Ph.D. in Epidemiology from Umea University in Sweden. I also earned my Master of Public Health from the Department of Community Health, Medical Faculty, Addis Ababa University, and a Medical Doctoral degree from Gonder College of Health Sciences within Addis Ababa University. Finally, I have also worked as a post-doctoral candidate at Upsala University, Sweden, to work on the Multi-country Study on Violence Against Women database. My clinical practice and experience go to the early 90th. I have worked as a general practitioner at Moyale Health Center in South Ethiopia, Adigrat hospital as a Medical Director, and Mekelle Hospital as a general practitioner in North Ethiopia. I have also worked as head of the health service and training department at Tigray Regional Health Bureau in northern Ethiopia.

As a professor in my department, I have conducted many training programs in epidemiology, research methods (mainly quantitative), Implementation (Science) Research, Gender-based violence, and Basic and Advanced Analysis using SPSS and STATA. I have participated in the training for students at my university and as a capacity building of faculty members of other universities, including Hawassa, Dilla, Wollaita, Selalle, and Ambo Universities, and the Addis Continental Institute of Public Health. As a senior faculty, I have participated in research on gender-based violence through active involvement in rural health attachment at grass root level within the public. During my sabbatical leave from July 2021-to September 2022, I joined the Ethiopian CORE Group Polio Project secretariat as an operational research consultant that developed more than ten manuscripts, of which seven staff members had accepted abstracts for oral or poster presentations at the American Public Health Association Annual Conference in 2022, of which one abstract was chosen the best.

Dr. Negussie has authored numerous publications from my research on diverse health issues, including gender-based violence necessary for the public, health providers and policymakers in Ethiopia. I have published over 105 articles in peer-reviewed, reputable, and prestigious national and international journals. My research in gender-based violence started during my first thesis as an MPH graduate. It continued to my Ph.D. to study violence against women in Ethiopia within the multi-country study on violence. I have worked on several tasks related to gender-based violence among rural and urban dwellers, women visiting health facilities, schoolgirls, refugees, and humanitarian crisis areas in Somali and Eritrean Refugees. I have served the women's group using simple descriptions to rigorous international standard randomized controlled trials. Dr. Negussie Deyessa has won more than thirteen national and international grant projects and has applied to the projects in the country. I have advised more than 165 master's students and five Ph.D. students, and he currently advises more than seven Ph.D. students and five master's students. I have published over a hundred publications in reputable and prestigious national and international peer-reviewed journals.

B. Projects/ Grants

Grant ID Number: Grand Challenges Canada Grant Number: 0342-04

Principal Investigator: Dr Desta Argaw;

My role in the project: I was the major monitoring and evaluation and project lead to do the research work at baseline, midline, and end-line evaluation of the project [evaluation instrument development, implementing the research process and analysis and publication of the research work.

Project start date and Ending date: Started on September 30, 2013, and completed on September 30, 2015.

Title of the project: Global Mental Health: Introducing School mental health in Ethiopia

Grant ID Number: Grand Challenges Canada Grant Number: TTS-1911-31103

Principal Investigator: Dr Desta Argaw;

My role in the project: I was the lead in the monitoring and evaluation, leading the research work at baseline, midline, and end-line evaluation of the project [development of evaluation instrument development, implementing the research process and analysis and publication of the research work.

Project start date and Ending date: Started on May 01, 2019, and completed on April 30, 2021.

Title of the project: Scaling Up Comprehensive Early Child Care and Education Program in Resource-Poor Settings in Ethiopia.

Grant ID Number: IFPRI Project No. 601158.001.001.515.01.01- Contract No. 2022X124.KAB

Principal Investigator: Dr Negussie Deyessa;

My role in the project: I was the lead in the overall research work of the project [development of evaluation instrument development, implementing the research process, and analysis and publication of the research work.

Project start date and Ending date: Started on July 15, 2022, and will be completed on January 30, 2023.

Title of the project: Evaluation of the Group Problem Management Plus study on the mental health problem of people in Productive Safety Net Program: a pilot study in Oromia and Amhara Regional States, Ethiopia

Grant ID Number: IFPRI Project No. 601158.001.001.520.01.01- Contract No. 2022X169.EPH

Principal Investigator: Dr. Negussie Deyessa;

My role in the project: I was the lead in the overall research work of the project [development of evaluation instrument development, implementing the research process, and analysis and publication of the research work.

Project start date and Ending date: Started on September 15, 2022, and will be completed on July 31, 2023.

Title of the project: Gender-based violence and related mental health challenges among women in Woldia woreda in Amhara, Ethiopia

Grant ID Number: INH award R25TW011214

Principal Investigator: Prof. Miliard Derbew;

My role in the project: I was the lead in the overall research work, monitoring and evaluation, and analysis of the research work.

Project start date and Ending date: Started on September 01, 2018, and will be completed on August 31, 2023.

Title of the project: Health Professionals Education Partnership Initiative (HEPI) in Three Ethiopian Universities

Other local grants

- Principal Investigator of “Feasibility, Acceptability, Cost-Effectiveness and Impact of the 99DOTS Technology on TB Treatment Adherence and Outcome In Dollo Ado and Dollo Bay, South East Ethiopia” from **Health Limited, Ethiopia**. [365,000 Eth. Birr, May 2018-May 2021]
- Co-Principal Investigator of “Evaluation of the Disasters and Emergency Preparedness Program, in Ethiopia” from Harvard T.H Chan, School of Public Health, [133,000 USD, Feb 2017-May 2018]
- Principal Investigator of ‘Using cultural ceremony to reduce **Intimate Partner Violence** in four districts of Ethiopia,” an intervention with grant exceeding 240,000USD, USAID, 2018-2018 [supplemented]
- Principal Investigator of ‘Using cultural ceremony to reduce Intimate Partner Violence in four districts of Ethiopia,” an intervention with a grant exceeding 840,000USD, USAID, 2013-2017

C. Positions, Scientific Appointments, and Honors

Positions and Scientific Appointments

2021 to Present: **Profession in Epidemiology**, Addis Ababa University, Addis Ababa, Ethiopia

2020-2022 **Operational Research Consultant**. During my **sabbatical year** from July 01, 2021, to Sept 2022, I joined the CORE Group Polio Project-Ethiopia, with a duty to analyze and make

research outputs in the form of manuscripts, abstract submissions, and training CGPP and partner staff on research methods from data available (mainly immunization related) in the country.

2013 – 2021	Associate Professor in Epidemiology, Department of Preventive Medicine, School of Public Health, Addis Ababa University, Addis Ababa, Ethiopia
2002 – 2013	Assistant Professor in Epidemiology, School of Public Health, Addis Ababa University, Addis Ababa, Ethiopia
1996 – 1998	Head, Department of Health Service and Training, Tigray Regional Health Bureau, Mekele City, Ethiopia
1991 – 1994	Medical Director, Adigrat General Hospital, Adigrat Town, Tigray, Ethiopia
1989 – 1991	Medical Practitioner, Moyale Health Centre, Moyale District, Ethiopia

Other Experience and Professional Memberships

- 1992- Member, Ethiopian Public Health Association
- 2003- Member, Ethiopian Medical Association
- 2014- Election Committee, Ethiopian Public Health Association

D. Complete List of Published Work in My Bibliography [Last five years only]

- Legesse, K., B. Filimona, M. Mohammud and D. Negussie (2022). “Curbing an outbreak of circulating vaccine-derived poliovirus type 2 in Dolo Zone, Somali Region, Ethiopia: response to the outbreak.” PAMJ **42**(46).
- Abota, T.L., Gashe, F.E. and Deyessa, N., Perinatal intimate partner violence and postpartum contraception timing among currently married women in Southern Ethiopia: A Multilevel Weibull regression modelling. *Frontiers in Public Health*, p.3907.
- Semeredin, N., Seid, S., Deyessa, N., Haile, T., Yusuf, H., Kebede, E. and Kebede, D., 2022. Characteristics and outcome of COVID-19 among people living with HIV at Eka Kotebe General Hospital, Addis Ababa, Ethiopia. *IJID Regions*.
- Desta, M., Deyessa, N., Hailu, Y., Baye, A., Rodriguez, N., Fish, I., & Garland, A. F. (2022). Harsh Physical Discipline: Prevalence and Associated Factors Among Primary Caregivers of Preschool Children in Ethiopia. *International Journal on Child Maltreatment: Research, Policy and Practice*, 1-20.
- Hunduma G, Deyessa N, Dessie Y, Geda B, Yadeta TA. High Social Capital is Associated with Decreased Mental Health Problem Among In-School Adolescents in Eastern Ethiopia: A Cross-Sectional Study. *Psychology Research and Behavior Management*. 2022;15:503.
- Asrat, Y., Huluka, D. K., Getachew, N., Abule, H. A., Araya, H., Tadesse, B., Deyessa, N. ... & Sherman, C. B. (2021). Awake prone positioning for COVID-19 patients at Eka Kotebe General Hospital, Addis Ababa, Ethiopia: A prospective cohort study. *Journal of the Pan African Thoracic Society*, 1-7..
- Megerso, A., Deyessa, N., Jarso, G., & Worku, A. (2020). Lived experiences of tuberculosis patients and their implications for early tuberculosis case identification and management in pastoralist

- community setting: a qualitative study in Borena zone, Oromia region of Ethiopia. *BMC Health Services Research*, 20(1), 1-9.
- Ali, H. A., Abebe, B., Moges, A., & Deyessa, N. (2021). Behavioural abnormalities among school-age children living with HIV at Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia. *African Journal of AIDS Research*, 20(4), 307-313.
- Asemu, M. M., Yalew, A. W., Kabeta, N. Deyessa, & Mekonnen, D. (2021). Prevalence and risk factors of hypertension among adults: A community based study in Addis Ababa, Ethiopia. *PloS one*, 16(4), e0248934.
- Leight, J., Deyessa, N., & Sharma, V. (2021). Cost-effectiveness analysis of an intimate partner violence prevention intervention targeting men, women and couples in rural Ethiopia: evidence from the Unite for a Better Life randomized controlled trial. *BMJ Open*, 11(3), e042365.
- Gebremedhin G, Enqueselassie F, Yifter H, and Deyessa N. 2021. Hyperglycemic Crisis Characteristics and Outcome of Care in Adult Patients without and with a History of Diabetes in Tigray, Ethiopia: Comparative Study. *Diabetes Metab Syndr Obes*;14:547-556
<https://doi.org/10.2147/DMSO.S275552>
- Yifter, H., Omer, A., Gugsu, S., Fekadu, A., Kebede, A., Gebremariam, T., Melkie, A. and Deyessa, N., 2021. Protocol: Early detection and management of major non-communicable diseases in urban primary healthcare facilities in Ethiopia: a study protocol for a type-3 hybrid implementation-effectiveness design. *BMJ Open*, 11(1), p.e040564.
- Asemu, M. M., Yalew, A. W., Kabeta, N. Deyessa., & Mekonnen, D. (2021). Prevalence and risk factors of hypertension among adults: A community based study in Addis Ababa, Ethiopia. *PloS one*, 16(4), e0248934.
- Desalegn, Z., Deyessa, N., Teka, B., Shiferaw, W., Hailemariam, D., Addissie, A., Abagero, A., Kaba, M., Abebe, W., Nega, B. and Ayele, W., 2021. COVID-19 and the public response: Knowledge, attitude and practice of the public in mitigating the pandemic in Addis Ababa, Ethiopia. *PloS one*, 16(1), p.e0244780.
- Desalegn, Z., Deyessa, N., Teka, B., Shiferaw, W., Yohannes, M., Hailemariam, D., & Abebe, T. (2021). Evaluation of COVID-19-related knowledge and preparedness in health professionals at selected health facilities in a resource-limited setting in Addis Ababa, Ethiopia. *PloS one*, 16(2), e0244050.
- Leight, J., Deyessa, N., Verani, F., Tewolde, S. and Sharma, V., 2021. Community-level spillover effects of an intervention to prevent intimate partner violence and HIV transmission in rural Ethiopia. *BMJ global health*, 6(1), p.e004075.
- Megerso, A., Deyessa, N., Jarso, G., Tezera, R., & Worku, A. (2021). Exploring Community Tuberculosis Program in the Pastoralist Setting of Ethiopia: a Qualitative Study of Community Health Workers' Perspectives in Borena Zone, Oromia Region.
- Nega, B., Addissie, A., Mamo, G., Deyessa, N., Abebe, T., Abagero, A., Ayele, W., Abebe, W., Haile, T., Argaw, R. and Amogne, W., 2020. Sero-prevalence of anti-SARS-CoV-2 Antibodies in Addis Ababa, Ethiopia. *bioRxiv*.

- Regassa, B., Deyessa, N., Addissie, A., Abagaro, A., Shumi, G., and Gudina, G., 2020. Outbreak investigation of Visceral Leishmaniasis in Borena Zone, Oromia Region, Ethiopia, November 2019: Case-Control study. *medRxiv*.
- Deyessa, N., Senbete, B., Abdo, A., & Mundia, B. M. (2020). Population estimation and harm reduction among people who inject drugs in Addis Ababa, Ethiopia. *Harm Reduct J*, 17(1), 61. doi:10.1186/s12954-020-00407-x
- Huluka DK, Mekonnen D, Abebe S, Meshesha A, Mekonnen D, Deyessa N, Klinger JR, Ventetuolo CE, Schluger NW, Sherman CB, Amogne W. Prevalence and risk factors of pulmonary hypertension among adult patients with HIV infection in Ethiopia. *Pulmonary Circulation*. 2020 Oct;10(4).
- Sahlu, D., Deyessa, N., Firdu, N. and Asfaw, S., 2020. Food insecurity and other possible factors contributing to low birth weight: A case-control study in Addis Ababa, Ethiopia. *Asian Pacific Journal of Reproduction*, 9(4), p.174.
- Megerso, A., Deyessa, N., Jarso, G., & Worku, A. (2020). Lived experiences of tuberculosis patients and their implications for early tuberculosis case identification and management in the pastoralist community setting: a qualitative study in Borena zone, Oromia region of Ethiopia. *BMC Health Services Research*, 20(933). doi:https://doi.org/10.1186/s12913-020-05787-1
- Deyessa, N., Webb, S., Duku, E., Garland, A., Fish, I., Janus, M., & Desta, M. (2020). Epidemiological study of a developmentally and culturally sensitive preschool intervention to improve school readiness of children in Addis Ababa, Ethiopia. *J Epidemiol Community Health*, 74(6), 489-594. doi:10.1136/jech-2019-213019
- Gebremedhin, G., Enqueselassie, F., Deyessa, N., & Yifter, H. (2020). Urban-Rural Differences in the Trends of Type 1 and Type 2 Diabetes Among Adults Who Received Medical Treatment from Public Hospitals in Resource-Poor Community Tigray, Ethiopia. *Diabetes Metab Syndr Obes*, 13, 859-868. doi:10.2147/DMSO.S238275
- Tadesse, A.W., Deyessa, N., Wondimagegnehu, A., Biset, G., and Mihret, S., 2020. Intimate partner violence during pregnancy and preterm birth among mothers who gave birth in public hospitals, Amhara Region, Ethiopia: A case-control study. *The Ethiopian Journal of Health Development (EJHD)*, 34(1).
- Gebremariam, T.H., Shewamare, A., Deyessa, N., Haile, L., Blumberg, H.M., Auld, S. and Degu, W.A., 2020. Effect of Isoniazid Preventive Therapy on Prevention of Tuberculosis and Reduction of All- Cause Mortality Among HIV Patients on Antiretroviral Therapy. In *A108. HIV RELATED PNEUMONIA, T.B., AND MYCOBACTERIAL INFECTIONS* (pp. A2692-A2692). American Thoracic Society.
- Keynejad, R. C., Bitew, T., Sorsdahl, K., Myers, B., Honikman, S., Medhin, G., Deyessa, N . . . Hanlon, C. (2020). Problem-solving therapy (PST) tailored for intimate partner violence (IPV) versus standard PST and enhanced usual care for pregnant women experiencing IPV in rural Ethiopia: protocol for a randomized controlled feasibility trial. *Trials*, 21(1), 454. doi:10.1186/s13063-020-04331-0
- Bacha, T., Getachew, T., Kejela, S., Deyessa, N., & Svenson, J. (2020). The pattern of pediatric trauma in AABET hospital: A cross-sectional study using a trauma registry. *Ethiop Med J*, 58(Supp. 2), 115-123.

- Leight, J., Deyessa, N., Verani, F., Tewolde, S., & Sharma, V. (2020). An intimate partner violence prevention intervention for men, women, and couples in Ethiopia: Additional findings on substance use and depressive symptoms from a cluster-randomized controlled trial. *PLoS Med*, 17(8), e1003131. doi:10.1371/journal.pmed.1003131
- Sharma, V., Amobi, A., Tewolde, S., Deyessa, N., & Scott, J. (2020). Displacement-related factors influencing marital practices and associated intimate partner violence risk among Somali refugees in Dollo Ado, Ethiopia: a qualitative study. *Confl Health*, 14, 17. doi:10.1186/s13031-020-00267-z
- Sharma, V., Leight, J., Verani, F., Tewolde, S., & Deyessa, N. (2020). Effectiveness of a culturally appropriate intervention to prevent intimate partner violence and HIV transmission among men, women, and couples in rural Ethiopia: Findings from a cluster-randomized controlled trial. *PLoS Med*, 17(8), e1003274. doi:10.1371/journal.pmed.1003274
- Sharma, V., Papaefstathiou, S., Tewolde, S., Amobi, A., Deyessa, N., Relyea, B., & Scott, J. (2020). Khat use and intimate partner violence in a refugee population: a qualitative study in Dollo Ado, Ethiopia. *BMC Public Health*, 20(1), 670. doi:10.1186/s12889-020-08837-9
- Debebe, T., Shekur, Z., Solomon, D. Z., Tersit, A., Deyessa, N., Assefa, G., . . . Laeke, T. (2019). Computerized Tomographic Findings and Injury Pattern in Patients with Traumatic Brain Injury at Tikur Anbessa Specialized Hospital, Addis Abeba. *Ethiop Med J*, 57(4), 337-341.
- Tamrat G, Osman M, Deyessa N, Taye M, Lett R, Bekele A. Delay of emergency surgical interventions in Ethiopia: Patient and health system factors. *EAST and CENTRAL AFRICAN Journal of Surgery*. 2018;23(2):59–65.
- Deyessa N, Argaw A. Intimate partner violence and unmet need for contraceptive use among Ethiopian women living in marital union. *Ethiop J Health Dev*. 2018;32(3):000-.
- Shimelis D, Abebe B, Deyessa N. Incidence of Acute Kidney Injury and Determinant Factors in Children Admitted to a Tertiary Hospital. *Journal of Dental and Medical Sciences*. 2018;17(3):48- 53.
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- Deyessa N. Intimate Partner Violence and Human Immunodeficiency Virus Infection among Married Women in Addis Ababa. *Ethiop Med J* 2018;56(1):51-9.
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References

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 - Prof. Derege Kebede, MD, MSc, DSc, Professor of Epidemiology (Adjunct) at the School of Public Health, Addis Ababa University, and Visiting Professor of Epidemiology, Johns Hopkins School of Public Health (2017-19) e-mail: deregek@hotmail.com
 - Dr Girma Taye, Head Department of Public Health, Addis Ababa University; e-mail: girmataye2009@gmail.com, Tel: +251-911769926
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 - Dr Filimona Bisrat, Regional director of the CORE Group Polio Project, Secretariat; Tel: +251911407456 Mail. Filimonab.cgpp@gmail.com
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Nell Hodgson Woodruff School of Nursing (Atlanta)

Principal Investigator, Emory-Ethiopia Implementation Research Partnership (Ethiopia)

Adjunct Associate Professor, Center for the Study of Human Health, Emory University (Atlanta)

Adjunct Associate Professor, Bahir Dar University, College of Health Sciences (Ethiopia)

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EDUCATION

<u>Dates</u>	<u>Institution and Location</u>	<u>Degree</u>
08/2012-07/2014	National Institutes of Health Fogarty International through Northern Pacific Global Health Research Fellows Training Consortium; Department of Global Health University of Washington Kisumu, Kenya & Seattle, WA, USA	Post-Doctoral Research Fellow Reproductive Anthropology & Obstetric Quality Improvement
06/2009-12/2010	University of Washington School of Nursing Seattle, WA	DNP Global Maternal Mortality & HIV Clinical Care
07/2004-08/2006	Johns Hopkins University Bloomberg School of Public Health Baltimore, MD	MPH Global Community-Based Primary Care
08/2003-08/2006	Johns Hopkins University School of Nursing Baltimore, MD	MSN Adult Nurse Practitioner & Community Health
06/2001-12/2003	Johns Hopkins University School of Nursing Baltimore, MD	BSN Nursing
08/1996-05/2000	Wheaton College Wheaton, IL	BA Religious Studies

Licenses and Certifications

<u>Dates</u>	<u>Type</u>	<u>Number</u>
2025	Adult Gerontology Primary Care Nurse Practitioner (AGNP-C)	Upon request
2023	Evidence-Based Practice—Certified (EBP-C); Accreditation Board for Specialty Nursing Certification (ABSCN)	--
2020-2023	Evidence-Based Practice, Certificate Holder (EBP-CH), ABSCN	--
2020-	Certified in Public Health (CPH), National Board of Public Health Examiners (NBPHE)	Upon request
06/2014-12/2010	Registered Nurse (RN), Georgia	Upon request
	Multidisciplinary Graduate Certificate in HIV and STIs, University of Washington	--
2007-2015	Advanced Registered Nurse Practitioner (ARNP), Washington	Upon Request
2007-2015	Registered Nurse (RN), Washington	Upon Request
12/2006-	National Provider Identification Number (NPI)	Upon Request
2006 - 2016	Licensed DEA Prescriber, Drug Enforcement Administration	Upon Request
2006-2021	Board Certified Adult Nurse Practitioner (ANP-BC), ANCC	Upon Request
2006- 2011	Licensed Controlled Dangerous Substance Prescriber (CDS), Maryland	--
2006-2009	Certified Registered Nurse Practitioner – Adult (CRNP-A), Maryland	Upon Request
2004-2009	Registered Nurse (RN), Maryland	Upon Request
1996-	Cardiopulmonary Resuscitation (CPR) American Red Cross & American Heart Associations	Upon Request

HONORS AND AWARDS

<u>Year</u>	<u>Name of Award</u>	
2024	Full Member	Sigman Xi, International Scientific Honor Society
2022	Fellow	American Academy of Nursing
2022	National “Edge Runner” Award (National program with sustainable impact)	American Academy of Nursing
2020	Emory 1% Award For Saving Little Lives at Birth (grant score in the top 1 percentile)	Emory University, Atlanta, GA
05/2018	Global Health Award	Emory University, Nell Hodgson Woodruff, School of Nursing Atlanta, GA
05/2015	Exemplary Teamwork Award	Emory University, Nell Hodgson Woodruff School of Nursing Atlanta, GA
05/2009	Clinical Preceptor of the Year	Seattle University, Seattle, WA

05/2008	Adjunct Faculty of the Year	Seattle Pacific University School of Health Sciences, Seattle, WA
05/2005	Rita and Lawton Langbaum Endowed Scholarship	Johns Hopkins University, Baltimore, MD
08/2004	Stella Shiber Endowed Scholarship	Johns Hopkins University, Baltimore, MD
2003, 2010	Sigma Theta Tau Inductee	Sigma Theta Tau International
05/2003	Sinai Nurse's Alumnae Association Award	Johns Hopkins University, Baltimore, MD
2001-2004	Dean's Honors	Johns Hopkins University School of Nursing, Baltimore, MD
2000	<i>Cum Laude</i> Graduate	Wheaton College, Wheaton, IL
1996-2000	Dean's List	Wheaton College, Wheaton, IL

PROFESSIONAL EXPERIENCE

Academic Positions

<u>Month, Year</u>	<u>Position</u>	<u>Institution</u>
08/2021-present	Associate Professor	Emory University School of Nursing, Atlanta, GA
11/2022-present	Associate Professor, Adjunct	Bahir Dar University, College of Health Sciences (Ethiopia)
08/2021-present	Associate Professor, Adjunct	Emory College, Center for the Study of Human Health
08/2017 - present	Principal Investigator, Emory-Ethiopia Implementation Research Partnership	Emory-Ethiopia, Addis Ababa, Ethiopia
05/2020- 08/2021	Assistant Professor, Adjunct	Emory College of Arts and Sciences, Center for the Study of Human Health
06/2014- 08/2021	Assistant Professor	Emory University School of Nursing, Atlanta, GA
08/2015- 08/2018	Specialty Track Coordinator: Population Health	Emory University School of Nursing Doctor of Nursing Practice Program, Atlanta, GA
09/2013- 06/2014	Senior Post-Doctoral Research Fellow NIH-Fogarty International	Northern Pacific Consortium, Seattle, WA
08/2012- 09/2013	Post-Doctoral Research Fellow NIH-Fogarty International	Northern Pacific Consortium, Seattle, WA
01/2012- 05/2012	Organizational and Training Consultant	Swedish Hospital Neurosciences Institute, Seattle, WA
06/2011- 03/2013	Adjunct Faculty	Seattle University, Seattle, WA
08/2011- 05/2011	Adjunct Faculty	Seattle Pacific University, School of Health Sciences, Seattle, WA
01/2011- 04/2011	Adjunct Faculty	Northwest University, Seattle, WA

03/2010- 01/2011	Doctoral Research Assistant, Global Health	University of Washington, Department of Global Health Seattle, WA
12/2009- 03/2010	Doctoral Research Assistant, Nursing	University of Washington Department of Biobehavioral Nursing & Health Systems, Seattle, WA
08/2007- 12/2008	Adjunct Faculty	Seattle Pacific University School of Health Sciences, Seattle, WA
05/2008- 07/2008	Quality Improvement Leader	Sea Mar Community Health Center, Burien, WA
01/2008- 03/2008	EHR Program Designer- Implementation	Sea Mar Community Health Centers Western Washington Region, USA

Clinical Positions

<u>Month, Year</u>	<u>Position</u>	<u>Institution</u>
08/2007- 03/2013	Primary Care Provider	Sea Mar Community Health Centers, Burien, WA
08/2007- 05/2009	Site Supervisor	AmeriCorps and Sea Mar Community Health Center- Burien and South Park, Burien, WA
12/2006- 05/2007	Primary Care Provider Baltimore Medical Systems	Highlandtown Community Health Center, Baltimore, MD
01/2007 11/2006- 12/2006	Educational Program Consultant Clinical Instructor	IT Works Learning Center, Baltimore, MD IT Works Learning Center Baltimore, MD
09/2001- 03/2002	Clinical Volunteer Outreach to Underserved Populations	Johns Hopkins & People's Community Health Centers Baltimore, MD
05/2000- 05/2001	Medical Assistant	Wheaton Pediatrics, Wheaton, IL
06/1997- 05/1998	Medical Assistant	Rose Ann Weaver, MD (Internal Medicine & Geriatrics) Madison, GA
06/1996- 08/1997	Nursing Assistant	Hospitality Care Center Madison, GA
08/1996- 08/1998	Nursing Assistant	Morgan Memorial Hospital

SCHOLARSHIP: GRANTS AND OTHER FUNDING

Research Grants Funded by Global Agencies: Under Contract

Title of grant (PI): Adaptation, integration and Scale-Up of NEST360 in the Saving Little Lives (SLL) Consortium, Ethiopia (*MPI: Cranmer JN*)
Role and effort: MPI, 12% FTE

Grant number: --

Funding agency: The NEST360 Global Consortium through Rice University

Total costs: \$1,148,000 / 3 years

Funding period: 2024-2027

Research Grants: Under Review

Title of grant (PI): A Randomized Clinical Trial Testing the Impact of Probiotics on Newborn Growth: Amhara, Ethiopia (*Gebremariam A*)

Role and effort: Co-I, 10% FTE

Grant number: --

Funding agency: The World Health Organization (WHO) from The Bill and Melinda Gates Foundation

Total costs: \$1,353,801 / 3 years

Funding period: *Under review*

Other Grants: In Development

Title of grant (PI): High-tech, low-cost prediction of newborn sepsis in Low and Middle Income Country Hospitals (LMICs) (*MPI: Cranmer JN*)

Role and effort: PI, 20% FTE

Grant number: In development

Funding agency: US Advanced Research Projects Agency for Health (ARPA-H)

Total costs: \$6,000,000 / 5 years

Title of grant (PI): Affordable Band-Aid-Like Patch for Early Diagnosis of Common Newborn Mortality Drivers in Ethiopia (PI: *Gleason R*; MPI: *Cranmer JN*)

Role and effort: CO-I, 10% FTE

Grant number: In development for 2024 cycle

Funding agency: National Institutes of Health (NIH), Fogarty International Center, R21-R33

Total costs: \$ 1,353,062 / 5 years

Title of grant (PI): Predicting Sepsis for Small and Vulnerable Newborns in Ethiopia Hospitals (*Rule A*)

Role and effort: Co-I, 10% FTE

Grant number: In development

Funding agency: NIH-R21

Total costs: \$325,000 / 3 years

Title of grant (PI): Colostrum Seeding to prevent necrotizing enterocolitis among vulnerable low birth weight newborns in Low and Middle Income Countries (*Young M & Cranmer JN*)

Role and effort: Co-I, 10% FTE

Grant number: In development

Funding agency: NIH-R21

Total costs: \$325,000 / 3 years

Research Grants Funded by Global Agencies: Funded

Title of grant (PI): Saving Little Lives at Birth: National Scale Up of KMC as part of a Minimum Care Package for Preterm and Low Birth Weight Babies in Ethiopia (MPI: *Cranmer JN*)

Role and effort: PI-Amhara Region

Grant number: NA

Funding agency: Global Financing Facility (GFF) through Unicef-Ethiopia

Total costs: \$1,153,000

Funding period: 12-20-20 to 12-31-24

Title of grant (PI): Optimizing care for newborns and children in Benishangul-Gumuz and Afar Regions, Ethiopia (*Cranmer J*)

Role and effort: PI

Grant number: --

Funding agency: Korean International Cooperation Agency (KOICA) through Unicef-Ethiopia

Total costs: \$5,131,948

Funding period: 01/01/21 to 12/31/24

WHO Awards

Title of grant (PI): KMC Implementation Research for Accelerating Scale-Up-I (KMC-I) (*Cranmer J*)

Role and effort: PI, 1% FTE (from 08/17)

Grant number: eNOA: 37465

Funding agency: The Bill and Melinda Gates Foundation through The World Health Organization (WHO)

Total costs: \$470,833

Funding period: 06/23/16 to 05/31/19

Title of grant (PI): KMC Implementation Research for Accelerating Scale-Up II (KMC-II) (*Cranmer J & Sibley L*)

Role and effort: PI, 20% FTE

Grant number: eNOA: 37465

Funding agency: The Bill and Melinda Gates Foundation through The World Health Organization (WHO)

Total costs: \$288,332

Funding period: 02/16/18 to 05/31/19

Title of grant (PI): Implementation Research Initiative to Accelerate Scale-up Kangaroo Care—Atlanta-I-II (KMC-Atlanta I-II) (*Cranmer J*)

Role and effort: PI, 20% FTE

Grant number: 2018/789261-0 (eNOA: 37283, 3 awards)

Funding agency: The Bill and Melinda Gates Foundation through The World Health Organization (WHO)

Total costs: \$244,254

Funding period: 01/01/18 - 03/31/19 (NCE: 10/31/19; WHO Budget Period: 11/10/17 to 12/31/17)

Unicef Awards

Title of grant (PI): Every Newborn Action Plan—Ethiopia (ENAP) (*Cranmer J*)

Role and effort: PI, 1% FTE

Grant number: eNOA: 47944

Funding agency: Unicef-Ethiopia
Total costs: \$575,317
Funding period: 6/12/2018-8/31/2019

Title of grant (PI): Integrated Community Case Management-Benshangul-Gumuz (iCCM-BG)
(*Cranmer J & Sibley L*)
Role and effort: PI, 3.0% (from 8/2017)
Grant number: eNOA: 38590
Funding agency: Unicef-Ethiopia
Total costs: \$1,309,418
Funding period: 08/05/16 to 06/30/17 (NCE: 11/30/18, 08/31/19)

Title of grant (PI): Integrated Community Case Management in Afar (iCCM-Afar)
(*Cranmer J & Sibley L*)
Role and effort: PI, 3.0% FTE (from 08/17)
Grant number: eNOA: 32295
Funding agency: Unicef-Ethiopia
Total costs: \$1,433,914
Funding period: 11/13/15 to 07/30/17 (NCE: 12/17)

Nutrition International – Micronutrient Initiative Awards

Title of grant (PI): Weekly Iron Folic Acid Supplementation and Nutrition Education Project (WIFAS)
(*Cranmer J*)
Role and effort: PI, 3.0-6.76% FTE
Grant number: 2269 (eNOA: 44461)
Funding agency: Nutrition International (NI)
Total costs: \$218,739
Funding period: 04/01/18 to 12/31/19

Title of grant (PI): Extend the Reach of the Grain Bank (Afar Region) (*Cranmer J & Sibley L*)
Role and effort: PI, 3% FTE (from 8/2017)
Grant number: 10-1669-UEMORY-02 (eNOA: 39322, 2 awards)
Funding agency: Micronutrient Initiative – Nutrition International
Total costs: \$412,530
Funding period: 2/10/17 - 3/31/20

Title of grant (PI): Infant and Young Child Nutrition in the Afar Region (IYCN) (*Cranmer J & Sibley L*)
Role and effort: PI, 1% FTE (from 08/17)
Grant number: NI: 10-1579; 2739322-UEMORY (eNOA: 42987)
Funding agency: Nutrition International
Total costs: \$80,251
Funding period: 08/24/17 - 01/31/18

Title of grant (PI): Community-Based Maternal-Neonatal Health (CMNH-BG & CMNH-Afar)
(*Cranmer J & Sibley L*)
Role and effort: PI, 5.0% FTE (from 07/17)

Grant number: 10-1670-UEMORY-02 (eNOA: 40183, 2 awards)
Funding agency: Micronutrient Initiative (Nutrition International)
Total costs: \$905,154
Funding period: 10/01/16 to 03/31/20

Title of grant (PI): Improved Care & Nutrition for Women during Pregnancy Through a Novel Community- Facility Linkage Program in Kakamega Central & Mumias/Matungu Districts, Western, Kenya (*Walker D*)
Role and effort: Lead Analyst, 100% FTE
Grant number: eNOA: 35620
Funding agency: Micronutrient Initiative
Total costs: \$2,900,000 (\$44,548 for sub-contract analysis activities)
Funding period: 04/01/12-03/31/16 (contracted 12/15/15-03/15/16)

Institutional Grants

Title of grant (PI): Initiation of Emory Global Maternal-Neonatal Health Collaborative (*Setty*)
Role and effort: Co-Investigator
Grant number: --
Funding agency: Emory Global Health Institute (EGHI)
Total costs: \$10,000
Funding period: 12/2023-11/24

Title of grant (PI): Creating a Neonatal Sepsis Care Cascade to Improve Sepsis Identification in Ethiopian Hospitals (*Cranmer JN, Rule A, Gebremariam A*)
Role and effort: Co-PI
Grant number: --
Funding agency: Emory Global Health Institute (EGHI)
Total costs: \$10,000
Funding period: 2023, Summer

Title of grant (PI): High-tech, low-cost prediction of newborn sepsis in Low and Middle Income Country Hospitals (LMICs) (*Cranmer JN*)
Role and effort: PI
Grant number: NA
Funding agency: Emory University ARPA-H Support for US Advanced Research Projects Agency for Health
Total costs: Training Seminar / 4 months support

Title of grant (PI): Pioneering An Early Language Intervention to Promote Neurocognitive Development of Vulnerable Low Birth Weight Infants in Ethiopia (*Becklenberg A*)
Role and effort: Co-I
Grant number:--
Funding agency: Emory Global Health Institute

Total costs: \$20,000
Funding period: 10/2022-10/2023

Title of grant (PI): Halt Neural Tube Defects (NTD): Testing A Salt Fortification Mechanism for a NTD-Epidemic Context (*Kancherla V*)

Role and effort: Co-I
Grant number:--
Funding agency: Emory Global Health Institute
Total costs: \$20,000
Funding period: 10/2020-12/2024

Title of grant (PI): Faculty Exchange to Promote Low Birth Weight Neurocognitive Development in Ethiopia (*Becklenberg A, Staple-Wax*)

Role and effort: Co-I
Grant number:--
Funding agency: Global Strategies and Initiatives (GSI)
Total costs: \$8,000
Funding period: 05/2021-12/2024

Title of grant (PI): Toward Expanding Uptake of Maternal Vaccination in Ethiopia: A Systems-Based Approach to Understanding Catalysts and Catches of Maternal Immunization. (*Quincer E*)

Role and effort: Co-I (In-kind, faculty advisor)
Grant number:--
Funding agency: Global Health Office of Pediatrics Seed Grant (GHOPE)
Total costs: \$10,000
Funding period: 10/2020-12/2023

Title of grant (PI): Survive and Thrive: Transforming Labor-Related Emergency Care in Ethiopia's Health System by Linking Novel Assessment with Real-Time Data-to-Action Solutions. (*Cranmer J, Young M*)

Role and effort: PI, 10% FTE
Grant number: --
Funding agency: Emory Global Health Institute
Total costs: \$25,000
Funding Period: 04/2020-12/2024

Title of grant (PI): Stop Sepsis Now: Developing and Testing Interventions to Prevent Neonatal Sepsis in Amhara, Ethiopia (*Cranmer J & Moe C*)

Role and effort: Co-PI, 10% FTE
Grant number: --
Funding agency: Emory Global Health Institute
Total costs: \$25,000
Funding period: 04/2020-12/2024

Title of grant (PI): Measuring the Impact of Constrained Water, Sanitation and Hygiene Infrastructure on Adverse Maternal and Perinatal Outcomes at Health Facilities: A Multisite Pilot Study

(Cranmer J & Moe C)

Role and effort: Co-PI, 5% FTE

Grant number: --

Funding agency: Woodruff Foundation, Woodruff Health Sciences Center

Total costs: \$100,000

Funding period: 10/2017-05/2019

Educational, Training, or Program Grants Funded

Title of grant (PI): Northern Pacific Global Health Fellows Program (*Zunt J*)

Role and effort: Research Fellow, 100% FTE

Grant number: R25 TW009345

Funding agency: NIH-Fogarty International Center

Total costs: \$110,000 / 23 months

Funding period: 08/01/12 – 07/15/14

Title of grant (PI): Evaluating the Readiness of the Educational Systems in Rwanda, Kenya, and Ethiopia (*Moyer C*)

Role and effort: Graduate research assistant, 50%

Grant number: NA

Funding agency: Bill & Melinda Gates Foundation

Total costs: \$100,000 (learning grant sub-contract to *John-Steward G*)

Funding period: 11/01/09 - 01/31/13

Title of grant (PI): Infectious Disease Curriculum Enhancements (*Simpson T*)

Role and effort: Graduate research assistant, 10% FTE

Grant number: D11HP08378

Funding agency: Division of Nursing (DN), Bureau of Health Professions (BHPr), Health Resource Administration (HRSA), Department of Health and Human Services (DHHS)

Total costs: \$639,646

Funding period: 08/08 - 08/10

Title of grant (PI): Nurse Educator Preparation for Academic and Clinical Settings: Initiating Mentorship Educational Enhancement (*Simpson T*)

Role and effort: Graduate research assistant, 10% FTE

Grant number: D09HP08378

Funding agency: DHHS-HRSA Bureau of Health Professions

Total costs: \$841,200

Funding period: 08/08 - 08/10

Title of grant (PI): Integrated Community and Clinic Responses to HIV-Undernutrition Co-Occurrence in (*Cranmer J*)

Role and effort: PI, 100% FTE

Grant number: NA

Funding agency: Johns Hopkins University Bloomberg School of Public Health, Global Field Experience Fund

Total costs: \$2,000

Funding period: 05/01/06 - 08/01/06

Mentored Research Grants

Title of grant (PI): Using engaged education and social support to improve postpartum outcomes among refugee mothers in Clarkston, Georgia. (*Ramirez Y*)

Role and effort: Faculty Advisor

Grant number: UL1TR000454

Funding agency: National Institutes of Health, National Center for Advancing Translational Sciences, Clinical and Translational Science Awards Program, HIP-ACTSI Research Seed Grant

Total Cost: \$5,000

Funding Period: 03/15/19 - 03/14/20

Title of grant (PI): Video-Based Curriculum Expansion to Improve Refugee Women's Birth Experiences in Clarkston, Georgia (*Leonard M*)

Role and effort: Faculty advisor

Grant number: UL1TR000454

Funding agency: National Institutes of Health, National Center for Advancing Translational Sciences, Clinical and Translational Science Awards Program, HIP-ACTSI Research Seed Grant

Total costs: \$5,000

Funding period: 02/01/17 to 01/31/18

SCHOLARSHIP: PUBLICATIONS

(*DATA-BASED, + SENIOR OR FIRST AUTHOR, STUDENT OR CORRESPONDING AUTHOR)

Peer-Reviewed Publications – Manuscripts Published

1. Mulatu Agajie Amentie, Muluwas Amentie Zelka, Wagari Kelbessa Gibina, Merga Dheresa Aga, Feyisa Abebe Gelashe, Gezahegn Mengesha, Bizuhan Gelaw, Abebe Folla, Tiyese Chimuna, **John N Cranmer**, Abebe Gebremariam Gobezaeyu, Tamiru Kassa, Gurmesa Tura Debelew. (2025). Cohort Profile: Bambasi Health and Demographic Surveillance System (Bambasi HDSS), *International Journal of Epidemiology*, Volume 54, Issue 4, August 2025, dyaf131, <https://doi.org/10.1093/ije/dyaf131>
2. *+Mekonnen B, Gebremariam A, Deyessa N, **Cranmer JN**. (2025). Women empowerment and healthcare utilization for childhood illnesses: evidence from Ethiopia. *Int Health*. <https://doi:10.1093/inthealth/ihaf062>
3. *+Dougherty K, Tesfaye Y, Biza H, Belew M, Benda N, Gebremariam Gobezaeyehu, **Cranmer JN**, Bakken S. (2025). User-Centered Design of an Electronic Dashboard for Monitoring Facility-Level Basic Emergency Obstetric Care Readiness in Amhara, Ethiopia: Mixed Methods Study. *JMIR Hum Factors*. 2025;12:e64131. <https://humanfactors.jmir.org/2025/1/e64131>
4. *Quincer EM, Gobezaeyehu AG, Belew ML, Endalamaw LM, Tesfaye YA, Shiferaw M, Hussen SA, **Cranmer JN**, Omer SB, & Cranmer LM. (2025) High Intention to Vaccinate Against Tuberculosis During Pregnancy and Lactation: Understanding Vaccine-specific Maternal Immunization Acceptance in Amhara, Ethiopia. *Pediatr Infect Dis J* 2025; 44(2S):S135–40. <https://journals.lww.com/10.1097/INF.0000000000004699>
5. *+Mekonnen B, Gebremariam A, Deyessa N, & **Cranmer JN**. (2025). Intimate partner violence and maternal antenatal care utilization: Is there a dose-response relationship? Findings from the

Ethiopian National Demographic and Health Survey. *International Health*.
<https://doi.org/10.1093/inthealth/ihaf003>

6. *+Ekwueme MC, Girma AZ, Gobezeayehu AG, Young MF, **Cranmer JN**. (2024). Predictors of effective kangaroo mother care, exclusive breastfeeding, and skin-to-skin contact among low birthweight newborns in Amhara, Ethiopia. *J Glob Health* 2024;14. <https://jogh.org/2024/jogh-14-04114>
7. *Benda N, Dougherty K, Gebremariam Gobezeayehu A, **Cranmer JN**, Zawtha S, Andreadis K, Biza, H, Masterson Creber R. (2024). Designing Electronic Data Capture Systems for Sustainability in Low-Resource Settings: Viewpoint With Lessons Learned From Ethiopia and Myanmar. *JMIR public health and surveillance*, 10, e47703. <https://doi.org/10.2196/47703>.
8. *+**Cranmer, JN.**, Baumgardner, J, Cohen, S, Dettinger, J, Kestler, E, Holme, F, Walker, D. (2023). Improving clinical obstetric teamwork in low and middle income countries: using factor analysis to develop a brief instrument for real-time feedback. *Journal of Interprofessional Care*.
<https://doi.org/10.1016/j.xjep.2023.100633>
9. *+Dougherty K, Gebremariam A, Biza H, Belew M, Benda N, Tesfaye Y, **Cranmer J**, & Bakken S. (2024). Obstetric Emergency Supply Chain Dynamics and Information Flow Among Obstetric Emergency Supply Chain Employees: Key Informant Interview Study. *JMIR Formative Research* 2024: e59690. <https://doi.org/10.2196/59690>
10. *+Dougherty K, Gobezeayehu AG, Liajiam M, Endalamaw, L, **Cranmer JN**. (2023). Comparison of Clinical Readiness: A Cross-Sectional Analysis of Hospitals in Amhara, Ethiopia. *PLOSOne*.
<https://doi:10.1371/journal.pone.0289496>
11. *+Gobezeayehu AG, Lijalem M, Endalamaw LA, Mohammad H, Beyene T, Mekonnen TB, Abay GG, Sibley LM, **Cranmer JN**. Creation of a globally informed and locally relevant KMC implementation model for population-impact in Amhara, Ethiopia. *Acta Paediatr*. 2023 Dec 21.
<https://doi:10.1111/apa.16587>. PMID: 36544262.
12. *Pfeiffer K, Cunningham T, **Cranmer JN**, Harrison T, Crosby H, Schroeder K, Jordan D, Coburn C. Changes in Posttraumatic Growth After a Virtual Contemplative Intervention During the COVID-19 Pandemic. *J Nurs Adm*. 2023 Jan 1;53(1):40-46. doi: 10.1097/NNA.0000000000001240. PMID: 36542443.
13. +Smith L, Grabbe L, **Cranmer JN**. Workplace Culture: The Key to Mitigating Burnout. *J Psychosoc Nurs Ment Health Serv*. 2023 Jan;61(1):2-3. doi: 10.3928/02793695-20221207-02. Epub 2023 Jan 1. PMID: 36595305.
14. ***WHO KMC Scale Up Study Group**. Incremental costs of scaling up kangaroo mother care: Results from implementation research in Ethiopia and India. *Acta Paediatr*. 2022 Aug 19. doi: 10.1111/apa.16490. Epub ahead of print. PMID: 35983749.
15. *+Whaley B, Butrick E, Sales J, Wanyoro, A, Waiswa P, Walker D, **Cranmer JN**. Using Clinical Cascades to Measure Health Facility's Obstetric Emergency Readiness: Testing the Cascades Model Using Cross-Sectional Facility Data in East Africa. *BMJ Open* ;12(4):e057954. doi: 10.1136/bmjopen-2021-057954.
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Doi.org/10.1097/JHQ.0000000000000318.
17. *Mony, PK, Tadele, H, Gobezeayehu, AG, Chan, GJ, . . **Cranmer JN**, et. al. KMC Scale-Up Study Group (2021). Scaling up Kangaroo Mother Care in Ethiopia and India: a multi-site implementation research study. *BMJ global health*, 6(9), e005905. <https://doi.org/10.1136/bmjgh-2021-005905>.
18. *Omary, C, Cox-Henly, M, Hertzberg VS, **Cranmer, JN**, Simpson, R. (2021). Toolkit for Best Practice Use of Electronic Health Record Data in Quality Improvement. *Computers, Informatics, Nursing*. 39(6). doi.org/10.1097/CIN.0000000000000757

19. ***Buser, JM, Cranmer, JN**, Bzomeku, VM, Ngoma-Hazemba, A, Ngabirano TD, Bakari A, Lori, JR. (2021). The Call for Global Health Research Mentorship for Doctorally Prepared Nurses in Low- and Middle-Income Countries. *Am J Trop Med Hyg*. 104(5). doi.org/10.4269/ajtmh.20-1603
20. *+Asfaha, MD, Comeau, DL, Spangler, SA, Spratt, BL, Alamineh, L, Gobezaeyehu, AG, **Cranmer, JN**, (2020). Neonatal care and community-level treatment seeking for possible severe bacterial infection (PSBI) in Amhara, Ethiopia. *BMC Health Serv Res* 20, 264. doi.org/10.1186/s12913-020-05081-0
21. *+Fuller, T. J., Leonard, M., Cochran, J., Hutchins, R.J., Brioché, R., Kitiabi, H., & **Cranmer, JN**. (2020). Collaborative Development and Implementation of a Video-Based Curriculum Expansion to Improve Refugee Women's Birth Experiences in the United States. *Health Promotion Practice*. doi.org/10.1177/152483992091519.
22. *Medhanyie AA, Alemu H, Asefa A., **Cranmer JN**, Gebremariam Abebe, KMC Scale-Up Study Group, *et al.* (2019). Kangaroo Mother Care implementation research to develop models for accelerating scale-up in India and Ethiopia: study protocol for an adequacy evaluation. *BMJ Open*, 9:e025879. doi: 10.1136/bmjopen-2018-025879
23. Morgan, M. C., Spindler, H., Nambuya, H., Nalwa, G. M., Namazzi, G., Waiswa, P., Otieno P., **Cranmer, JN.**, Walker, D. M. (2018). Clinical cascades as a novel way to assess physical readiness of facilities for the care of small and sick neonates in Kenya and Uganda. *PLoS One*, 13(11), e0207156. doi:10.1371/journal.pone.0207156
24. Dettinger JC, Kamau S, Calkins K, Cohen SR, **Cranmer JN**, Kibore MW, Gachuno O, Walker D. (2018). Measuring movement towards improved emergency obstetric care in rural Kenya with implementation of the PRONTO simulation and team training program. *Maternal & Child Nutrition*. 14 Supplement 1. <https://doi.org/10.1111/mcn.12465>
25. *+**Cranmer, JN.**, Dettinger, J., Calkins, K., Kibore, M., Gachuno, O., & Walker, D. (2018). Beyond signal functions in global obstetric care: Using a clinical cascade to measure emergency obstetric readiness. *PLoS One*, 13(2), e0184252. doi:10.1371/journal.pone.0184252.
26. +Wright PP, & **Cranmer JN**. (2018). Leveraging Graduate Academic-Practice Partnerships to Transform Health System Outcomes. *Nurs Adm Q*, 42(4), 324-330. doi:10.1097/NAQ.0000000000000311.
27. ***Biscone E**, Lewitt MJ, Simpson R, **Cranmer JN**, Martyn K. (2017). Are CNM-Reported Births in Texas Hospitals Underreported? *Journal of Midwifery and Women's Health*. <https://doi.org/10.1111/jmwh.12654>

Other Publications (book chapter, book review, research abstract, software, video, etc.)

1. *+**Mengesha M**, Gobezaeyehu AG, Alamineh L , Belew M, Hopkins J, Yakubu H, Denny L, Moe C, Kramer M, **Cranmer JN**. (2023). The Clinical, Obstetric, Parent, and Sociocultural Factors Associated with Antimicrobial Resistance for Newborns in Amhara, Ethiopia. [Podium, P2B144]. American Academy of Pediatrics National Conference and Exhibition (AAP, 2023). Washington, DC, USA
<https://aapexperience23.eventscribe.net/searchbyposterbucket.asp?f=PosterSessionName&pfp=BrowsbyProgram>
2. *Brasher S, Hailu SG, **Cranmer JN**, Gobezaeyehu AG, Becklenberg A, Clifford-Hall R, Biza, H, Shiferaw M, Stapel-Wax J, Darcy-Mahoney A. (2023). Leveraging International Partnerships Among Stakeholders to Enhance Early Childhood Development. American Public Health Association Annual Expo (APHA) [5094.0; Podium]. Atlanta, Georgia, USA.
<https://apha.confex.com/apha/2023/meetingapp.cgi/Paper/535979>
3. *Brasher S, Hailu SG, **Cranmer JN**, Gobezaeyehu AG, Becklenberg A, Biza H, Hall-Clifford R, Yibrahu M, Darcey-Mahoney A, Stapel-Wax J. (2023). Building Partnerships Towards Social and Cultural Adaptations of the Talk With Me Baby Intervention (TWMB). Society for Research in Child Development. Salt Lake City, Utah, USA. <https://bwg.ku.edu/conference-presentations/>

4. *+Aranato A, Dougherty K, Biza H, Alaminah L, Belew M, Gebremariam A, **Cranmer JN**. Quantifying obstetric emergency readiness in Amhara, Ethiopia: A comparison of signal functions and clinical cascades. (2023). American Public Health Association Annual Meeting and Expo (APHA). Atlanta, GA, USA.
5. *Brasher S, Getachew S, **Cranmer JN**, Gebremariam A, Becklenberg A, Hall-Clifford R, Biza H, Shiferaw M, Stapel-Wax J, Darcy-Mahoney A. (2023). Leveraging International Partnerships Among Stakeholders to Enhance Early Childhood Development. 12th Annual Southern Pediatric Research Conference (SPRC). Atlanta, GA, USA.
https://www.pedsresearch.org/uploads/blog/doc/Abstract_Book.pdf
6. *Dougherty K, Gebremariam A, Biza H, Belew LM, Alamin L, **Cranmer JN**, Bakken S. (2023). Developing an Electronic Dashboard to Monitor Obstetric Emergency Readiness in Ethiopia: User-Centered Design Approach. Sigma Theta Tau's 34th International Nursing Conference. Abu Dhabi, United Arab Emirates. <https://stti.confex.com/stti/congrs23/meetingapp.cgi/Paper/117771>
7. *+Dougherty K, Gebremariam A, Biza H, Whaley B, **Cranmer JN**. (2022). Readiness to Manage Basic Obstetric Emergencies in Amhara, Ethiopia: Comparison of Cascades and Clinical Functions. 13th Annual CUGH Global Health Conference. San Francisco, CA, USA.
8. *+Najjar N, Yakubu H, Belew M, Alamin L, Sibley L, Gobeze Yehu AG, Moe CL, **Cranmer JN**. (2021). Risk Prediction of Neonatal Sepsis in Normal and Low Birth Weight Neonates in Ethiopia. American Public Health Association Annual Meeting and Expo (APHA). Minneapolis, MN, USA.
9. +AG Gobeze Yehu, Mohammad H, Tadesse L, **Cranmer JN**. (2020). Power and Privilege in Collaborative Practice: Ethiopia's Every Newborn Action Plan. Community-Based Primary Health Care Pre-Conference of the American Public Health Association Annual Expo (APHA). Atlanta, GA, USA.
10. Estifanos A, Tadele H, Gebremariam A, **Cranmer JN**, Hailu M, Nigussie B, Medhanyie A, Beyene S, Tariku A, Zelalem M Duguma D. (2020). Saving Little Lives: An Innovation to Scale Initiative for Preterm and Low Birthweight Infants in Ethiopia. *Special Bulletin*, 22nd Annual Review Meeting. November 10, 2020. Ethiopia Federal Ministry of Health.
11. *+**Cranmer JN**, Gobeze Yehu AB, Alamineh L, Yismaw G, Hopkins J, Belew M, Yakubu H, Lindsay Denny, Moe CL. (2020). Alarming Incidence of Neonatal Sepsis and Antimicrobial Resistance at Two Large Hospitals in Ethiopia (486). 69th Annual meeting of the American Society for Tropical Medicine and Hygiene. November 17, 2020.
<https://www.abstractsonline.com/pp8/#!/9181/presentation/1448>.
12. *Carr K, Zhao K, Yakubu G, Alamineh L, Belew M, Gebremariam AG, Yismaw Gizachew, **Cranmer JN**, Moe CL. Impact of WASH Conditions on Microbial Contamination of the Environment in Two Hospitals in Amhara, Ethiopia 69th Annual meeting of the American Society for Tropical Medicine and Hygiene (1577). November 19, 2020.
<https://www.abstractsonline.com/pp8/#!/9181/presentation/1169>.
13. *+**Cranmer JN**, Belew M, Alamineh L, Tikaru A, Gebremariam AG. (2019). Bringing Vulnerable Newborn Care Closer to Home: A 3-Way Intersectoral Collaboration in Amhara, Ethiopia. Toward Unity for Health 2020 (TUFH). Mexico City, Mexico. <https://tufh2020.com/wp-content/uploads/2020/07/TUFH152.pdf>
14. *+Amare Y, Gebremariam AG, Gebeyehu A, Belew M, Sibley L, **Cranmer JN**. (2019). Making Kangaroo Mother Care Stick: Qualitative Research and Collaborative Cross-Section Strategies Guide KMC Implementation at Government Facilities. Qualitative Evidence Symposium, Brazilia, Brazil.
https://qesymposium.org/wp-content/uploads/2019/12/QESymposium2019_abstracts_book_complete.pdf
15. *+Asfaha M, Spratt B, Alamineh L, Comeau D, **Cranmer JN**. (2019). Harmonious Home-to-Hospital Care for Sick Newborns: How Amhara Is Moving from Community Voice to Systems-Level Change for Septic Newborns. Qualitative Evidence Symposium. *Presenter https://qesymposium.org/wp-content/uploads/2019/12/QESymposium2019_abstracts_book_complete.pdf

16. +**Cranmer JN**, Wright P, Woods J, Esper G, Martyn K. (2017). Generating Solutions for Real-World Population Health Problems Using a Transdisciplinary Academic-Practice Partnership. American Public Health Association Annual Convention (APHA), November 2017 (4127.0). Atlanta, GA. <https://apha.confex.com/apha/2017/meetingapp.cgi/Paper/384429>.
17. +**Cranmer JN**, Wright P, Woods J, Abraham C, Simpson R, Davis P, Martyn K. Creating a Practice-Transforming, Vision-Driven Doctorate of Nursing Practice Program in Population Health. American Public Health Association Annual Convention November 2017. (3410.0). Atlanta, GA. <https://apha.confex.com/apha/2017/meetingapp.cgi/Paper/388792>.
18. ***Tesfalul M**, Madriz S, **Cranmer JN**, Kestler E, Walker D. (2017). Application of Capacity Cascade as a Novel Approach to Emergency Obstetric Care Readiness Assessment in Guatemala. American College of Obstetricians and Gynecologists (ACOG) Annual Clinical and Scientific Meeting May 2017. <https://journals.lww.com/greenjournal/toc/2017/05001>
19. *+**Morgan M**, Spindler H, Nambuya H, Nalwa G, Namazzi G, Waiswa P, Otieno P, **Cranmer JN**, Walker D. (2018). Clinical Cascades to Assess facility readiness for neonatal care in Kenya and Uganda. Pediatric Academic Societies 2018 Meeting (PAS, Podium presentation). May 5-8, 2018. Toronto, Canada. <https://plan.core-apps.com/pas2018/abstract/e5177900e60498db774eaebbeec87a8c>.
20. +**Cranmer, JN**. (2015). Chapter 9: Heartburn. In Rhoades, J, & Jensen, M. (Eds.), *Differential Diagnosis for the Advanced Practice Nurse* (149-156). New York, New York, USA: Springer Publishing Company. (Book Chapter)

Peer-Reviewed Publications –In press, under review & completed

1. +***Chenmua Y**, Webb-Girard A, Gebremariam A, Zerihun S. **Cranmer, JN**. (2024). Using Clinical Cascades to Measure Hospital's Neonatal Emergency Readiness Across the Continuum of Care: Cross-Sectional Data from Amhara, Ethiopia. (Under review: *Global Health: Science and Practice*).
2. +***Najjar N**, Gobezaayehu AG, Hopkins J, Biza H, Yakubu H, Denny L, Lijalem M, Endalamaw LA, Ahmed YS, Tadege TZ Endalew MW, Tafere YE, Debelew GT, **Stone E**, Moe C, **Cranmer, JN**. (2024). Risk Prediction of Healthcare-associated Neonatal Sepsis in Amhara, Ethiopia: A Prospective Cohort Study. (Under review: *PLOS Global Public Health*).
3. *+**Cranmer JN**, Dettinger, JC, Calkins, K, Kamau S, Cohen S, Kibore M, Lamadrid, H, Gachuno O, Walker D. (2024). Integrating Maternal and Neonatal Facility-Based Care: The Relationship Between the PRONTO Skills-Based Clinical Training and Health System Care Quality in East Africa. (Under review: *Global Implementation Research and Applications*).
4. +***Dougherty K**, Gebremariam AG, Biza H, Belew M, Benda N, Tesfaye Y, **Cranmer JN**, Bakken S. Suzanne Bakken (2024). Design and Evaluation of an Electronic Dashboard Prototype to Monitor Facility-Level Obstetric Emergency Readiness in Amhara, Ethiopia. (Under review: *Digital Health*).
5. *+**Squire N**, Kompaniyets L, Brook B, **Cranmer JN**, Elliott R, Chandler R, Raymond K, Goodman A. (2024). Review of the Evidence-base for Electronic Case Detection Algorithms to Identify Chronic Kidney Disease in Children who have Overweight or Obesity. (Under Review *Journal of the American Medical Association—Pediatrics*).

Peer-Reviewed Publications – Manuscripts In Progress

1. ***Stone E**, +**Carr K**, Zhao K, Yakubu H, Alamineh L, Belew M, Gebremariam A, Yismaw G, **Cranmer JN**, Moe C. (2025). Impact of WASH Conditions on Microbial Contamination of the Environment in Two Hospitals in Amhara, Ethiopia. (Target: *International Journal of Hygiene and Environmental Health*).

2. *+Stone S, Blenis C, Omary C, Wright P, Kumarasamy M, Franks N, Esper G, Mouzon H, **Cranmer JN**. (2025). Predicting and Reducing Readmissions for Sickle Cell Disease Crisis Using Routinely Collected Electronic Data. (Target: *Journal of Hospital Medicine*)
3. *+Najiir N, Gebremariam A, Alamineh L, Belew M, Gonzalez M, Moe LC, **Cranmer JN**. (2025). Predicting Antimicrobial Resistance and Mortality Among Normal and Low Birthweight Newborns in Amhara, Ethiopia. (Under Development, target: *PLOS Global Public Health*).
4. *Brasher S, Stapel-Wax J, **Cranmer JN**, Gobezaeyehu A, Becklenburg A, Hall-Clifford R, AD Mahoney, Biza H, Yibarahu M, Hailu S. (2025). Leveraging International Partnerships Among Stakeholders to Enhance Early Childhood Development Among Small and Vulnerable Newborn Infants. (Target: *Global Health Science and Practice*).
5. *+Gebremaria AG, Mukherjee I, Tura G, **Cranmer JN**. (2025). The Impact of Clinical Mentorship on Newborn Care Quality and Health Outcomes in Two Emerging Regions of Ethiopia. (Target: *Global Health Research and Policy*).
6. *+Pfeiffer K, Aganthis A, Cunningham T, Cranmer JN. A Factor Analysis of the Posttraumatic Growth Inventory-Expanded for Front-Line Nurses in the Context of the COVID-19 Pandemic Response. (2025). (Target: *BMC Public Health*, “Mental Health in the Workplace” Collection).
7. *+Bhiminai A, Swanson S, **Cranmer JN**. (2025). Piloting and Evaluating a Skills-based learning intervention to increase effective clinician-clinician communication in Tajikistan. (Target: *BMC Medical Education*).
8. *+Smith L, Grabbe L, Cranmer JN. (2025). Measuring Burnout, Collaborative Practice, and Work Environment at a Community Mental Health Practice: A Formative Evaluation For Retaining Clinicians. (Target: *PLOS Mental Health*)
9. *+**Cranmer JN**, Darcey-Mahone A, Tadele H, Chan G, organ M, Lijalem M, Endalamaw LA, Paljug E, Seifu A, Nigussie B, Shifeta M, Dimtse A, Amed Y, Gebremaria A (2025). Integrating Airway Support into Routine Practice for Low Birth Weight Weight Newborns at Primary Hospitals: A Scoping Review for a National Scale-up Study in Ethiopia. (Target: *Health Policy and Planning*).
10. *+Ku K, Gebremariam A, Debelew GT, **Cranmer JN**. (2025). Measuring Collaborative Practice to Improve Global Service Delivery: a scoping review of collaboration measurement tools to guide Possible Severe Bacterial Infection Strategies in Amhara, Ethiopia. (Target: *Health Policy and Planning*).

SCHOLARSHIP: PRESENTATIONS

(#INVITED, ^PODIUM)

International Presentations (If conference is run by an international organization)

1. ^#Gobezaeyehu AG, **Cranmer JN**, Mohommad H. (2017). Formative Assessment-Amhara Region. World Health Organization (WHO) KMC Implementation Research for Accelerating Scale-Up: Annual Review Meeting. Addis Ababa, Ethiopia. May 10, 2017.
2. ^#Tadesse P, Mohommad H, **Cranmer JN**, Gobezaeyehu AG. (2017). KMC Pre-Facility Assessment—Amhara Region. WHO KMC Implementation Research for Accelerating Scale-Up: Annual review Meeting. Addis Ababa, Ethiopia. May 10, 2017.
3. ^#Lijalem M, Hailemichael A. **Cranmer JN**, Gobezaeyehu AG. (2017). KMC Model Development and Post-Facility Assessment-Amhara Region. WHO KMC Implementation Research for Accelerating Scale-Up: Annual Review Meeting. Addis Ababa, Ethiopia. May 11, 2017.
4. #Biscione, E, Prado, L, Wright, P, **Cranmer, JN**. (2016). Does Independent Advanced Practice Nursing Scope Influence Excess Pneumonia Readmissions? In Sigma Theta Tau International’s Leadership Connection Conference. Indianapolis, IN, USA.
<https://sigma.nursingrepository.org/handle/10755/620249>.
*Award: Invited international poster

5. ^**Cranmer JN.**, Baumgardner J, Cohen S, Dettinger J, Kestler E, Home F, Walker D. (2015). *Improving Clinical Obstetric Teamwork: A Tool for Practice-Based Feedback in Low Income Countries*. Presentation for FIGO (International Federation of Gynecology and Obstetrics). Vancouver, Canada.
6. ^**Cranmer JN**, Dettinger J, Calkins K, Kibore M, Walker D. (2015). Beyond Signal Functions in Global Emergency Obstetrics: Using a Cascade Model to Improve Clinical Quality and Guide National Strategy. Presentation for FIGO (International Federation of Gynecology and Obstetrics). Vancouver, Canada.
7. ^Calkins, K., Kamau, S, Dettinger, J, **Cranmer, JN**, Gachuno, O, Walker, D. (January 29, 2015). *Training-driven, facility-based procurement of Emergency Obstetric and Neonatal Care (EmONC) Commodities in Western Kenya: PRONTO's strategic planning program*. Presentation at the University of Nairobi Annual STD-AIDS Collaborative Meeting, Nairobi, Kenya.
8. ^**Cranmer JN**, Dettinger J., Gachuno O, Kibore M, Osano B, Walker D (2014). *Tailoring a Successful Obstetrical Intervention: Learning from Global Partners and Customizing Curriculum to Kenya*. Presentation at the Annual Review Meeting of the University of Nairobi STD-AIDS Collaborative Group, Nairobi, Kenya.
9. **Cranmer, JN**, Cohen, SR, Dettinger, J, Fahey, J, Walker, D. (2013). *Developing a Teamwork Measurement Strategy for Obstetrical Emergency Management in Kenya*. Poster at the Consortium of Universities for Global Health (CUGH), Washington, DC, USA.
10. #^**Cranmer, JN**, Auma, K., Attwa, M, Chung, M. (2013). *Fostering HIV Clinical Excellence Through Participatory Practice Improvement Using Internet-Based Distance Learning*. Presentation at the Annual Review Meeting of the University of Nairobi STD/AIDS Collaborative Group, Nairobi, Kenya.

International Presentations—Other [see also, “Other Publications”]

1. **Cranmer JN**, Were A, Gumo-Kurgot S, Ouma C. (December 1-5, 2013). Conducting Qualitative Community Based Research. Presented at the Conducting Qualitative Community-Based Research Skills-Based Training Seminar, The Royal Hotel, Mumias, Kenya. (*Training Organizer*)
2. #**Cranmer JN**. (May, 2013). Maximizing Your Team’s Potential and Your Success: Creating Team Mission and Vision. Presentation presented at Pediatric Urgent Start of HARRT (PUSH) Training, Nyanza Provincial Hospital, Kenya.
3. #**Cranmer JN**. (February, 2013). Developing Organizational Mission and Vision to Transform Clinical Research. Presentation presented at Pediatric Urgent Start of HARRT (PUSH) Orientation, University of Nairobi, Kenya.
4. **Cranmer JN**. (January 24-28, 2011). Operationalizing an Innovative Education Curriculum for a New School of Public Health. Skills-based workshop on Operationalizing an Innovative Education Curriculum for a New School of Public Health, presented at University of Nairobi, College of Health Sciences, Nairobi, Kenya.
5. **Cranmer JN**. (November 15-19, 2010). University of Nairobi School of Public Health: Collaborative Learning and Planning. Interactive, problem-based seminar designed for University of Washington Department of Global Health in collaboration with University of Nairobi School of Public Health. Seattle, Washington. (*Conference organizer*)
6. **Cranmer JN**. (September 27, 2010). Save More Lives: Achieve More Together. Conference entitled Save More Lives, Panafric Hotel, Nairobi, Kenya. (*Conference organizer*)
7. **Cranmer J**. (August, 2006). Assessment of the Community Nutrition Resources Available to HIV-Positive Undernourished Clients: An Analysis of the Scope and Capacity of Community-Based Organization in the Zewditu, St. Peter In-Patient Department and ALERT Catchment Areas of Addis Ababa, Ethiopia (Formative Evaluation). Paper presented to Presidential Emergency Plan for AIDS Relief (PEPFAR) Nutrition group through the Johns Hopkins

University Technical Support for Ethiopia's HIV/AIDS Antiretroviral Initiatives Project (TSEHAI), Addis Ababa, Ethiopia.

National Presentations (If conference is run by a national organization)

1. *Brasher S, Hailu SG, **Cranmer JN**, Gobezeayehu AG, Becklenberg A, Hall-Clifford R, Biza H, Shiferaw M, Mahone AD. Stapel-Wax J. (2023). Leveraging International Partnerships among Stakeholders to Enhance Early Childhood Development. Society for Research in Child Development Pre-Conference (SRCD). [Poster] March 2023. Salt Lake City, USA.
2. Dougherty K, Biza H, Gobezeayehu AG, **Cranmer JN**. Measuring Facility Readiness to Manage Obstetric Emergencies: A Comparison of Signal Functions and Clinical Cascades. American Public Health Association Annual Meeting. November 2022. [Poster] Boston, MA, USA. <https://apha.confex.com/apha/2022/meetingapp.cgi/Paper/516095>
3. ^Najiir N, Gebremariam A, Alamineh L, Belew M, Gonzalez M, Moe C, **Cranmer JN**. (2022). Predicting Sepsis and Mortality and Among Normal and Low Birthweight Newborns in Ethiopia. American Public Health Association Annual Meeting. [Presentation] November 2022. Boston, MA, USA.
4. Jackson A, Sheridan T, Wright P, **Cranmer JN**. Methods to Improve Long-Acting Reversible Contraception Use in a Federally Qualified Health Center. Poster in: Nurse Practitioners in Women's Health Conference 2019 (NPWH). Savannah, GA.
5. ^Langdon K, Byrd E, Kamarasamy M, Esper G, Wright P, **Cranmer JN**. (March 2017). Function as a Predictor of 30 Day Hospital Readmission. [Presentation] Southern Nursing Research Society 31st Annual Conference.
6. ^**Cranmer, JN**, Wright, P, Simpson, R, Davis, P, Abraham, C, Woods, J, Martyn, K. (2016, January). Designing Academic Programs to Transform Real-World Practice: Using Action-Oriented Vision to Guide DNP Program Design. Presentation at 2016 AACN Doctoral Education Conference: Naples, FL.
7. Grigg, A., Maxym M, Cranmer L, **Cranmer JN**, Danoff N, Hunt, A, Evans K, Bergman S, Macklin L, Graham E. (2009, April 3-5). *CHIMPS: Partnering with Communities in Global Health Education--An Experience in Abelines, El Salvador*. Poster at the 18th Annual Global Health Education Consortium, Transcending Global Health Barriers—Education and Action, Seattle, WA.
8. ^**Cranmer J**. (August, 2006). Assessment of HIV Clinical Nutrition Practices and Recommendations for Intervention: Addis Ababa Ethiopia. Paper presented at the Nutrition Group of Presidential Emergency Plan for AIDS Relief (PEPFAR) through the Johns Hopkins University Technical Support for Ethiopia's HIV/AIDS Antiretroviral Initiatives Program (TSEHAI), Addis Ababa, Ethiopia.
9. Michelin A, **Cranmer, J**, Henderson, DA. (2004). *Meeting the JCAHO 2004 Patient Safety Goals: A Research Hospital's Review of Prevental Nosocomia Infections Contributing to Patient Mortality*. Poster at the 14th Annual Meeting of the Society for Healthcare Epidemiology of America, Philadelphia, PA.

State/Regional Presentations (If conference is run by a state/regional organization)

1. Brasher S, Hailu G, Cranmer JN, Gobezeayehu AG, Becklenberg A., Hall-Clifford, R., Biza, H., Shiferaw, M., Stapel-Wax, J., & Darcy Mahoney, A. (2023). Leveraging International Partnerships Among Stakeholders to Enhance Early Childhood Development. 12th Annual Southeastern Pediatric Research Conference (SPRC). Atlanta, Georgia. [Poster] https://www.pedsresearch.org/uploads/blog/doc/Abstract_Bookrev.pdf
2. #^Arinat AK, Dougherty KK, Gebremariam AG, **Cranmer JN**. (2023). Emory Systems Cascades Comparing Emergency Obstetric Readiness Between Hospital Levels in Amhara, Ethiopia.

- Georgia Clinical and Translational Science 10th Annual Health Services Research Day. Atlanta, GA, USA.
3. **Cranmer JN, Pfeifer K, Cunningham T.** (2022). A Posttraumatic Growth-Informed Online Contemplative Intervention for Nurses. Beyond Flexner Conference 2022. [Poster]
 4. Rogers P, Young M, Biza H, **Cranmer, JN**, Kancherla V. (2022). Determinants of Exclusive Breastfeeding Among Mothers of Low Birth Weight Infants in Amhara, Ethiopia. Emory MPH Thesis Presentations. Atlanta, GA, USA. [Poster].
 5. Quincer E, Gobezaehu AG, Hussen S, **Cranmer JN**, Omer S, Cranmer LM. (2022). Toward Expanding Uptake of Maternal COVID-19 Vaccination in Amhara, Ethiopia: Understanding vaccine acceptance among pregnant women. Emory University. Atlanta, GA, USA. [Poster].
 6. Dougherty K, Biza H, Gobezaehu AG, **Cranmer JN**. Obstetric Emergency Readiness: A Comparison of Two Estimates in Amhara, Ethiopia. Columbia University Scholar's Day. November 2022. New York, NY, USA. [Poster].
 7. Carr K, Zhao K, Yakubu H, Alamineh L, Cranmer JN, Moe CL. (2020). Impact of WASH Practice on Ethiopian Hospital Environmental Contamination. 11th Annual Water and Health Conference at University of North Carolina at Chapel Hill. October 29, 2020. Chapel Hill, NC, USA.
 8. Asfaha M, Comeau D, Spanger S, Spratt B, Endalamaw L, **Cranmer JN**. (2019). Socio-Contextual Determinants of Community-Level Care-Seeking for Neonatal Possible Severe Bacterial Infection (PSBI) in Ethiopia. Georgia Public Health Association (GPHA) [Poster].
 9. Blenis C, Green S, Modly L, Smercansky B, Stone S, Kamarasamy M, Mouzon H, Franks N, Esper G, Wright P, Cranmer JN. (2018). Sick Cell Disease and 30-day Readmissions. Georgia Nursing Leadership Coalition Doctoral Symposium (GNLC) 2018. Atlanta, GA, USA.
 10. Papa G, Winter K, Courtney T, Landerfelt P, Hutchinson H, Kamarasamy M, Mouzon H, Franks N, Esper G, Wright P, Cranmer JN. (2018). Decision Tools to Predict and Reduce Preventable Heart Failure Readmissions. Georgia Nursing Leadership Coalition Doctoral Symposium (GNLC) 2018. Atlanta, GA, USA.
 11. **Cranmer JN**, Dettinger J, Lamadrid-Figueroa H, Calkins K, Kamau S, Cohen S, Kibore M, Onesmus G, Walker D. (2018). Transforming Integrated Maternal and Neonatal Clinical Care: Linking PRONTO Skills-Based Clinical Training with Community Mobilization to Drive Health System Improvements in East Africa. 5th Annual Health Services Research. Georgia Clinical and Translational Sciences Alliance. Atlanta, GA, USA. May 9, 2018.
 12. Turner O, Lindsley K, Cranmer JN. (2017). Care Plan Transmission and 30-Day Heart Failure Readmission. NHWSN Scholar's Day. Atlanta, GA, USA
*Award: 2nd Place Scholar's Day.
 13. Smith L, Santhanam H, Kamarasamy M, Esper G, Wright P, **Cranmer JN**. (November 2016). Psychosocial Frailty as a Driver of Excess Heart Failure Readmissions. [Presentation] Georgia Nursing Leadership Coalition Doctoral Symposium (GNLC). Atlanta, GA, USA.
 14. Langdon K, Byrd E, Kamarasamy M, Esper G, Wright P, **Cranmer JN**. (October 2016). Function as a Predictor of 30-Day Hospital Readmission [Presentation]. Georgia Nursing Leadership Coalition Doctoral Symposium. Atlanta, GA, USA.
 15. **Cranmer, JN**, Dettinger, J, Calkins, K, Kibore, M, Walker, D. (May 2016). New Horizons in Emergency Obstetric Readiness: Using a Cascade Model to Improve Clinical Quality. [Poster] Advancing Health Care Quality Research at Emory University 2016: Atlanta, GA.
 16. **Cranmer, JN**, Baumgardner, J, Cohen, S, Dettinger, J, Kestler, E, Holme, F, Walker, D. (May 2016). Improving Clinical Teamwork: A Tool for Practice-Based Feedback. [Poster] Advancing Health Care Quality Research at Emory University 2016: Atlanta, GA, USA.
 17. Biscone, E, Prado, L, Wright, P, **Cranmer, JN**. (April, 2016). Does Advanced Practice Nursing Scope of Practice Impact Excess Readmissions for Pneumonia? Poster in Emory Nursing Scholar's Day 2016: Atlanta, GA.

***Award:** *Regional: Rising Starts of Research and Scholarship, Sigma Theta Tau International (STTI)*

***Award:** *1st place conference recipient, STTI, Alpha Epsilon Chapter*

18. Wright, P, **Cranmer, JN**. Creation of a 3-part tool for predicting 30-day hospital readmission. (May 2016). [Poster] Advancing Health Care Quality Research at Emory University 2016: Atlanta, GA.
19. [^]**Baumgardner, JT**, Cohen, SR, Dettinger, J, Walker, D, **Cranmer, JN**. (2014). Can Team Communication Check-Ins Predict Team Function and Improve Obstetrical Care? [Presentation] Western Institute of Nursing (WIN): Seattle, WA, USA.
***Award:** *Sigma Theta Tau International (STTI), Alpha Epsilon Chapter Scholarship Recipient 2014*

State-Regional Presentations—Other

1. **Avantzano V, Ogorchi U, Yizengaw B**, Gebremariam A, **Cranmer JN, McCann C**, Tebeje H, Zerihun S, Rule ARL. (2023). Creating a Neonatal Sepsis Care Cascade to Improve Sepsis Identification in Ethiopian Hospitals. Emory Global Health Institute Scholar's Day. Atlanta, GA, USA.
2. **Cranmer, JN**. (2023 September). Kangaroo Mother Care Implementation Research in Ethiopia. Lecture in, Clinical Perspectives in Global Health Course. Emory University, Atlanta, GA
3. **Cranmer, JN**. (2020 November). Career Pathways In Global Health Panelist. Clinical Perspectives in Global Health Course, Emory University, Atlanta, GA
4. Moe CL, **Cranmer JN**. Water, Sanitation and Newborn Sepsis: Results of the Synergy Study in Amhara, Ethiopia. (2019). Emory Global Health Track, Pediatric Resident Quarterly Didactic Seminar. January 15, 2019. Atlanta, GA, USA
5. **Cranmer, JN**. (2016 March). Collaboration Strategies to Promote Global Health Transformation. Emory University Fuld Fellows Program. Atlanta, GA.
6. **Cranmer JN**. (May, 2016). Cultural Humility and Strategies to Promote Clinical and Global Health Collaboration. Emory University Graduate Nursing Council Cultural Humility Series.
7. **Cranmer, JN**. (2015, August). *Beyond Ground Hog Day: How the Practice-Evidence-Practice Cycle Transforms Clinical Obstetric Care Globally*. Children's Health Care of Atlanta Evidence-Based Practice Seminar: Atlanta, GA.
8. **Cranmer, JN**. (2010, May). *Assessing the Human Condition: Mixed Research Methods Applied to HIV in Ethiopia*. Presentation at Graduate Research Seminar, Northwest University, Kirkland, WA.
9. **Cranmer, JN**. (2009, October). *Global Undernutrition: Epidemiology, Assessment and Management Applied to Adults with HIV*. Presentation: Introduction to Global Health class, University of Washington, Seattle, WA.
10. **Cranmer, JN**. (2009, May and 2007, August). *Role Transition: From Student to Savvy Job-Seeker*. Presentation for Legal & Entrepreneurial Issues Course, Seattle Pacific University, Seattle, WA.
11. **Cranmer, JN**. (2009, Fall). *An Overview of the Mosely-Chen Framework and its Relevance to Clinical Practice*. Presented at UW School of Medicine Global Health Journal Club, Seattle, WA.
12. **Cranmer, JN**. (2008, Summer). *Primary Care for People Living with HIV-AIDS*. Presentation presented at Sea Mar Community Health Centers Clinician In-Service, Burien, WA.
13. **Cranmer, JN**. (2007, August). *Foundations of Community Development—Conceptual Overview & Practice Examples*. Presentation at International Care and Community Development Program, Northwest University, Kirkland, WA.

Copyrights, Trial Registrations and Public Data

1. **Embrace-Emory University Video-Enhanced Curriculum for Birth Preparedness: Copyright © 2018, Emory University, Embrace Refugee Birth Support, Friends of Refugees, & Brent Lambert-Zaffino.**

Copyright videos (password available upon reasonable request):

Introduction:	https://vimeo.com/389726786
Induction Preparation:	https://vimeo.com/389733498
Newborn swaddling:	https://vimeo.com/389733498
Labor induction:	https://vimeo.com/389743157
After delivery risks:	https://vimeo.com/389730772
After delivery emotions:	https://vimeo.com/389749965

2. **Kangaroo Mother Care Implementation Research for Accelerating Scale-up**
NCT03506698 registered in [ClinicalTrials.gov](https://clinicaltrials.gov)
3. **Community Based Maternal and Neonatal Health and Nutrition: Kenya**
PACTR 201212000457326 in [PAN-AFRICAN CLINICAL TRIAL REGISTRY](https://pan-african-clinical-trial-registry.org)
4. **Beyond signal functions in global obstetric care: Using a clinical cascade to measure emergency obstetric readiness.**
[10.17026/dans-zgg-6wuj](https://doi.org/10.17026/dans-zgg-6wuj) in DANS ([Data Archiving and Network Services](https://dans.org))
5. Amhara Hospitals Obstetric Emergency Clinical Readiness 2021.
doi.org/10.17026/dans-x7q-vduq in DANS (DANS—Life Science Station)

Patient Education and Clinical Materials

1. **Cranmer, JN.** (2008, Winter). *Primary Care for People Living with HIV-AIDS in the Grater Seattle Region*. Protocol presented at the SeaMar Community Health Centers Clinical In-Service, Burien, WA. *Patient Care-Protocol*
2. **Cranmer, J.** (2006). *Help Your Heart* (Coronary Artery risk reduction strategies for East Baltimore African American female residents. With Johns Hopkins School of Public Health and Highlandtown Community Health Center of Baltimore Medical Systems, (pp. 6). *Booklet/Patient Care Material-Protocol*
3. **Cranmer, J.,** Kisalu, A, Senhaji, B, Tyler, T. (2006). *Fight Diabetes*. Johns Hopkins School of Public Health and Highlandtown Community Health Center of Baltimore Medical Systems, (pp. 6). *Booklet/Patient Care Material-Protocol*
4. Maier, T., Anderson, M., **Cranmer, JN.,** Simpson, T. (2010). Nursing care for a patient co-infected with tuberculosis and HIV at a public health clinic. *Web-based Undergraduate Curriculum Enhancements in Infectious Diseases: Infectious Disease Curriculum*. 2010, from <http://www.son.washington.edu/portals/idc/cases/clinicVisit/clinicV10/clinicVisit.swf>
Educational Software

5. Anderson, M., **Cranmer, JN**, Simpson, T. (2010). Hepatitis C Virus in an Adult Hispanic Male. *Web-based Undergraduate Curriculum Enhancements in Infectious Diseases: Infectious Disease Curriculum*. 2010, from <http://www.son.washington.edu/portals/idc/cases/hepC/rc11/index.html> *Educational Software*
6. **Cranmer, JN**, Simpson, T. (2010). Initiating Mentorship. *Graduate nursing education: Enhancements in teaching, learning, and evaluation*. 2010, from <http://www.son.washington.edu/portals/nursed/tutorials.asp> *Educational Software*

TEACHING ACTIVITIES

Emory University Advisement

Doctoral Advisement

<u>Date</u>	<u>Student, Thesis Title and Role</u>
2023-2025	Noelle Pruitt , DNP(c), BSN Assessing Diabetes Self-Management in Primary Care: The Insulin Self-Management Scale; Member, DNP Committee (inferential analysis lead)
2020-2022	Kate M. Pfeiffer , DNP(c), MS, APRN, PMHCNS-BC, PMHNP-BC Evaluation of a Virtual Contemplative Intervention on Post-Traumatic Growth Member, DNP Committee (inferential analysis lead)
2020-2021	Jennie Tang Member, DNP Committee (inferential analysis lead)
2019-2020	Courtney Omary , DNP(c), MSN, RN-BC Toolkit for Best Practice Use of Electronic Health Record Data in Quality Improvement Member, DNP Committee (inferential analysis lead)
2018-2019	Patti Landerfelt , DNP(c), MSN, CRNA Nurse Leadership and Adverse Patient Outcomes Member, DNP Committee
2017-2018	Tennisha Beckaroo , DNP(c), MSN, CPNP-PC Predicting Demand for Preventative Health Services in an Urban School System Member, DNP Committee
2017-2018	Arnice Jackson , DNP(c), MSN, APRN Methods to Improve Long-Acting Reversible Contraception at a Federally Qualified Health Center. Member, DNP Committee
2017-2018	Laurie Ray , DNP(c), MSN, APRN An Opt-out Approach to Increase Gonorrhea and Chlamydia Screening in an Urban Family Planning Clinic Member, DNP Committee
2017-2020	Nyagua Squire , DNP(c), MHS, RN

An National Electronic Case Detection Algorithm to Identify Chronic Kidney Disease Risk in Children who have Overweight or Obesity
Chair, DNP Committee

- 2017-2020 **Alisha Bhimani**, DNP(c), ENP(c), RN
 Enhancing Limited Clinical Decision Making Through ESL-Based Medical Terminology Training in Khorog, Tajikistan
 *Award: Nurses Educational Funds, Incorporated (NEF),
 *Award: Eleanor C. Lambertsen Memorial Scholarship
Chair, DNP Committee
- 2016-2019 **Brandon Spratt**, DNP(c), RN
 Treatment Closer to Home: Strategies to Operationalize Community-Based, Simplified Possible Serious Bacterial Infection (PSBI) Management in Amhara, Ethiopia
Chair, DNP Committee
- 2016-2019 **Hema Santhanam**, DNP(c), MSN, APRN
 Creating and testing a comprehensive quality model for managing population health, transforming service delivery and reimbursement in primary care
Chair, DNP Committee
- 2016 **Rosemary Kinuthia**, MPH, DNP(c)
 Factors Associated with Loss-to-Follow-Up among Post-Partum HIV-Positive Women at the Ponce Center for Infectious Diseases
Member, DNP Committee (design phase)
- 2016 **Erin Biscione**, MSN, CNM, DNP(c)
 Are Certified Nurse Midwife Births Underreported in Texas? A Quality Improvement Project; *Member, DNP Committee (analysis phase)*

Emory University & External Universities **PhD Doctoral Advisement & External PhD Examination**

- | <u>Date</u> | <u>Student, Thesis Title and Role</u> |
|---------------------|--|
| 01/2023- | Hana Abera , PhD(c)—Nursing (Addis Ababa University & Emory University)
Thesis: Predictors of bubble CPAP (bCPAP) utilization and its impact on Low Birth Weight (LBW) newborn clinical outcomes at primary hospitals in Ethiopia
<i>Member, Thesis Committee</i> |
| 05/2024 | Agezegn Asegid , PhD(c)—Nursing (Haramaya University, Ethiopia)
Thesis: “Nurse Educator’s Clinical Skill Competencies and Teaching Skill in Ethiopia’s Higher Teaching Institution: A Mixed Method Study”
<i>External Examiner</i> |
| 01/2022-
08/2025 | Moses Ekwueme , PhD(c)—Nutrition
Thesis: Predictors and Targeted Interventions to Support Exclusive Breastfeeding Among Small and Vulnerable Newborns
<i>Member, Thesis Committee</i> |
| 2020-2023 | Kylie Dougherty , PhD(c), RN, BSN (Columbia University) |

Thesis: Leveraging Informatics to Enhance Ethiopia's Obstetric Emergency Supply Chain
 Fogarty-Fulbright Fellow with Emory-Ethiopia
 Member, Thesis Committee

2019-08/2025 **Bazie Mekonnen**, PhD(c), RN (Addis Ababa University & Emory University)
 The Impact of Intimate Partner Violence (IPV) on Maternal and Child Health Service Uptake in Ethiopia Using National Demographic and Health Survey Data
 Chair, Thesis Committee

Fellow and Other Clinical-Graduate Advisement: Emory University

<u>Date</u>	<u>Student, Thesis Title and Role</u>
03/2024-	Sifan Tolosa , MPH(c) Thesis: Impact of Mobile Health Clinics on Obstetric Care Service Delivery in Conflict-Impacted Areas of Afar, Ethiopia
03/2024-	Ziza Temesgin , MPH(c) Advanced Practice Experience (APE): The Impact of Audi-Feedback Cycles on Water, Sanitation and Hygiene Conditions (WASH) at Referral Hospitals in Amhara, Ethiopia
02/2024-	Filmon Gebremichael , MD, MPH(c) Advanced Practice Experience (APE): Data Transparency, Quality and Accessibility for Regional, National and Global Research Partners in Atlanta and Ethiopia
11/2023-	Alexandra Aganthis , DNP(c), MS, LPC (Role: Scientific Advisor)
11/2021-03/2023	Hina Raheel , PhD(c), RN (Role: Scientific Advisor)
01/2022-04/2022	Katherine Alonso , PhD(c)—Nutrition Research Rotation: Facility Infrastructure and Practices that Predict Exclusive Breastfeeding Support for Small and Vulnerable Newborns in Ethiopia
06/2020-	Kamauna Hassan , RN; EMPHASIS Fellow Research Rotation: Analysis of Obstetric Near Miss Causes and Solutions at a National Referral Hospital (Tanzania)
04/2020-2023	Elizabeth Quincer , MD; Pediatric Physician Project: Maternal Vaccination Barriers: Individual and System-Factors (Ethiopia)
05/2019-	Nadine Najar , MD; Pediatric Global Health Fellow & Pediatric Physician Project: Predictors of Newborn Sepsis Among Hospitalized Infants in Amhara, Ethiopia
08/2019-2021	Katherine Ku , MD(c), MPH(c); Medical Student III-IV Fulbright Fellowship: Creating A System Strategy for Decentralizing Treatment of Infant Possible Severe Bacterial Infections in Amhara
08/2022-	Erin Stone , PhD(c)—Global Health and Development

02/2024	The Relationship Between Environmental Contamination, Hand Hygiene, WASH Infrastructure and Newborn Infections in Amhara, Ethiopia <i>Field Supervisor, Ethiopia</i>
02/2021- 05/2022	Erin Stone, MPH(c) —Global Health The Relationship Between Environmental Contamination, Hand Hygiene, WASH Infrastructure and Newborn Infections in Amhara, Ethiopia <i>Field Supervisor</i>
09/2021- 11/2022	Eliana Paljug, BA, MPH(c) —Global Health Clinical Guidelines for Implementing and Monitoring Respiratory Support Among Low Birth Weight Infants in Ethiopia <i>Field Supervisor, Ethiopia</i>
08/2021- 07/2022	Enneye Makonnen, MPH(c), RN, BSN, CCRN —Global Health Thesis: Feasible Indicators for Routine Monitoring of Sepsis, Hand Hygiene and Environmental Contamination for Hospitals in Amhara, Ethiopia <i>Member, Thesis committee</i>
06/2021- 08/2022	Mel Mengesha, MPH(c) —Global Epidemiology Thesis: Predictors of Antimicrobial Resistance Among Neonates in Amhara, Ethiopia (AMR) <i>Member, Thesis committee</i>
04/2021- 05/2022	Chenmua Yang, MPH(c) —Global Epidemiology Thesis: Relationship between Estimates of Facility Readiness to Manage Neonatal and Maternal Emergencies at Hospitals in Amhara, Ethiopia <i>Member, Thesis committee</i>
05/2019- 05/2020	Kirsten Carr, MPH(c) —Global Health Thesis: The Impact of WASH Conditions on Environmental Contamination with Pathogens Known to Cause Neonatal Sepsis <i>Field Supervisor</i>
12/2019- 05/2020	Bridget Whaley, MPH(c) —Behavioral Health Thesis: Beyond Signal Functions: Estimates of Facility Readiness to Manage Obstetric Emergencies in Kenya and Uganda <i>Member, Thesis committee</i>
05/2020- 08/2020	Nastassia Donoho, MPH(c) —Global Health Practicum: Using Clinical Cascades to Measure Newborn Emergency Readiness in Amhara, Ethiopia <i>Field supervisor</i> *Award: Global Field Experience Financial Award, \$1,000
05/2020- 08/2020	Bridget Whaley, MPH(c) —Behavioral Health Practicum: Using Clinical Cascades to Measure Maternal Emergency Readiness in Amhara, Ethiopia <i>Field supervisor</i> *Award: Global Field Experience Financial Award, \$1,000

01/2019- 05/2020	Charlotte Marshall-Fricker , MPH(c)—Behavioral Health Practicum: Role of the Ethiopian Orthodox Church in Sepsis Care Seeking for Newborns in Amhara, Ethiopia <i>Field supervisor</i> *Award: Global Field Experience, \$2,000
02/2018- 05/20d19	Meron Asfaha MPH(c)—Behavioral Health Thesis: Analyzing the Socio-Contextual Determinants of Community-Level Care Seeking for Neonatal Possible Severe Bacterial Infection (PSBI) in Amhara, Ethiopia <i>Member and Content Expert, Thesis committee</i> *Award: Global Field Experience, \$2,000

Other Graduate Advisement

<u>Date</u>	<u>Team, Student, Project Title and Role</u>
2023	Creating a Neonatal Sepsis Care Cascade to Improve Sepsis Identification in Ethiopian Hospitals (5 global student team; Ethiopia & Atlanta) Student Team: Yizengaw B, Avantazo V, Ujari O, Yizengaw B, McCann <i>Faculty Co-Advisor</i> (Rule, Gobeze yehu, Zerihun) *Award: \$10,000, Emory Global Health Institute (EGHI)
2017-2018	Birth Preparation Innovation Team (5-student team) Student PI: Mackenzie Leonard, MPH(c) Project: Improving Maternal Birth Outcomes Through Video-based Curriculum Enhancements for Refugee Women in Clarkston, Georgia <i>Faculty advisor</i> *Award: \$5,000, Clinical and Translational Science Alliance (CTSA)
2018-2019	Post-Partum Innovation Team (4-student team) Student PI: Yesenia Ramirez, MPH(c) Project: Using Engaged Education and Social Support to Improve Postpartum Outcomes Among Refugee Mothers in Clarkston, Georgia <i>Faculty advisor</i> *Award: \$5,000, Clinical and Translational Science Alliance (CTSA)
2018-2019	Erin Brown , RN, DNP(c) Project: Cervical cancer screening in female Veterans <i>Pre-doctoral advisor & doctoral course faculty</i> (data analysis course) *Award: Harry R. Kendall Leadership Development Scholarship

Undergraduate Advisement

<u>Date</u>	<u>Team or Student, Project Title and Role</u>
2023-24	Dana Smaley , BA(c)—Human Health Senior Independent Reading, Effective Partnership & Collaboration Strategies: Insights from Global Cases for The Carter Center's US Violence Mitigation Team <i>Faculty Advisor</i>
2023-24	Agnes Arianto , BA(c)—Human Health Senior Directed Reading Project, Intimate Partner Violence Care at New American Pathways

Faculty Advisor

- 2022-2023 **Agnes Arianto**, BA(c)—Human Health
Project: Measuring Emergency Obstetric Readiness Across 3 Levels of Care in Amhara, Ethiopia
Faculty Advisor
- 2021-2023 **Abel Girma**, BA—Human Health (post-baccalaureate data science internship)
Project: Predicting KMC, Breastfeeding and Skin-to-Skin Care in Amhara, Ethiopia
Internship Advisor
- 2020-2021 **Merissa Coleman**, BA(c)—Human Health
Project: Evaluating Barriers to Healthcare Access for Refugees in the US
Faculty advisor

University of Washington

Graduate and Master of Public Health Advisement

- | <u>Date</u> | <u>Student, Thesis Title and Role</u> |
|--------------------|---|
| 02/14 - 04/14 | Kelly Bogaert , MD(c)
Project: “Birth Observations and Obstetrical Practices in Kissi County, Kenya”
<i>Mentor, Global Practicum</i> |
| 02/10 - 06/10 | Dr. Agya Maha , DDS, MPH(c)
Project: “Health Promotion Needs Assessment for Massai in Rural Kenya”
<i>Mentor</i> |

Clinical Mentorship

- | <u>Date</u> | <u>Student, Thesis Title and Role</u> |
|--------------------|---|
| 2009 | Ali Hunt , MD(c)
Family Medicine Ambulatory Rotation
<i>Clinical Preceptor</i> |
| 2008 | Grace Marx , MD(c)
Family Medicine Ambulatory Rotation
<i>Clinical Preceptor</i> |
| 2008 | Allison Porter , MD(c)
Family Medicine Ambulatory Rotation
<i>Clinical Preceptor</i> |

Seattle University

Master of Science in Nursing

- | <u>Date</u> | <u>Student, Thesis Title and Role</u> |
|---------------------|--|
| 01/2013-
12/2013 | Nelly Ayala , MSN(c)
Project: “Measuring Teamwork During Obstetrics Emergencies Among Guatemalan Clinicians” |

Mentor-Community Health

01/2013- 12/2013	Jean Baumgardner , MSN(c), FNP(c) Thesis: “Can Team Communication Checks Predict Teamwork Improve Obstetrical Care?” *Award: \$750, Sigma Theta Tau International (STTI), Alpha Epsilon Chapter Scholarship 2014 <i>First Reader-Nurse Practitioner</i>
01/2012- 06/2012	Joe Gardner , MSN(c), FNP(c) Project: “Increasing Stakeholder Participation in Human Milk Bank Design within PATH” <i>Mentor-Community Health</i>
03/2012- 06/2012	Erin Donald , MSN(c) Project: “Initiative for a Palliative Approach in Nursing Evidence and Leadership (iPANEL)” <i>Mentor-Community Health</i>
03/2012- 06/2012	Miller Sherling , MSN(c) Project: “Clinical Support in Neighborcare Health” <i>Project Advisor-Community Health</i>
03/2012- 06/2012	Natalie Sloan , MSN(c) Project: “Nursing and Medical Services for Homeless Populations at Lake City Way Clinic, Washington” <i>Project Advisor-Community Health</i>

Clinical Mentorship

<u>Date</u>	<u>Student, and Mentorship Role</u>
2009	Ravyn Ramos , MSN(c), FNP(c), ND(c) Internal Medicine <i>Clinical Preceptor</i>
2008	Amanda King-Kangas , MSN(c), NP(c) Clinical Preceptor
2008	Sarah Hebert , MSN(c), NP(c) <i>Clinical Preceptor</i>

Northwest University

Graduate and Master of Public Health Advisement

<u>Date</u>	<u>Student, Thesis Title and Role</u>
02/10-06/10	Dr. Caleb Tindando , MD, MA(c) Thesis: “Innovative and Sustainable Secondary Health Care Service Delivery in Burkina Faso” <i>First Thesis Reader</i> , Master of Arts in International Care and Community Development

SeaMar Community Health Center

Clinical Mentorship

<u>Date</u>	<u>Student, Thesis Title and Role</u>
2009	Dalilah Bernal , Pre-Nurse Practitioner, BSN Student (SPU) <i>Clinical NP Mentor</i>
2009	Janhavi, Sookra , DO(c) <i>Clinical Mentor</i>
2008	Shannon Stinson , Pre-Health Professional (UNC) <i>Clinical Mentor</i>

Courses Taught

Emory University

<i>[Summer 2024]</i>	NURS 675: Population Management & Care Transitions	Co-Faculty
	NURS 675: Population Management & Care Transitions	Co-Faculty
Spring 2024	HLTH 385: Advancing Global Health Equity NURS 675: Population Management & Care Transitions	Lead Faculty Co-Faculty
Fall 2023	HLTH 455: Collaborate to Transform Health NURS 416: Global Health NURS 675: Population Management & Care Transitions NURS 617: Data Utilization	Lead Faculty Lead Faculty Co-Faculty Co-Faculty
Summer 2023	NURS 616: Quality and Safety NURS 542: Evidence-Based Practice	Co-Faculty Group Facilitator
Spring 2023	HLTH 485: Epidemiology in Action NRSG 542: Evidence-Based Practice	Lead Faculty Group Facilitator
Fall 2022	HLTH 385: Advancing Global Health Equity NRSG 589: Innovative Leadership in Healthcare	Lead Faculty Lead Faculty
Summer 2022	NRSG 616: Foundations of HC Quality and Safety	Group Facilitator
Spring 2022	HLTH 385: Advancing Global Health Equity	Lead Faculty
Fall 2021	HLTH 485: Collaborate to Transform Health	Lead Faculty
Summer 2021	NRSG 725: Social Behavior in Public Health	Lead faculty
Spring 2021	HLTH 485: Epidemiology in Action	Lead faculty

(Topics in Human Health Capstone)

Fall 2020	NRSG 416: Global Health NRSG 315: Population Health: Community and Population Health	Co-Faculty Co-Faculty
Summer 2020	NRSG 416: Global Health NRSG 497: Low Birth Weight Infant Nutrition	Co-Faculty Faculty Mentor
Spring 2020	NRSG 721D: DNP Project IV	Lead Faculty
Fall 2019	NRSG 702D: Analyzing, Evaluating and Translating Health System Evidence	Lead Faculty
Summer 2019	NRSG 504: Biostatistics for Practice Scholars	Lead Faculty
Spring 2019	NRSG 721D: DNP Project IV	Lead Faculty
Fall 2018	NRSG 702D (Sections A & B): Analyzing, Evaluating and Translating Health System Evidence	Lead Faculty
Summer 2018	NRSG 718D: Population Adaptive Solutions NRSG 720: Collaboration and Transformation for Population Health NRSG 504: Biostatistics for Practice Scholars	Lead Faculty Lead Faculty Lead Faculty
Spring 2018	NRSG 721D: DNP Project IV NRSG 697: Interdisciplinary Strategies to Identify and Manage Infant Sepsis at the Community Level	Lead Faculty Faculty Mentor
Fall 2017	NRSG 702D (Sections A & B): Analyzing, Evaluating and Translating Health System Evidence	Lead Faculty
Summer 2017	NRSG 718D: Population Adaptive Solutions NRSG 720: Collaboration and Transformation for Population Health NRSG 504: Biostatistics for Practice Scholars NRSG 717D: DNP Project Development-III	Lead Faculty Lead Faculty Lead Faculty Lead Co-Faculty
Spring 2017	NRSG 716D: DNP Project Development-II NRSG 371: Evidence-Based Practice	Lead Co-Faculty Group Facilitator (7)
Fall 2016	NRSG 720: Collaboration and Transformation for Population Health NRSG 610D: Analyzing, Evaluating and Translating Health System Evidence NRSG 715D: DNP Project Development-I	Lead Faculty Lead Faculty Lead Faculty
Summer 2016	NRSG 610D: Analyzing, Evaluating and Translating Health System Evidence	Lead Faculty

	NRSG 717D: DNP Project Development-III	Lead Faculty
	NRSG 718D: Population Adaptive Solutions	Lead Faculty
Spring 2016	NRSG 716D: DNP Project Development-II	Lead Faculty
Fall 2015	NRSG 715D: DNP Project Development-I	Lead Faculty
Summer 2015	NRSG 610D: Analyzing, Evaluating and Translating Health System Evidence	Lead Faculty
Spring 2015	NRSG 371: Evidence-Based Practice	Lead Faculty
Seattle University		
Winter 2013	NURS 620: Population-Based Health Care	Lead Faculty
Spring 2012	NURS 548: Community Health Practice IV	Lead Faculty
Summer 2012	NURS 501: Advanced Health Assessment and Health Promotion	Co-Faculty
	NURS 575: Differential Diagnosis and Advanced Health Assessment	Lead Faculty
	NURS 574: Primary and Population-Based Care	Lead Faculty
Summer 2011	NURS 575: Differential Diagnosis and Advanced Health Assessment	Lead Faculty
Summer 2011	NURS 574: Primary and Population-Based Care	Lead Faculty
Summer 2011	NURS 589: Transition to Advanced Practice Nursing	Co-Faculty
Winter 2011	NURS 545: Community Health Practice II	Lead Faculty
Northwest University		
Winter 2011	Psych 5152: Quantitative Research Methods (ICCID 5152)	Lead Faculty
Seattle Pacific University		
Summer 2012	NUR 6212: Health Assessment II-Advanced	Co-Faculty
Spring 2012	NUR 6211: Health Assessment I-Advanced	Co-Faculty
Summer 2011	NUR 6211: Health Assessment I-Advanced	Co-Faculty
Summer 2011	NUR 6212: Health Assessment II-Advanced	Co-Faculty
Spring 2011	NUR 6212: Health Assessment II-Advanced	Co-Faculty
Spring 2010	NUR 6211: Health Assessment I-Advanced	Co-Faculty
	NUR 6211: Health Assessment I-Advanced	Lead Faculty
Summer 2009	NUR 6212: Health Assessment II-Advanced	Co-Faculty
Winter 2008	NUR 6911: <i>Multi-System</i> Health Conditions- Evidence Based and Therapeutic Reasoning	Lead Faculty
Fall 2008	NUR 6910: <i>Single System</i> Health Conditions- Evidence Based and Therapeutic Reasoning	Co-Faculty
	NUR 6212: Health Assessment II-Advanced	Lead Faculty
Summer 2008	NUR 6211: Health Assessment I-Advanced	Co-Faculty
Spring 2008	NUR 6912: <i>Complex</i> Health Conditions—Evidence Based and Therapeutic Reasoning	Co-Faculty
Spring 2008		Lead Faculty
Winter 2007	NUR 6911: <i>Multi-System</i> Health Conditions- Evidence Based and Therapeutic Reasoning	Lead Faculty

Fall 2007	NUR 6910: <i>Single System</i> Health Conditions-Based and Therapeutic Reasoning	Lead Faculty
Summer 2007	NUR 6212: Health Assessment II – Advanced	Lead Faculty
Spring 2007	NUR 6912: <i>Complex</i> Health Conditions—Evidence Based and Therapeutic Reasoning	Lead Faculty
Wheaton College		
Spring 2000	BIOL 321: Human Physiology	Teaching Assistant
Spring 2000	SCI 229: Health Professions Internship and Seminar	Teaching Assistant

Professional and University Service Activities

Membership in Professional Organizations

2022-	American Academy of Nursing (AAN)	Fellow
2018-	International Health Section, APHA	Member
2018-	American Public Health Association (APHA)	Member
2020-	Network for Evaluation and Implementation Sciences, Emory University (NEISE)	Member
2020-	Community Health Community of Practice	Member
2011-	American Nurses Association (ANA)	Member
2020-2022	Editorial Board, <i>PLOSOne</i>	Academic Editor & Member
2019-2022	Toward Unity for Health (TUFH), Board of Advisors	Board member
2019-2022	Community-Based Primary Health Care Working Group (CBPHC), American Public Health Association (APHA)	Chair
2019-2022	Leadership Committee, International Health Section, APHA	Leadership Committee, Member
2018-2019	CBPHC Working Group	Co-Chair
2015-2018	American Association of Nurse Practitioners	Member
2014-2015	National Postdoctoral Association (NPA)	Member
2010-2011	American Public Health Association (APHA)	Member
2009-2014	Sigma Theta Tau International, Nu Beta Chapter	Member
2009-2014	Kenya Research Program (KRP), UW Department of Global Health	Collaborator
2009-2013	Training, Research and Expert Education (TREE), UW Department of Global Health	Trainer
2007-2009	Advance Registered Nurse Practitioners United of Washington	Member
2006-2007	Global Health Council	Member

2006-2007	Nurse Practitioner Association of Maryland	Member
2006-2007	Maryland Nurses Association (MNA)	Member

Journal Editor
2020-2022 Academic Editor, *PLOSOne*

Manuscript Reviewer

Review Profile	publons.com/a/1205803/
2021-	<i>PLoS Neglected Tropical Diseases</i>
2021-	<i>Health Promotion and Practice</i>
2020-	<i>BMC Health Services Research</i>
2020-	<i>International Journal of Health Planning and Management</i>
2020-	<i>Journal of Pediatric Infectious Diseases</i>
2020-	<i>Health Promotion Practice</i>
2020-	<i>African Health Sciences</i>
2019-	<i>BMJ Open</i>
2019-	<i>International Health</i>
2017-	<i>Nursing Research</i>
2015-	<i>PLoS One</i>
2013-	<i>Maternal and Child Health Journal</i>

National and International Consultation

11/2023-present	Consultant , Ministry of Health (MOH): “Ethiopian Small and Sick Newborn Care Protocol Development;” Addis Ababa, Ethiopia
12/2023	Informant , Ministry of Education, Culture, Sports, Science, and Technology (MEXT): “Intercultural Sensitivity of Nursing Educators and the Necessary Support for Global Nursing Education” through Tokyo Medical and Dental University (TMDU), International Nursing Development Department
11/2023	Participant , Ministry of Health (MOH): “Ethiopian Health Sector Strategic Plan, Annual Review Meeting (ARM);” Addis Ababa, Ethiopia
06/2022	Informant , National Board of Public Health Examiners (NBPHE): “Global Public Health Workforce Study”
05/2022	Item Reviewer , Accreditation Board for Specialty Nursing Certification: “Evidence-Based Practice Certification Test (EBP-C)”
10/2020, 11/2020	Key Informant , Ethiopian Public Health Institute (EPHI) & Harvard University & HaSET Program: “Formative assessment on maternal, newborn, and child health research priorities in Ethiopia;” Addis Ababa, Ethiopia
05/2019	Informant , World Health Organization (WHO), KMC Scale-Up Working Group—Multi-country (Geneva, Switzerland)
05/2018	International Proposal Reviewer , Center for Disease Control and Prevention (CDC); (African Health Profession Regulatory Collaborative for Nurses and Midwives (ARC);” Atlanta, GA
07/2017	Informant , World Health Organization (WHO): “KMC Scale-Up Working Group;” Addis Ababa, Ethiopia
11/2017	Session Facilitator , International Health Section of the American Public Health Association Annual Meeting (APHA), “Global Health (5116.0);” Atlanta, GA
2015-2016	Data Analyst , Micronutrient Initiative’s Linda Mama Intervention Trial, Kakamega, Kenya.
2012-2014	Trainer , PRONTO International; Kakamega, Kenya and Huehuetenango, Guatemala

2012	Consultant , Swedish Neuroscience Institute and Seattle University, Seattle, WA
2010-2013	Board Member , Strengthening Care Opportunities through Partnerships in Ethiopia (SCOPE).
2009-2010	Doctoral Research Assistant , Maternal-Child Mortality Project, Gates Learning Grant, Universities of Nairobi & Washington (UW); Nairobi, Kenya & Seattle, WA
2006	Project Consultant , Johns Hopkins Technical Support for Ethiopia's HIV/AIDS Antiretroviral Initiative (TSEHAI) Project, The Presidential Emergency Plan for AIDS Relief (PEPFAR), Addis Ababa, Ethiopia

Emory University Service

<u>Year</u>	<u>Role, Name of Committee or Group</u>
2023-	Member , Coordinating Committee: Emory Global Maternal-Neonatal Health Collaborative (steering committee member for "Emory Perinatal Equity Conference 2023")
2022-	Fellow , Global Health (Emory Global Health Institute, EGHI)
2018-present	Member , Evaluation and Implementation Sciences, Steering Committee
2020	Visioning lead , Human Health baccalaureate degree program revision
2014-2016	Member , Woodruff Scholars Selection Committee (Standing)
2016	Lead Designer , DNP-MDP Dual degree proposal development team (Doctorate of Nursing Practice & Masters of Development Practice)
2015	Lead Coordinator , Interprofessional Team Training Day (Spring 2015)
2014-2015	Member , Emory University Interprofessional Team Training Day Committee (Standing)
2014	Lead Coordinator , Interprofessional Team Training Day (Fall 2014)

Nell Hodgson Woodruff School of Nursing Service

<u>Year</u>	<u>Role, Name of Committee or Group</u>
2022-present	Member , Curriculum Committee (standing)
2020-2021	Member , Global Health Task Force (ad hoc)
11/2020	Key Informant , Innovative Practice Working Group (ad hoc)
2019	Key Informant , Project NeLL (1 Million patient database)
2019	Member , NHWSN Baccalaureate program revision task force (ad hoc)
2016	Member , DNP Curriculum Revision Working Group (ad Hoc)
2015-2020	Member , NHWSN Curriculum Committee (Standing)
2015	Lead , DNP Population Health Curriculum Design (Ad Hoc)
2015	Member , DNP Mission-Vision-Values Working Group (Ad Hoc)
2014-2015	Member , NHWSN Innovative Practice Models Working Group (Ad Hoc)
2014-2015	Member , Diversity Committee (Standing)
2014-	Member , DNP Doctoral Faculty Collaborative (Standing)
2014	Member , NHWSN Mission-Vision-Values Working Group (Ad Hoc)

Emory University—Healthcare & University Partnership Service

<u>Year</u>	<u>Role, Name of Committee or Group</u>
2017-2019	Lead collaborator , Education Affiliation Agreement (EAA) between NHWSN DNP program and Emory Health Care Office of Quality, Emory Midtown Hospital
2017	Visioning Leader , Pilot AmeriCorp Patient Navigator Program for HIV+ Patient Population, Ponce Center for Infectious Disease, Grady Healthcare, Atlanta, GA (ad hoc)
2016-2018	Member , Emory Healthcare Congestive Heart Failure Value Acceleration Program team (VAP, standing)

Other Community Service

<u>Year</u>	<u>Role, Name of Committee or Group</u>
2019-	Member , Midway Woods Neighborhood Association, Decatur, GA
2016 -	Contributor , Waldorf School of Atlanta, Artisan Auction/Fundraiser, Decatur, GA
2016-2017	Consultant , Waldorf School of Atlanta Leadership Team and Transformation Teams, “3-year strategic plan development”; Decatur, GA
2007-2010	Adult Education Small Group Co-Facilitator and Leader , Bethany Community Church, Seattle, WA
2007-2009	Community Health Volunteer , Children’s Hospital International Medical Project (CHIMPS), Abilenes, El Salvador and Seattle, WA
2006-2007	Adult Education Committee Member , Faith Fellowship, Baltimore, MD
2005-2006	Adult Education Facilitator , Faith Fellowship, Baltimore, MD
2004	Public Health Education Volunteer , El Camino Academy, Bogotá, Colombia
2004	Public Health Volunteer , Proyecto Libertad, Boca Chica, Colombia
2004	Public Health Volunteer , Niños de la Calle and Proyecto FARED, Bogotá, Colombia.

Declaration

I, the undersigned, declare that this is my original work, has never been presented in this or any other University, and that all the resources and materials used for the dissertation, have been fully acknowledged.

Name: Bazie Mekonnen Berihun,

Signature:



Date: 26/08/ 2025

Place: Addis Ababa University, College of Health Sciences, School of Nursing and Midwifery
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Name: Negussie Deyessa Kabeta, Professor of Epidemiology, Primary Advisor

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Place: Addis Ababa University, College of Health Sciences, School of Public Health
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Date: 26/08/ 2025

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Date: 26/08/ 2025

Violence Against Women; Intimate Partner Violence: Association with Maternal Health Service Utilization and Women Empowerment

by Bazie Mekonnen Berihun

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 Violence Against Women; Intimate Partner Violence: Association with Maternal Health Service Utilization and Women Empowerment

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Intimate partner violence and maternal antenatal care utilization: is there a dose-response relationship? Findings from the Ethiopian National Demographic and Health Survey

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Background: Maternal mortality in sub-Saharan Africa (SSA) is an enduring public health challenge. Adequate utilization of antenatal care (ANC) services is one strategy to mitigate the problem by identifying and managing pregnancy risks early. Yet, in SSA, uptake of ANC remains low. Intimate partner violence (IPV) may be a deterrent to ANC uptake. We measured the dose-response relationship between IPV and adequate ANC utilization (defined as four or more visits [ANC-4]) using data from the Ethiopia Demographic and Health Survey (EDHS) 2016.

Methods: We used complex sample logistic regression to measure the impact of three IPV subscales (emotional, sexual and physical) on ANC-4 while controlling for sociodemographic, obstetric and women empowerment factors.

Results: A total of 2599 (weighted) currently married or in-union women were included. There was a significant dose-response relationship between IPV and ANC utilization. Emotional (adjusted odds ratio [aOR] 0.78 [confidence interval {CI} 0.64 to 0.97]) and sexual (aOR 0.68 [CI 0.50 to 0.92]) violence decreased ANC-4 uptake while controlling for the covariates.

Conclusions: IPV is common, yet often invisible, in Ethiopia. Health workers may begin directly screening pregnant women for IPV in order to increase targeted support of ANC uptake. This is the first known study to confirm IPV has a dose-response relationship with ANC-4 uptake.

Keywords: antenatal care, intimate partner violence, maternal mortality, sub-Saharan Africa.

Introduction

Maternal mortality from preventable causes remains persistently high, especially in the countries of sub-Saharan Africa (SSA). Worldwide, 295 000 mothers died in 2017 from pregnancy-related causes,¹ with 66% occurring in SSA.^{1,2} For each maternal death, 20–30 more women suffer acute or chronic pregnancy-related complications such as obstetric fistula and depression.² Of these deaths, 70% are due to preventable or readily treatable causes such as postpartum haemorrhage (PPH), hypertensive disorders (eclampsia, pre-eclampsia), postpartum infections, obstructed labour and abortion.³

One key strategy for reducing pregnancy-related maternal mortality is the provision of compassionate and respectful care during pregnancy.^{3,4} Antenatal care (ANC) provides the opportunity for screening and tests that are directed to identify early and manage pregnancy-related complications that endanger the life and health of the mother and foetus.⁴ It also serves as a foundation for linking pregnant women to other healthcare services when necessary.^{2–4} However, the uptake of adequate ANC (at least four visits) and timely (early in the first trimester) ANC services remains low in SSA. Only 53% of pregnant mothers in SSA received four or more ANC visits in 2020.⁵

A host of factors may deter mothers from accessing adequate and timely ANC. Intimate partner violence (IPV) is one such factor.^{6–12} A meta-analysis of 10 studies in Africa indicated that women who experienced IPV had 25% decreased odds of accessing adequate ANC.⁶ In other studies, women who experienced physical and emotional IPV were 52%, 27% and 32% less likely to receive adequate ANC.^{9–11} Furthermore, IPV predicts late entry into ANC (past the 16th week of pregnancy); women who recently experienced sexual IPV were 1.55 times more likely to enter ANC late.¹²

Research findings are not consistent, however. A study in Nepal found no significant association between IPV and the uptake of skilled maternity care.¹³ In India, no significant association was observed between emotional IPV and reproductive health outcomes.¹⁴ An Egyptian study indicated that ever-abused professional women were more likely to have four or more ANC visits than those who did not report abuse.¹⁵ And a study in Rwanda found no significant association between IPV and adequate ANC.¹⁶

Women who experience IPV are also more likely to have low-birthweight babies, induced abortions, depression and acquire human immunodeficiency virus or syphilis.⁷ They are also more likely to experience unwanted pregnancy, miscarriage and stillbirth.^{4,17,18} More than one-third of the women intentionally killed globally in 2017 were killed by their current or former intimate partner.¹⁹ A study in South Africa found that of 3797 female homicides, 50.3% were from IPV.²⁰ Children who witness IPV are also more likely to develop anxiety, depression, poor school performance, low self-esteem, nightmares, physical health complaints and, in extreme cases, death.^{21–23}

IPV is defined as any behaviour within an intimate relationship that causes physical, psychological/emotional or sexual harm to those in the relationship.^{7,8} It is the most prevalent form of violence against women worldwide.^{7,8} Nearly 37% of ever-partnered women in Africa experienced some form of physical and/or sexual violence from their intimate partner, which is slightly higher than the 30% estimate globally.^{7,8}

Many theoretical perspectives and models have been developed to explain and predict IPV risk. From a feminist model perspective, patriarchy and male dominance are seen as primary drivers.^{24–26} From a sociological model perspective, one's prior experiences of violence and unequal resources in relationships are viewed as primary predisposing factors for violence.^{24–26} In contrast, the social ecologic model provides a more comprehensive and nuanced perspective by mapping IPV drivers to individual, relationship, community and societal levels of influence.^{27,28}

Ethiopia has significantly reduced maternal mortality over the last decade.^{1,2} However, it is still ranked among the highest burdened countries globally.²⁹ In 2017, 14 000 Ethiopian mothers died.^{1,2} The country also has a high maternal mortality ratio (MMR) of 401 deaths per 100 000 live births. This is nearly double the global MMR of 211.^{1,2} Annually, almost 11% of Ethiopian mothers experience adverse pregnancy outcomes.²⁹ Despite these high burdens of mortality and morbidity, the 2016 Ethiopia Demographic and Health Survey (EDHS) report indicated only 32% of mothers received adequate ANC nationally.²⁹ Further, 37% of Ethiopian mothers did not receive any ANC.²⁹ Simultaneously, the report showed IPV remains high, with 27% of

reproductive-age women reporting a current experience of IPV and 34% reporting ever having experienced IPV.²⁹

Predicting health service utilization with continuous IPV scores

Usually, measurement of maternal IPV experience uses multiple items mapped to three subscales for emotional, sexual and physical violence. The EDHS 'domestic violence module' measures IPV experience using 13 items mapped to these three subscales.²⁹

However, violence-related studies to date have primarily analysed IPV as a dichotomous variable—'yes' she experienced IPV or 'no' she did not. This yes/no dichotomous approach merges and treats a woman victim of only a single form and/or number of violent behaviours equally with the woman who experienced multiple forms and numbers of violent behaviours from emotional, sexual and physical partner violence. Treating IPV as a dichotomous 'yes' versus 'no' experience may dilute the impact of IPV (overall and the three subscales) on the outcome variable of interest, including its effect on adequate ANC utilization and other health services.

Historic approaches to dichotomizing IPV and not measuring it on multiple scales may explain in part why studies on IPV and obstetric health service utilization have mixed findings. A study done to assess how different conceptualization and coding of IPV variables affects interpretation of the impact of violence prevention intervention compared the 'standard' dichotomous approach to a new method that accounted for the severity and intensity of IPV subscales.³⁰ The study indicated the new approach allowed for a better understanding of the impacts of the intervention, which was masked by the traditional way of lumping maternal violence experience all together. The research used secondary data from six randomized controlled trials conducted in low- and middle-income countries.³⁰

Based on the argument and research findings above, this study was designed to treat each type of IPV as discrete count data and measure the potential dose-response relationships between each IPV subscale and adequate ANC uptake for the last child born in the 5 y before the survey.

Methods

Source of data

The data source for this study was the EDHS 2016 survey, which is de-identified, delinked and publicly available.²⁹ The survey was conducted from 18 January to 27 June 2016. The target groups included women ages 15–49 y in randomly selected households across Ethiopia. A stratified multistage cluster sampling technique was used to select samples of enumeration areas (EAs) in two stages. In the first stage, a total of 645 EAs (202 in urban areas and 443 in rural areas) were selected with probability proportional to EA size and with independent selection in each sampling stratum. In the second stage, a fixed number of 28 households per cluster were selected with an equal probability systematic selection from the newly created household listing.²⁹ Data collection was done with a face-to-face interview utilizing a computer-assisted personal interviewing data collection system.

A total of 15 683 women were interviewed and 95% of women invited to interview provided data.²⁹

Information on partner violence was obtained from ever-married women on their experience of violence committed by their current and/or former husbands/partners. Specially constructed weights in the EDHS were used to adjust for the selection of only one woman per household and to ensure that the violence module subsample was nationally representative.²⁹

The 2016 EDHS and the corresponding dataset from the DHS program database is the 4th and most recent standard DHS available for public use. In 2019, Ethiopia conducted an interim DHS and collected information on key performance monitoring indicators. However, this mini-DHS did not collect data on domestic violence.

Measurement of variables

Outcome measurement

The outcome variable for this study was adequate utilization of ANC for the last birth that occurred in the 5 y before the survey, defined as four or more ANC services (ANC-4) received from a skilled healthcare provider (such as a doctor, nurse or midwife). Although the current World Health Organization (WHO) recommendations are for pregnant women to have at least eight ANC visits,⁴ the EDHS 2016 data were collected when the focused ANC model, which recommended a minimum of four visits, was the standard model of care.³¹

Predictor variable

Main predictor variable. The main predictor variable for this study is IPV measured on three subscales. The 2016 Ethiopia DHS employed 13 items to quantify IPV for currently or ever-partnered women. The emotional violence subscale has three items: say or do something to humiliate you (the woman) in front of others, threaten to hurt or harm you or someone close to you and insult you or make you feel bad about yourself. The sexual violence subscale has three items: physically force you to have sexual intercourse even when you did not want to, physically force you to perform any other sexual acts you did not want to and force you with threats or in any other way to perform sexual acts you did not want to. The physical violence subscale has seven items: push you, shake you or throw something at you; slap you; twist your arm or pull your hair; punch you with his fist or with something that could hurt you; kick you, drag you or beat you up; try to choke you or burn you on purpose; and threaten or attack you with a knife, gun or any other weapon. Thus the IPV score ranges from 0 to 3 for emotional violence, 0–3 for sexual violence and 0–7 for physical violence, with the total IPV score ranging from 0 to 13 without weighting or standardizing the subscale scores.

Covariates. Based on the literature review of factors that have been used to predict ANC service utilization globally and in Ethiopia, maternal sociodemographic variables (e.g. age, religion, region, residence, education and household wealth), obstetrics variables (e.g. last child was wanted, bad obstetric history, number of living children and birth order of the last child), women empowerment variables (e.g. participation in household decision-

making) and problems related to healthcare access were included as covariates in this study. In the EDHS, a bad obstetric history is defined as ever experiencing abortion, miscarriage or stillbirth.

The woman empowerment indicator, participation in household decision-making, was a composite variable generated by joining three DHS variables on household decision-making into a single yes/no dichotomous variable. The three merged question items are own healthcare, large household purchases and visits to family or relatives. Each question item was first converted to 'yes' if the woman participates in the decision-making alone or jointly with her partner and 'no' if she does not participate at all. The other predictor, 'access to healthcare is a big problem', was created by merging five variables into a single dichotomous yes/no indicator. These variables were getting medical help for self is a big problem, getting permission to go out is a big problem, getting money needed for treatment is a big problem, distance to the health facility is a big problem and not wanting to go alone to the health facility is a big problem.

Statistical analysis

SPSS version 27 (IBM, Armonk, NY, USA) was used for data analysis. Data management was done before creating the complex sample analysis plan. We first confirmed each variable's adequacy for use in this study with descriptive figures (histograms, box plots) and descriptive statistics (absolute range, interquartile range [IQR]), median and percentage, since data were not normally distributed). After exploring each variable independently, we explored the relationship between each predictor and the outcome using stratified figures (histograms, box plots) and stratified measures of central tendency and variability (median/IQR or percentage). Next, we statistically tested for differences in the predictors stratified by the outcome (ANC 4 visits versus <4 visits). For continuous variables we used the Wilcoxon ranked sum test to compare the rank distributions across these two levels of ANC uptake. For categorical variables with cell counts >6, we used the χ^2 test of independence since all variables had cell counts >6 in this large-sample EDHS dataset.

We then quantified the direction and strength of association between each predictor and the outcome of ANC-4 using univariate logistic regression (including the odds ratio [OR], 95% confidence interval [CI] and p-value). We also calculated the area under the receiver operating characteristics curve (AUC, C-statistic) for each individual predictor.

To construct the multivariate logistic regression (MLR) model predicting adequate ANC-4, we empirically and iteratively refined how certain variables were modelled. For example, when continuous variables such as age had a high AUC on univariate modelling but did not have an OR that was statistically significant, we tested various cut points for age based on the ANC-4 stratified box plots and empiric ORs.

After using the empiric approaches to find the optimal cut points, we did a full model MLR by adding all predictor variables along with the IPV subscales treated as continuous count data. Although logistic regression does not require the predictor be unbounded and violation of the assumption of linearity in the logits results in type II errors,³² we performed a residual analysis creating a scatter plot of the logit residual by predicted probability

and found a linear relationship (see [Supplementary Figures S1 and S2](#)). We also compared the sensitivity and the AUC and observed nearly the same model performance for the IPV continuous versus IPV dichotomous model approaches. These findings allowed us to treat the IPV subscales as continuous count data in our final complex samples logistic regression model.³² We performed a separate analysis on IPV and ANC for the group who gave birth in the 12 months before the survey and found a 10% improvement in the model sensitivity. We assessed for multicollinearity in the MLR using a variance inflation factor (VIF) cut point >10; variables with a VIF >10 would be considered potentially collinear and subject to being removed from the final MLR model.

Following the data management, complex sample analysis plan was created to predict ANC-4 using three IPV subscales (emotional, sexual and physical), sociodemographic, obstetric and empowerment variables. The EDHS 2016 sample weight for domestic violence, sample strata for sampling errors and clusters variable were used to create the complex sample analysis plan based on how the EDHS data were collected.^{29,33}

Complex sample frequency, descriptive and crosstab techniques were used to describe the background characteristics of respondents and test for predictor differences in ANC-4 uptake. Univariate and multivariate complex samples logistic regression analysis with the corresponding ORs and 95% CIs were employed to assess the effect size of each predictor variable on the outcome. Taylor series linearization variance estimation was used to produce design-adjusted standard errors. No observation deletion or suppression was done in the analysis.³⁴

Some of the EDHS variables included in this study were specific only for woman currently in a union or living with a man. Thus this analysis was limited to the subpopulation of mothers who were in a union or living with a man at the time of the EDHS.

Results

Description of respondents by background characteristics and ANC service utilization

A total of 2599 weighted (2788 unweighted) currently married or in-union mothers from the 2016 EDHS were included in this study. Of the sample, <1% did not have data on ANC. The respondents' ages ranged from 15 to 49 y, with a mean of 29.8 y. The majority were Christians (60.6%), lived in rural areas (88.1%) and had no formal education (64.3%) (Table 1). Sexual violence was common, with 1 in 10 women (10.3%) reporting having ever experienced it. However, nearly one-quarter of all respondents reported experiences of emotional or physical IPV (23.0% and 22.9%, respectively). Maternal experience of multiple forms of IPV ranged from 5.2% for all subtypes to 14.2% for emotional and physical violence (see [Supplementary Figure S3](#)).

Only 30.2% of respondents had utilized adequate ANC services (ANC-4) for their last child. As maternal age and birth order of the last child increased, adequate ANC utilization decreased. In contrast, education level showed a direct positive relationship with adequate ANC utilization for the last child. Maternal age, whether the last child was wanted and maternal experience of a bad obstetric history were found to have no significant relationship with adequate ANC utilization in the χ^2 test (Table 1).

Complex sample univariate logistic regression analysis

In the complex samples univariate logistic regression, all the IPV subscales decreased adequate ANC utilization. Physical IPV, however, had a low effect size and was not statistically significant (Table 2).

Complex sample multivariate logistic regression predicting ANC-4 utilization

Complex sample multivariate logistic regression was done to measure the effect size of the main predictor variables (three IPV subscales) and related predictors (sociodemographic, obstetric and empowerment) on the uptake of ANC-4 for the last-born child.

Initially, each IPV subscale (controlled for confounders) was tested for its effect on adequate ANC utilization for the last child. Then a full-model complex samples analysis was done by adding all the IPV subscales and covariates into one multivariate model (Table 3). No variables were excluded from the multivariate model due to multicollinearity since all VIFs were <5.

The result from the full-model regression indicated a dose-response relationship between IPV subscale scores and ANC-4. A unit increase in the emotional IPV score from 0 through 3 decreased the likelihood of ANC-4 by 22.0% (aOR 0.78 [CI 0.64 to 0.97]) and a unit increase in the sexual IPV score from 0 to 3 decreased ANC-4 by 32.0% (aOR 0.68 [CI 0.50 to 0.92]). On the other hand, a unit increase in the physical IPV score from 0 to 7 increased ANC uptake slightly, although the change was not significant (aOR 1.15 [CI 0.97 to 1.35]) (Table 3).

Discussion

This study measured the impact of three forms of maternal IPV on the uptake of adequate ANC. We modelled each IPV subscale (sexual, emotional and physical) as continuous count data to quantify for any dose-response relationship between the three forms of IPV and ANC-4 using complex samples logistic regression. To our knowledge, no previous studies have measured the dose-response relationship between each type of IPV and ANC-4.

We identified a significant inverse dose-response relationship between both emotional and sexual IPV and adequate ANC service utilization for the last child born in the 5 y before the survey. Our finding that emotional violence deters ANC-4 utilization is not consistent with other studies,^{9,14,16} nor is the finding for sexual violence.^{10,16} These studies indicated no significant association between IPV subscales and maternal health service utilization. However, the studies followed the usual way of dichotomizing IPV as a whole or for each subscale, as opposed to our continuous count data approach. Research indicates that lumping together all maternal violence experiences could potentially hamper the expression of subtle predictor-outcome relationships.³⁰ We believe that variation in conceptualization and coding of IPV partially explains the discrepancy of the research findings and could be attributed to differences in sample size, type of study population and sociocultural factors.

Our research discovery of a predictive dose-response relationship between IPV subscales and ANC uptake provides a novel

Table 1. Background characteristics of respondents stratified by adequate ANC uptake for the last child

Predictors	Adequate ANC uptake (%) (N=2656, unless indicated)		Total (%)
	No	Yes	
IPV subscales			
Emotional	$\chi^2=26.6, p<0.01$		
No	67.7	32.3	77.0
Yes	76.7	23.3	23.0
Sexual	$\chi^2=22.0, p<0.01$		
No	68.8	31.2	89.7
Yes	78.0	22.0	10.3
Physical IPV	NS		
No	68.7	31.3	77.1
Yes	73.2	26.8	22.9
Sociodemographics			
Age (years)	NS		
15–29	66.9	33.1	50.4
30–39	71.5	28.5	39.9
40–49	77.5	22.5	9.7
Religion	$\chi^2=27.9, p=0.01$		
Christians	67.0	33.0	60.6
Muslim	72.8	27.2	37.2
Others	93.6	6.4	2.2
Region	$\chi^2=89.8, p<0.001$		
Agrarian	70.7	29.3	91.5
Pastoralist	77.7	22.3	5.8
City dwellers	22.3	77.7	2.7
Residence	$\chi^2=154.3, p<0.001$		
Rural	73.7	26.3	88.1
Urban	40.7	59.3	11.9
Woman education level	$\chi^2=175.5, p<0.001$		
No formal education	77.0	23.0	64.3
Primary	62.3	37.7	26.7
Secondary	43.1	56.9	5.8
Higher	34.8	65.2	3.3
Household wealth quintile	$\chi^2=185.9, p<0.001$		
Poorest	82.9	17.1	20.9
Poorer	76.5	23.5	22.5
Middle	67.1	32.9	22.3
Richer	70.0	30.0	18.7
Richest	45.9	54.1	15.6
Partner education level ^a	$\chi^2=151.0, p<0.001$		
No formal education	78.5	21.5	48.6
Primary	66.5	33.5	38.0
Secondary	51.8	48.2	8.4
Higher	40.2	59.8	5.0
Obstetric predictors			
Last child wanted	NS		
Yes	68.3	31.7	75.4
No	74.3	25.7	24.6
Bad obstetric history ^b	NS		
No	69.8	30.4	91.0
Yes	69.3	30.7	9.0

Table 1. Continued

Predictors	Adequate ANC uptake (%) (N=2656, unless indicated)		Total (%)
	No	Yes	
Number of living children	$\chi^2=55.4$, $p<0.001$		
0–2	61.9	38.1	35.8
3–5	71.7	28.3	42.1
≥ 6	78.6	21.4	22.2
Birth order of last child	$\chi^2=70.7$, $p<0.001$		
1	60.9	39.1	16.9
2–3	65.0	35.0	30.2
4–5	69.4	30.6	24.0
≥ 6	80.3	19.7	28.9
Women empowerment predictors			
Participation in household decisions ^c	$\chi^2=43.8$, $p<0.001$		
Yes	68.0	32.0	90.0
No	87.0	13.0	10.0
Healthcare access is a big problem	$\chi^2=41.3$, $p<0.001$		
Yes	73.0	27.0	74.4
No	60.3	39.7	25.6

ANC uptake and χ^2 values are rounded to the nearest one decimal place. The p-value is of the adjusted F-statistics. NS: not significant.

^aN=2641.

^bEver experiencing abortion, miscarriage or stillbirth.

^cN=2615.

approach in quantifying IPV and demonstrating how both sexual and emotional IPV decrease ANC utilization. Further, this study uniquely quantifies the differential impact of each form of IPV on ANC-4. The approach allows researchers to more clearly measure the relationship between various forms of IPV and health service utilization. Using ordinal IPV subscales advances existing science on IPV and health service utilization. Historically, researchers often lumped together maternal experience of violence into a single dichotomous yes/no variable.^{9–16}

The physical, psychological, social and other negative impacts of IPV are not limited to the woman victim only. Children and other family members who lived through and experienced such a violent relationship may be affected by its direct and/or indirect consequences.^{21–23} The finding in this study that IPV has a dose–response relationship with maternal ANC service utilization suggests, by extension, that other IPV-related health outcomes may also have a similar dose–response relationship with different forms of IPV.

Although not significant, a unit increase in physical IPV experience was found to increase the uptake of ANC-4. In contrast, emotional and sexual IPV decreased ANC-4. One possible explanation for such a contradictory outcome could be that physical harm from IPV may motivate mothers to seek medical help for themselves. Another possible explanation for such a relationship may be the moderation effect of other covariates. If this is true, the effect of physical IPV on ANC utilization may be moderated by a third variable or complex set of other variables. Cultural and social influences may also play a role in the differential impact of various forms of IPV on ANC-4 uptake.

There are different theories and models that explain how IPV experience predisposes the victim to a variety of untoward health conditions. Among others, the abuser's psychological control of the woman where the perpetrator makes the victim financially dependent or limits the ability to control her sexual and reproductive decision-making is cited as one reason.⁷ In this study, the combination of a high prevalence of IPV coupled with low utilization of adequate ANC suggests women in Ethiopia are experiencing multifaceted abuse. This warrants intensified work to increase empowerment, gender equity and creating community-level IPV awareness that could support ANC-4 uptake.

Existing literature to date defines IPV as 'severe' if the victim experienced certain aspects of physical violence (i.e. having been kicked or dragged, strangled or burned or threatened with a knife/gun or other weapon), although some authors consider any sexual violence as severe.^{7,8} However, the novel dose–response measurement of IPV using three subscales could expand the definition of severe IPV to account for both the number and type of IPV behaviours experienced. Future studies could test various combinations of IPV experiences and/or various dose cut points for defining 'severe' IPV. Additional studies could create short-forms for rapidly screening pregnant women for each form of IPV in routine clinical practice.

We found a 10% improvement in sensitivity when we modelled IPV and adequate ANC utilization for women who gave birth in the 12 months before the survey. Apart from the difference in sample size (2599 vs 917) and magnitude of ANC-4 utilization (30.2% vs 34.3%), this may in part be that for some women who gave birth in the 5 y before the

Table 2. Complex sample univariate logistic regression predicting adequate ANC utilization using IPV subscales and covariates

Predictors	Complex sample univariate regression result	
	Crude OR	95% CI
IPV subscales		
Emotional (0–3)	0.74*	0.63 to 0.88
Sexual (0–3)	0.65*	0.50 to 0.80
Physical (0–7)	0.94	0.84 to 1.05
Sociodemographic predictors		
Age category (15–29, 30–39, 40–49 y)	0.78*	0.64 to 0.95
Religion		
Christian	1	
Muslim	0.76	0.54 to 1.07
Others	0.14*	0.04 to 0.48
Region		
Agrarian	1	
Pastoralist	0.69*	0.52 to 0.92
City dwellers	8.40*	5.61 to 12.56
Residence		
Rural	1	
Urban	4.08*	2.87 to 5.80
Woman education, category (none, primary, secondary, higher)	1.97*	1.68 to 2.32
Household wealth quintile, category (poorest, poorer, middle, richer, richest)	1.46*	1.33 to 1.60
Partners education level, category (none, primary, secondary, higher)	1.80*	1.54 to 2.09
Obstetric predictors		
The last child was wanted		
Yes	1	
No	0.74	0.55 to 1.01
Bad obstetric history ^a		
No	1	
Yes	1.02	0.71 to 1.47
Number of living children category (0–2, 3–5, ≥6)	0.66*	0.56 to 0.78
Birth order of last child category (1, 2–3, 4–5, ≥6)	0.73*	0.66 to 0.81
Woman empowerment predictors		
Participation in household decisions		
Yes	1	
No	0.32*	0.19 to 0.52
Healthcare access is a big problem		
Yes	1	
No	1.78*	1.38 to 2.29

The numbers are rounded to the nearest two decimal places.

^aEver experiencing an abortion, miscarriage or stillbirth.

*Statistically significant at $p < 0.05$.

survey, IPV might have occurred after delivery of the last child.

Strengths and limitations of the study

This study used nationally representative data from the EDHS 2016. Thus the findings from this research can be generalized to Ethiopia. The study assesses the dose–response relationship of IPV with ANC-4 utilization, making it the first known study of

the dose–response impact of IPV on a health outcome. Yet, since EDHS data are retrospective and cross-sectional, it is not possible to establish a definitive cause–effect relationship between IPV and ANC-4 uptake.

Conclusions

The findings of this study showed that as the number of maternal experiences of emotional and sexual IPV increases, the

Table 3. Complex samples multivariate logistic regression model predicting adequate ANC utilization using IPV subscales and covariates

	Complex sample multivariate logistic regression, full model	
Predictors	aOR	95% CI
IPV subscales		
Emotional (0-3)	0.78*	0.64 to 0.97
Sexual (0-3)	0.68*	0.50 to 0.92
Physical (0-7)	1.15	0.97 to 1.35
Sociodemographics		
Age (15–29, 30–39, 40–49 y)	1.04	0.77 to 1.41
Religion		
Christians	1	
Muslim	1.03	0.71 to 1.48
Other	0.22*	0.06 to 0.78
Region		
Agrarian	1	
Pastoralist	0.76	0.52 to 1.11
City dwellers	2.81*	1.63 to 4.86
Residence		
Rural	1	
Urban	1.37	0.77 to 2.43
Woman education level (none, primary, secondary, higher)	1.22	0.95 to 1.55
Household wealth quintiles (poorest, poorer, middle, richer, richest)	1.17*	1.03 to 1.32
Partners education level (none, primary, secondary, higher)	1.26*	1.02 to 1.56
Obstetric predictors		
The last child was wanted		
Yes	1	
No	0.81	0.58 to 1.15
Bad obstetric history ^a		
No	1	
Yes	1.18	0.78 to 1.78
Number of living children (0–2, 3–5, ≥6)	1.00	0.70 to 1.45
Birth order of the child (1, 2–3, 4–5, ≥6)	0.90	0.70 to 1.15
Women empowerment predictors		
Participation in household decisions		
Yes	1	
No	0.44*	0.26 to 0.73
Healthcare access is a big problem		
Yes	1	
No	1.07	0.79 to 1.45

The numbers are rounded to the nearest two decimal places.

^aEver experiencing an abortion, miscarriage or stillbirth.

*Statistically significant at $p < 0.05$.

probability of accessing adequate ANC services (ANC-4) decreases. Consequently, the number and types of IPV (emotional, sexual and physical) should be assessed and responded to differently when used to predict adequate ANC.

Based on our finding of a dose-response relationship between the IPV subscale and ANC-4, we believe that each woman victim of IPV should be managed individually. We therefore suggest that IPV exposure dose and exposure type require assessment in order

to mobilize differential interventions in the prevention, management and control of IPV.

Additional studies to assess for the presence of a dose-response relationship between IPV subscales and other maternal-child health services and outcomes are needed. Further research work to create 'severe' IPV indicators and short-forms for screening for IPV in routine clinical practice are warranted.

Supplementary data

Supplementary data are available at *International Health* online (<http://inthehealth.oxfordjournals.org>).

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Data availability: The dataset used for this study is available in the DHS repository (<https://dhsprogram.com>) upon registration and submission of research protocols. For further information about the data, please visit: <https://dhsprogram.com/data/Access-Instructions.cfm>.

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Women empowerment and healthcare utilization for childhood illnesses: evidence from Ethiopia

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Background: Five million children <5 y of age died globally in 2021, the majority (56%) in sub-Saharan Africa (SSA). Many of the deaths in children <5 y of age could be prevented through early detection and treatment. However, healthcare utilization for childhood illnesses remains low in the region. The aim of this study was to assess the relationship between women empowerment and healthcare utilization for childhood illnesses.

Methods: The main predictor variable for this study was women's empowerment and the outcome variable was healthcare utilization for childhood illnesses. The data source for the study was the 2016 Ethiopia Demographic and Health Survey dataset. Complex sample ordinal regression analysis was employed, controlling for confounders. Adjusted cumulative odds ratios (cuORs) and 95% confidence intervals were computed to estimate effect size.

Results: A total of 2101 (weighted) cases of children <5 y of age were included in this study. Children whose mothers were empowered with a wife-beating attitude were 59% more likely to get healthcare for all illnesses in children <5 y of age ($\beta=0.46$, cuOR 1.59, $p<0.01$). Children whose mothers had no problems with healthcare access were also more likely to receive health services for all illnesses in children <5 y of age ($\beta=0.42$, cuOR 1.52, $p=0.01$).

Conclusions: Women's empowerment has a significant effect on healthcare utilization for illnesses in children <5 y of age. The finding indicates empowering women, sooner or later, is empowering the family.

Keywords: empowerment, healthcare seeking, under-five children, under-five illness, women.

Introduction

Child mortality in sub-Saharan Africa (SSA) continues to be a persistent challenge.^{1–3} Five million children <5 y of age died worldwide in 2021 and 56% of the deaths occurred in SSA with an average mortality rate in children <5 y of age of 74 deaths per 1000 live births.¹ Most childhood deaths occur from preventable causes. The infectious diseases pneumonia (15%), diarrhoea (8%) and malaria (5%) remain the leading causes of mortality globally in children <5 y of age.^{1–3}

Many of the deaths from these illnesses in children <5 y of age could be prevented through early detection and treatment of cases. An ecological study to identify correlates of child mortality

in 82 developing countries indicated that healthcare seeking for acute respiratory infections (ARIs) (correlation coefficient: -0.48), provision of oral rehydration salt (ORS) for diarrhoea (correlation coefficient: -0.52) and antimalarials given for children with fever (correlation coefficient: -0.56) had a significant protective effect on childhood mortality.⁴

However, the prevalence of healthcare seeking for illnesses in children <5 y of age remains low in high-burden countries such as in SSA.^{1–3,5} (Healthcare seeking and healthcare service utilization are used interchangeably for this study. Similarly, respondents, mother, women and caretaker are interchangeable.) In 2021, UNICEF's estimate for the SSA region indicated 46% and 60% care-seeking prevalence for children with ARI symptoms

and fever, respectively.⁵ The report showed that only 37% of children with diarrhoea received ORS.⁵ An ecological study in developing countries indicated that 49% of child caregivers sought care for childhood ARI symptoms from a health institution and 39% of children with diarrhoea received ORS.⁴ According to the study, only 13% of children with fever were given antimalarials.⁴ Studies in Nigeria and Kenya also indicated a care-seeking prevalence for childhood illnesses of 21.6% and 30.4%, respectively.^{6,7} These studies showed that maternal obstetric factors, service accessibility, service quality and cost were significant predictors of healthcare seeking for illnesses in children <5 y of age.

Research indicates that women's empowerment has a significant effect on the health and general well-being of children. Empowerment is a process of change by which those who have been denied the ability to make strategic life choices—the powerless—regain their autonomy.^{8–10} It is a multidimensional concept grouped under three dimension pillars: resources (the financial, physical, human and social capital that enable choice); agency (the capacity to freely make decisions about one's own life) and self-efficacy (the belief in one's ability to act effectively towards a goal); and context (the social arrangements, mainly norms and institutions, necessary to express agency and assert control over resources).^{8–10} Empowerment involves removing barriers and creating an enabling environment for women to own and use these pillars.^{8–10}

Women's empowerment is a contextual concept as well—an empowerment indicator in one country/culture might not have a similar empowering effect in another. This feature of empowerment poses a challenge to developing standard measurement indicators that could be used to understand the magnitude, determinants and outcome of women's empowerment at the national or global level.^{11,12} Nonetheless, a recent international report indicated that only 60.7% of women globally are empowered to achieve their full potential.¹² The equivalent figure for SSA is 49.8%, compared with 76.3% for Europe and North America. The report covered 114 countries using 10 indicators from five women's empowerment dimensions.¹² Women's empowerment is one item of the 2030 Sustainable Development Goal 5, achieve gender equality and empower all women and girls.¹⁰

Research on the relationship between women's empowerment and care seeking for childhood health conditions are limited and show mixed findings. A study done using the Institute for Health Metrics and Evaluation's database of 161 countries indicated that women's political empowerment has a relevant effect on immunization for low-income and least-developed countries.¹³ A study in Zimbabwe, however, found no significant association between women's empowerment and childhood vaccinations and treatment for diarrhoea.¹¹

However, several other studies have assessed the effect of women's empowerment on the nutritional status of children. A systematic review of studies in SSA¹⁴ and another comparative study in the region¹⁵ indicated women's empowerment has a significant positive effect on childhood anthropometric indicators. A study in Gambia showed women who reported accepting wife-beating had 69% and 66% greater odds of having stunted and underweight children, respectively.¹⁶ In Peru, a study indicated that a low level of women's autonomy was significantly asso-

ciated with a higher probability of anaemia in children <5 y of age.¹⁷ Studies conducted in Ethiopia also indicated that women's empowerment had a significant protective effect on childhood malnutrition.^{18,19}

Although Ethiopia has decreased mortality in children <5 y of age by >75% since 1990,¹ it is still categorized among the global high-burden states.^{1,20} It is one of five countries where half of all deaths in children <5 y of age occurred in 2018.¹ In 2021 alone, 178 000 children <5 y of age died in the country.¹

Yet the prevalence of healthcare utilization for illnesses in children <5 y of age remains low in Ethiopia.^{5,20} The 2016 Ethiopia Demographic and Health Survey (EDHS) report indicated that among children <5 y of age in the country, 7% had ARI symptoms, 14% had fever and 12% had diarrhoea in the 2 weeks before the survey.²⁰ According to the report, treatment was sought for 31%, 35% and 44% of children with ARI symptoms, fever and diarrhoea, respectively. The country also has a lower level of women's empowerment. The 2016 EDHS report indicated that only 37% of all women and 70.6% of currently married women were fully empowered with attitudes towards wife-beating and participation in household decision-making, respectively.²⁰

Ethiopia has adopted several child survival strategies, including the integrated management of newborn and childhood illnesses approach. The Health Sector Transformation Plan, the National Newborn and Child Development Strategy 2021–2025 and the implementation of a national action plan that targeted pneumonia and diarrhoea, the two major contributors (25%) of mortality in children <5 y of age in the country, are some of the national programs.^{20,21} Nevertheless, Ethiopia is known for its high mortality rate in children <5 y of age, low level of healthcare seeking for childhood illnesses and low prevalence of women's empowerment.

Most studies on the relationship between women's empowerment and child health have employed childhood anthropometric indicators as the outcome variable. This study aims to assess the association of women's empowerment with healthcare seeking for diarrhoea, fever and ARI symptoms, the three major causes of mortality in children <5 y of age. To our knowledge, no previous study has examined the relationship between women's empowerment and healthcare seeking for illnesses in children <5 y of age.

Methods

Source of data

This study employed a retrospective cross-sectional survey data analysis using the Kids Recode (KR) dataset from the 2016 EDHS.²⁰ All women 15–49 y of age were eligible to be interviewed. The sampling frame for the survey was the 2007 Population and Housing Census (PHC) frame, which contains a complete list of all census enumeration areas (EAs). The sample was stratified (urban and rural) and selected in two stages. At the first stage of sampling, a total of 645 (202 urban, 443 rural) EAs were selected using the probability proportional to size selection technique. A fixed number of 28 households per cluster was chosen in the second stage.

Table 1. Domain-based women’s empowerment indicator variables and definitions.

Domain	Indicator	Definition of empowered
Decision making (3 items)	Decision on large household purchase	The woman participates in decisions on large household purchases alone or jointly with her partner
	Decision on own healthcare	The woman participates in decisions on her own healthcare alone or jointly with her partner
	Decision on visit to family/relatives	The woman participates in decisions on visits to her family or relatives alone or jointly with her partner
Attitude towards wife-beating (5 items)	Woman argues with her husband	The woman thinks that wife-beating is not justified if the woman argues with her husband
	Woman neglects the children	The woman thinks that wife-beating is not justified if the woman neglects the children
	Woman goes out without telling her husband	The woman thinks that wife-beating is not justified if the woman goes out without telling her husband
	Woman burns food	The woman thinks that wife-beating is not justified if the woman burns food
	Woman refuses to have sex with her husband	The woman thinks that wife-beating is not justified if the woman refuses to have sex with her husband
IEC indicators (6 items)	Newspaper	Reads the newspaper sometimes
	Television	Watches television sometimes
	Education level	Education level secondary and above
	Radio	Listens to radio sometimes
	Bank account	Has a bank account
	Cell phone	Has a cell phone
Durable asset ownership (2 items)	House	Owns house alone or jointly with her partner
	Land	Owns land alone or jointly with her partner

Data collection took place from 18 January 2016 to 27 June 2016. It was done with a face-to-face interview using a computer-assisted personal interviewing data collection system. A total of 15 683 women were interviewed, with a 95% response rate. Information on the health status of children was collected from these women. The survey used specially constructed weights for the sample selection. The women’s individual sample weight was used for this study.²⁰ Ethiopia conducted a mini-DHS in 2019. However, the survey did not collect data on women’s empowerment and childhood illnesses.

Measurements and variables

Outcome variable

The outcome variable for this study was utilization of healthcare services for the illnesses of diarrhoea, fever and ARI symptoms in children <5 y of age that occurred in the 2 weeks before the 2016 EDHS. Initially, health seeking for each illness was recoded as ‘yes’ (value 1) if women sought healthcare and ‘no’ (value 0) otherwise. The results were then merged to produce the total number of illnesses in children <5 y of age for which women sought healthcare. The values range from 0–3 (0, women did not seek healthcare for any illness; 3, women sought healthcare for all illnesses).

Predictor variables

The main predictor variable for this study was women’s empowerment. Based on a literature review and relevance to Ethiopia, 21 variables were initially identified as women’s empowerment indicators. Then, data screening and transformation was done to test for the adequacy of each selected variable. Five variables—respondent participates in decisions on spending husband’s earnings, participates in decisions on spending her own earnings, is employed in a regular paid job, is covered by health insurance and whether the husband helps with household chores—were excluded from this study mainly due to the small sample size and associated high missing values. Accordingly, the total number of women’s empowerment indicator variables was reduced to 16.

Following the data management, principal component analysis (PCA) was done using oblimin rotation to identify the components and the variables that aggregate the evidence within each women’s empowerment domain. Correlation analysis was done to test if the variables were fit to be used for PCA. The PCA (supplemented by parallel analysis) clustered the variables into four empowerment components: decision-making, attitude towards wife-beating, information education and communication (IEC) and durable asset ownership (Table 1).

Items in each domain were then merged and transformed into dichotomous yes/no variables to produce domain-based

women's empowerment indicators. For this study, a woman is considered empowered if she is empowered with all items in each domain (fully empowered). For example, merger of the three 'participation in decision-making' women's empowerment indicator items produces a scale ranging from 0 to 3. Values of 0–2 were recoded as 0 (not empowered) and a value of 3 was recoded as 1 (empowered).

Covariates

Based on the literature review, maternal and child sociodemographic variables (age of the child, sex of the child, residence, household wealth), maternal obstetric factors (number of children living in the house, desire for more children) and the socioeconomic factor (access to healthcare is not a big problem) were included as covariate variables. Whether 'access to healthcare' is not a problem was converted into a dichotomous variable by amalgamating problems related to distance, money, permission and women not wanting to go alone. It was then assigned 'yes' (value 1) if the respondent had no problem and 'no' (value 0) if she had at least one such problem. Selection of the covariates was determined by availability of the variable in the dataset.

Statistical analysis

Following the PCA, a complex sample analysis plan was made specifying the sample weight for individual women, sample strata for sampling errors and the clusters variable based on the EDHS sample design information.^{20,22} Complex sample frequency, descriptive and crosstab were done to describe the sample by background characteristics and healthcare seeking for childhood illnesses. The bivariate χ^2 test was used to assess for the presence of statistically significant ($p < 0.05$) differences in health service utilization for childhood illnesses.

Univariate and multivariate complex samples ordinal regression analysis (CSORDINAL) was done to measure the predictors effect size on the outcome variable, with the corresponding cumulative odds ratio (cuOR) and 95% confidence intervals (CIs). The Taylor series linearization method was used for variance estimation. No observation deletion or suppression was made in the analysis.²³ Data analysis was done using Statistical Software for Social Sciences version 27 (IBM, Armonk, NY, USA).

The EDHS collected data from women currently married or living with a man for its assessment of the women's empowerment indicator 'participation in household decision-making'. Accordingly, our study was limited to this subpopulation of respondents.

Results

Descriptive analysis

There were 9894 (unweighted) children <5 y of age living with mothers currently married or in union. The majority (67.9%) of the children had mothers fully empowered with household decision-making, while only 1.6% were from women fully empowered with the IEC domain of empowerment (Figure 1).

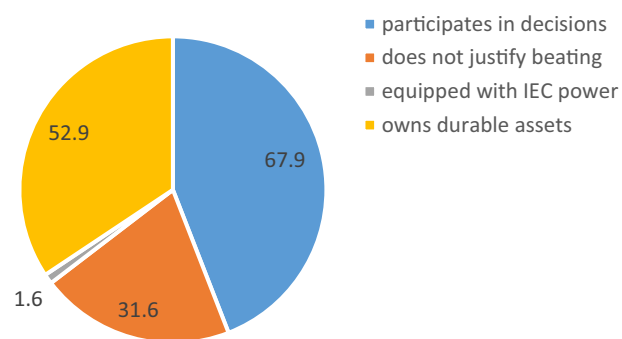


Figure 1. Percentage distribution of children <5 y of age by maternal empowerment status.

Table 2. Description of the study sample by healthcare utilization for illnesses in children <5 y of age.

Descriptive features	Children received care by type of illness, %		
	Diarrhoea (n=1157)	Fever (n=1390)	ARI (n=656)
Healthcare seeking	44.5	35.3	29.6
Healthcare sought on the same or next day		14.9	
ORS given	29.1		
Zinc given	32.8		
Antibiotic given		28.5	

No data for blank spaces.

Among these children, 11.7% (n=1157) had diarrhoea, 14.0% (n=1390) had fever and 6.6% (n=656) had ARI symptoms in the 2 weeks before the EDHS. Healthcare seeking was seen in 44.5% of children with diarrhoea, 35.3% of children with fever and 29.6% of children with ARI symptoms (Table 2).

Merging maternal healthcare seeking for each illness (diarrhoea, fever and ARI) returned 2268 (unweighted) cases; because it is the mother who sought healthcare for these children, the number (2268) also represents mother-child pairs of cases. While 61.9% of the cases received no healthcare, 2.9% received healthcare for three childhood illnesses (Table 3). Among these children, 66.7% (n=1513) had one childhood illness, while 7.9% (n=179) experienced all three illnesses in the 2 weeks before the survey. As the number of illnesses encountered increased, maternal utilization of healthcare for at least one childhood illness increased as well (Table 3).

Among the 2268 children, 51.9% were male and 89.3% were rural residents. The magnitude of women's empowerment, stratified by healthcare seeking for illness in children <5 y of age, showed a slight change compared with the magnitude from the complex sample descriptive frequency. In the χ^2 test, women's empowerment with attitude towards wife-beating and ownership of durable assets domains showed a significant relationship with healthcare seeking for illnesses in children <5 y of age (Table 4).

Table 3. Description of the sample by number of illnesses encountered and number who sought healthcare.

Illnesses encountered, n	Illnesses for which women sought healthcare, %				Total cases, N
	0	1	2	3	
1	68.5	31.5			1513
2	52.8	13.5	33.7		576
3	35.2	21.3	6.8	36.7	179
Total	61.9	26.1	9.1	2.9	2268

Table 4. Description of the study sample by background characteristics and the number of illnesses for which the respondent sought healthcare.

	Illnesses for which women sought healthcare, % (N=2268 unless indicated)				Total sample (%)
Predictors	0	1	2	3	
Empowerment indicators					
Participation in household decision			($\chi^2=1.12$, p=0.91)		
No	63.1	24.4	9.5	2.9	36.0
Yes	61.6	26.6	9.0	2.9	64.0
Does not justify wife-beating			($\chi^2=39.37$, p=0.00)		
No	66.3	24.1	7.4	2.2	68.3
Yes	52.4	30.5	12.8	4.4	31.7
Equipped with IEC power			($\chi^2=2.17$, p=0.57)		
No	62.3	25.8	9.1	2.9	98.6
Yes	53.3	26.9	16.8	3.0	1.4
Respondent owns durable assets			($\chi^2=20.78$, p=0.01)		
No	57.5	30.1	9.1	3.3	48.7
Yes	66.5	21.7	9.2	2.6	51.3
Sociodemographic indicators					
Age of child (months)			($\chi^2=20.68$, p=0.11)		
0–11	57.1	29.4	10.0	3.5	24.7
12–35	60.1	26.7	10.3	2.9	44.7
36–59	69.2	21.5	7.0	2.4	30.6
Sex of child			($\chi^2=0.72$, p=0.94)		
Male	61.3	26.5	9.4	2.9	51.9
Female	63.0	25.0	9.0	2.9	48.1
Residence			($\chi^2=50.54$, p<0.00)		
Rural	64.8	23.8	8.5	2.9	89.3
Urban	40.1	42.2	14.7	3.1	10.7
Household wealth status			($\chi^2=53.49$, p=0.00)		
Lower	67.7	22.8	7.2	2.2	43.0
Middle	66.5	21.8	7.0	4.8	21.4
Higher	52.7	31.7	12.9	2.7	35.6
Healthcare access not a problem			($\chi^2=54.54$, p<0.00)		
No	66.1	22.7	8.0	3.2	77.4
Yes	48.4	36.4	13.3	1.9	22.6
Children <5 y of age in the house, n (N=2229)			($\chi^2=24.60$, p=0.04)		
1	55.9	30.4	10.2	3.5	42.3
2	66.6	22.3	8.7	2.4	42.8
3–6	67.2	22.3	8.1	2.3	14.9
Desire for more children (n=2139)			($\chi^2=4.78$, p=0.50)		
No	64.7	23.9	8.8	2.6	38.0
Yes	59.7	27.3	10.0	3.1	62.0

Significant values in bold.

Table 5. CSORDINAL univariate regression analysis results.

Predictors	β	CSORDINAL univariate regression		
		cuOR	95% CI	TPL p-value
Empowerment indicators				
Participation in household decision				
No	0.07	1		0.95
Yes		1.08	0.82 to 1.41	
Does not justify wife-beating				
No	0.60	1		0.92
Yes		1.82	1.40 to 2.40	
Equipped with IEC power				
No	0.44	1		0.61
Yes		1.55	0.55 to 4.33	
Respondent owns durable assets				
No	−0.34	1		0.31
Yes		0.71	0.56 to 0.91	
Sociodemographic indicators				
Age of child (months)				
0–11		1		0.99
12–35	−0.48	0.62	0.44 to 0.87	
36–59	−0.12	0.89	0.66 to 1.21	
Sex of child				
Male	−0.06	1		0.95
Female		0.94	0.73 to 1.21	
Residence				
Rural	0.91	1		0.05
Urban		2.50	1.81 to 3.44	
Household wealth status (lower, middle, higher)	0.32	1.37	1.18 to 1.60	0.41
Healthcare access not a problem				
No	0.66	1		0.03
Yes		1.93	1.47 to 2.55	
Children <5 y of age in the house (1, 2, 3–6)	−0.29	0.75	0.62 to 0.91	0.68
Desire for more children				
No	0.21	1		0.95
Yes		1.23	0.92 to 1.65	

TPL: test of parallel lines.

Numbers rounded to the nearest two decimals.

Significant values in bold.

CSORDINAL univariate regression

Children whose mothers were empowered with attitude towards wife-beating had an increased probability of receiving healthcare for all childhood illnesses in the univariate regression ($\beta=0.60$, cuOR 1.82, $p<0.01$). Maternal ownership of durable assets, however, was found to have opposite effect ($\beta=-0.34$, cuOR 0.71, $p=0.01$) (Table 5).

CSORDINAL multivariate regression

A total of 2101 children were included in the CSORDINAL multivariate model, with a 7.4% missingness rate. Children whose mothers were empowered with an attitude towards wife-beating were found to have a 59% greater probability of receiving health-

care services for all the illnesses in children <5 y of age ($\beta=0.46$, cuOR 1.59, $p<0.01$). Children of mothers with no healthcare access problems were also more likely to receive health services for all illnesses in children <5 y of age ($\beta=0.42$, cuOR 1.52, $p=0.01$) (Table 6).

DISCUSSION

This study assessed the relationship between women's empowerment and healthcare seeking for diarrhoea, fever and ARI symptoms, the three common causes of childhood mortality. Our findings indicated that the prevalence of care seeking for childhood illnesses ranged from 30% to 45%. Less than 33% of the

Table 6. CSORDINAL multivariate regression analysis results.

Predictors	β	CSORDINAL multivariate regression	
		cu-OR	95% CI
Empowerment indicators			
Participation in household decisions			
No	−0.05	1	
Yes		0.95	0.72 to 1.23
Does not justify wife-beating			
No	0.46	1	
Yes		1.59	1.20 to 2.10
Equipped with IEC power			
No	−0.48	1	
Yes		0.62	0.21 to 1.85
Respondent owns durable assets			
No	−0.26	1	
Yes		0.77	0.59 to 1.02
Sociodemographic indicators			
Age of child (months)			
0–11		1	
12–35	−0.39	0.67	0.47 to 0.97
36–59	−0.06	0.94	0.68 to 1.31
Sex of child			
Male	−0.11	1	
Female		0.90	0.69 to 1.17
Residence			
Rural	0.38	1	
Urban		1.46	0.91 to 2.35
Household wealth (lower, middle, higher)	0.12	1.13	0.91 to 1.37
Healthcare access not a problem			
No	0.42	1	
Yes		1.52	1.10 to 2.09
Children <5 y of age in the house (1, 2, 3–6)	−0.16	0.85	0.71 to 1.03
Desire for more children			
No	0.11	1	
Yes		1.12	0.83 to 1.49

p-Value for test of parallel lines=0.07.

Numbers are rounded to nearest two decimal places.

Significant values in bold.

children received ORS, zinc or antibiotics for their illnesses. The prevalence of healthcare seeking in our study is lower than in the UNICEF report for SSA (46–60%)⁵ and the ecological study report for the region (49%).⁴ However, our findings are better than similar research from Nigeria and Kenya.^{6,7} The rationale for the variation in findings could be due to the difference in health awareness, socio-economic status and women's empowerment status.

The results from the CSORDINAL multivariate analysis showed that women's empowerment with attitude towards wife-beating has a positive effect on healthcare utilization towards all diseases in children <5 y of age. This is in line with other studies^{14–19} that indicated women's empowerment has a protective effect on childhood malnutrition. However, the outcome vari-

able for our study was health seeking for illnesses in children <5 y of age. hence caution should be exercised when comparing.

The women's empowerment indicators—participation in household decision-making, ownership of durable assets and IEC power—were found to have no significant association with health seeking for illnesses in children <5 y of age in the final multivariate model. This finding is similar to that of a study from Zimbabwe,¹¹ which indicated that women's empowerment with decision-making or maternal ownership of durable assets had no significant association with both childhood vaccination uptake and treatment for diarrhoea.

However, the research findings above deviate from the underlying theoretical foundation of women's empowerment.^{8–10}

The absence of standard measurement indicators of empowerment may contribute to the deviation of the research findings in general. Another possible explanation for the finding related to the empowerment indicator ‘participation in household decision-making’ may lie in the definition of the indicator itself. A woman is said to be empowered if she makes decisions alone or jointly with her partner. Joint decision-making could be considered communicative, participatory and equitable. However, the degree of women’s involvement that qualifies a ‘joint decision-making’ cannot be quantified objectively. This could introduce research bias. Accordingly, we suggest that although some household issues require couple’s joint decision-making, independent decision-making by women alone should be considered as a women’s empowerment indicator. Social desirability bias, where the respondent answers as if she were participating in household decision-making, but in reality she did not, might be another source of bias for the findings.

Some authors classify women’s empowerment variables as empowerment indicators and empowerment enablers: participation in household decision-making and attitude towards wife-beating are usually considered as empowerment indicators by researchers.^{11,12,24} Our finding that maternal ownership of durable assets and IEC power had no significant association with care seeking for illnesses in children <5 y of age could indicate that owning empowerment enablers does not directly translate to women’s empowerment. Especially in Africa, that a woman in a union owns durable assets does not necessarily mean that she is able to give away, rent out, sell or buy more assets alone or jointly. Less than 2% of the respondents in this study were fully empowered in the IEC domain of women’s empowerment. This low level of women’s empowerment status could affect the power of the test as well.

Our study found that a unit increase in age of children ages 12–35 months significantly decreases the probability of healthcare seeking towards all illnesses in children <5 y of age compared with children ages 0–11 months. However, a similar decreasing trend was observed for children ages 36–59 months compared with those ages 0–11 months. This may indicate that mothers are more sensitive to the illnesses of younger children compared with the older age groups.

As the number of children <5 y of age living in the household increases, healthcare seeking was found to decrease significantly. This may be due to higher socio-economic demands related to providing care for many children in the house. The study also showed that respondents with no healthcare access problem were more likely to seek care towards all illnesses in children <5 y of age.

Strengths and limitations of the study

This study tried to address the research gap on the relationship between women’s empowerment and healthcare seeking for diarrhoea, ARI symptoms and fever, the three major causes of mortality in children <5 y of age. This makes our research the first of its kind. We extracted data from the EDHS 2016 Kids Recode dataset for this study. The findings can therefore be inferred as the health-seeking behaviour of mothers for illnesses in children <5 y of age in Ethiopia. Lack of standard women’s empowerment indicators is a limitation of this study. We also cannot establish

a cause-and-effect relationship from a cross-sectional research design.

Conclusions

This study revealed that women’s empowerment has a significant association with maternal healthcare seeking for illnesses in children <5 y of age. The findings indicate that a lack of empowerment not only affects the life of the victim, it is also significant to others in the household, including children. It implies that empowering women is empowering the family. Hence, for women to make autonomous strategic life decisions, including healthcare seeking for children, significant attention should be given to women’s empowerment. We believe that understanding and addressing deterrents to maternal healthcare seeking behaviour could contribute significantly to the prevention and control of childhood mortality in SSA.

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Competing interests: None declared.

Ethical approval: The study used publicly available, de-identified and de-linked Kids Recode EDHS dataset from the DHS/ICF Macro international data repository.²⁰ Online registration and submission of the study protocol were performed to obtain permission to use the dataset from Measure DHS/ICF International program. The Addis Ababa University School of Nursing and Midwifery and the College of Health Sciences Ethics Review Committee reviewed and approved the study protocol (09/2023, 25 October 2023).

Data availability: The dataset used for this study is available from <https://dhsprogram.com>. Accessing the dataset requires registration and submission of research protocols. Further information about the data can be found at <https://dhsprogram.com/data/Access-Instructions.cfm>.

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Intimate Partner Violence Among Women in Ethiopia: Is Women Empowerment Protective?

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Abstract

Background: Intimate partner violence (IPV) is the most common form of violence against women (VAW). Close to 33% of ever-partnered women have experienced some form of IPV in Sub Sahara Africa (SSA). IPV could be prevented through different strategies including women empowerment. Empowerment is a process of change by which those who have been denied the ability to make strategic life choices regain their autonomy.

Method: We used data from the 2016 demographic and health survey Ethiopia (EDHS) for the study. We performed a complex sample cluster analysis to assess the relationship between women empowerment and IPV (emotional, sexual, and physical). Adjusted odds ratio (aOR) and 95% confidence interval (CI) was used to estimate effect size.

Result: A total of 3689 (weighted) respondents were included in the study. We found three empowerment clusters using the K-means cluster analysis. Women in the most empowered cluster were 69% less likely to experience emotional IPV compared to the least empowered cluster (**aOR: 0.31, CI: 0.17-0.53**). However, no significant relationship was found between women empowerment and sexual or physical partner violence.

Conclusion: Our study found that empowerment plays a crucial role in protecting women from experiencing emotional intimate partner violence (IPV). We recommend adopting comprehensive empowerment strategies that strengthen women's autonomy and enable them to live free from partner violence.

Key words: EMPOWERMENT, IPV, VAW, VIOLENCE, WOMEN.

I. INTRODUCTION

Violence against women (VAW) is a significant public health problem and a fundamental violation of women's rights ¹. It is a manifestation of historically unequal power relations between men and women ². Intimate partner violence (IPV) is the most common form of violence against women ³⁻⁴. Close to 33% of ever-partnered women aged 15-49 in SSA have experienced some form of intimate partner violence, compared to the global 27% ¹. Intimate partner violence (IPV) refers to any behavior within an intimate relationship that causes physical, psychological, or sexual harm to those in the relationship ^{1,3}.

Women who experience IPV are more likely to have adverse health outcomes including unwanted pregnancy, abortions, still-birth, depression, HIV, and homicide and/or suicide ^{3,5-10}. Children who witness IPV are also more likely to develop anxiety, depression, poor school performance, low self-esteem, and death in extreme cases ^{3-4,11}.

Different theories and models explain the primary behavior drivers of violence perpetrators; ranging from patriarchy and male dominance of the feminist model, to prior experiences of violence and unequal resources in relationships of the sociological model ¹²⁻¹⁵. The social-ecologic model, however, provides a more comprehensive picture delineating violence triggering factors at individual, relationship, community, and societal levels ¹⁶⁻¹⁷.

Partner violence is not an inevitable societal problem, however. The attitude, behavior, socioeconomic, and politico-cultural conditions that lead to violence can be changed through primary, secondary and tertiary prevention public health intervention measures ³⁻⁵. Women empowerment plays a vital role in this regard. Empowerment is a process of change by which those who have been denied the ability to make strategic life choices regain their autonomy ¹⁸⁻²¹. This involves making choices and decisions to shape one's social, economic and political life dimensions ¹⁸⁻²¹.

Empowerment is a complex multidimensional concept grouped under three pillars: (1) Resources; The financial, physical, human, and social capital that enable choice, (2) Agency; The capacity to make decisions about one's own life freely. Self-efficacy; The belief in one's ability to act effectively towards a goal, and (3) Context; The social arrangements, mainly norms and institutions necessary to express agency and assert control over resources ¹⁸⁻²¹. Empowerment entails removing the barriers to achieving these pillars ¹⁸⁻²¹.

It is a contextual notion as well- because the sociocultural, political, and economic conditions vary across societies and over time. Thus, empowerment programs/indicator might not have a similar outcome across nations ²²⁻²³. This makes it difficult to have a standard measurement indicator and understand its magnitude globally ²²⁻²³. However, a recent report indicated that, on average, only 60.7 percent of women internationally are empowered to achieve their full potential ²⁴. The equivalent women empowerment figure for SSA is 49.8 percent, compared to 76.3 percent for Europe and Northern America. The report covered 114 countries using ten indicators from five women empowerment dimensions ²⁴. Women empowerment is one agenda of the 2030 Sustainable Development Goal 5- Achieve gender equality and empower all women and girls ^{18-19,22}.

Women empowerment plays a vital role in the prevention and control efforts of partner violence. A systematic review and meta-analysis of 19 randomized controlled trials in low- and-middle income countries indicated women economic empowerment to have a significant deterring effect on all forms of IPV - emotional, sexual, and physical ²⁵.

A study done using 25 DHS data sets from 15 countries indicated women higher levels of education and increased household wealth significantly reduces IPV ²⁶. The study used household wealth, education level, employment status, type of earning, and income related decision participation as women economic empowerment indicators.

Other studies also report similar finding. In Zimbabwe, economic empowerment and women freedom of movement was found to have a significant protective effect from all forms of emotional violence ²⁷. A study in India indicated participation in household decision-making and mobile phone ownership significantly reduced IPV ²⁸. The study used participation in major household decisions, employment and earning in cash, ownership of house/land, having a bank account, and owning a mobile phone as women empowerment indicators.

However, research findings on women empowerment and IPV are mixed. In other studies, employment and earning more than the partner ²⁶, ownership of durable asset ²⁸, participation in a gender and entrepreneurship training program ²⁹, participation in decision making ³⁰⁻³¹, and economic independence ³², were found to significantly increase women risk of IPV.

Empowerment allows women to exercise their rights fully and independently, while IPV denies women of their right. Majority of women in Ethiopia, however, are far behind achieving their full empowerment potential and suffer from IPV. According to the 2016 EDHS report, 63% of reproductive age women in Ethiopia are not fully empowered with attitude towards wife beating- the respondents justify at least one wife beating specified reason. In addition, only 70.6% of currently married women participated in all three household decision making areas; own health, large house-hold purchase, and family visit. The report also indicated the current and ever experience of IPV among reproductive-age women was 27% and 34%, respectively ³³.

Ethiopia has adopted a number of women empowerment strategies. The 1997 Constitution, the National Policy on Women, the Family Law, the Growth and Transformation Plan (GTP), and the 2015 Proclamation- which requires women's issues be included in policies, laws, and development programs and projects- are among the national endeavors on women empowerment ³³. However, low women empowerment status and high IPV prevalence are still major public health concerns in the country.

Previous studies usually modeled women empowerment either with empowerment percentile or dichotomous empowerment indicator variables-mostly economic empowerment indicators. Our study, however, used a cluster based women empowerment approach utilizing national context variables classified in to four domain structures using the most recent EDHS data set. To the best of our knowledge, no previous research addressed the relationship between women empowerment and IPV using a similar approach.

II. Material and method

2.1. Source of data

We used data from the 2016 EDHS for this study ³³. The data set is de-identified, de-linked and available for public use. Data collection was conducted from January 18 to June 27, 2016. The survey employed multistage stratified cluster sampling technique to collect data in two stages. A total of 645 (202 urban and 443 rural) enumeration areas (EAs) were selected independently in each stratum in the first stage with probability proportional to EA size. House-hold listing and selection of a fixed number of 28 households per cluster was done in the second stage ³³. Face-to-face interview data collection technique was employed using computer-assisted personal interviewing data collection system (CAPI).

The target groups included women aged 15-49 across Ethiopia. The survey interviewed a total of 15,683 women and achieved a 95% response rate ³³. With regard to women empowerment, all women were eligible for the attitude towards wife beating empowerment information; currently married or in-union women were the targets to collect data on participation in house-hold decision making. Partner violence related information was collected from currently and/ or ever married/in-union women. Only one woman per household was selected for the IPV interview using specially constructed weights to adjust for the selection and produce a nationally representative sub-sample for the violence module ³³.

The 2016 EDHS is the 4th and most recent standard demographic and health survey (DHS) available for public use. Ethiopia has conducted Mini DHS and collected information on key performance indicators in 2019. However, the survey did not collect data on domestic violence.

2.2. Measurement of variables

2.2.1. Outcome measurement

The outcome variable for this study is maternal experience of partner violence. The 2016 EDHS employed 13 measurement items- divided in three sub scales-to quantify IPV for currently or ever partnered women. Maternal experience of **emotional violence**: has three items; 1. Say or do something to humiliate you (the woman) in front of others, 2. Threaten to hurt or harm you or someone close to you, and 3. Insult you or make you feel bad about yourself. The **sexual violence** sub-scale also has three items; 1. Physically force you to have sexual intercourse with him even when you did not want to, 2. Physically force you to perform any other sexual acts you did not want to and, 3. Force you with threats or in any other way to perform sexual acts you did not want to. The **physical violence** sub-scale has seven items; 1. Push you, shake you, or throw something at you, 2. Slap you, 3. Twist your arm or pull your hair, 4. Punch you with his fist or with something that could hurt you, 5. Kick you, drag you, or beat you up, 6. Try to choke you or burn you on purpose, and 7. Threaten or attack you with a knife, gun, or any other weapon. The items in each sub-scale were then merged to produce a dichotomous ‘no’ (value ‘0’) or ‘yes’ (value ‘1’) IPV indicator index.

2.2.2. Predictor variable

2.2.2.1. Main predictor variable

The main predictor variable for this study is women empowerment. Based on the literature review and relevance to Ethiopia, we initially identified 19 empowerment indicator variables to be used for this study. Data screening and transformation was done to test for adequacy of each variable. Following the data management, Principal Component Analysis (PCA) was done using oblimin rotation to identify the components and variables that aggregate the evidence within each women empowerment domain. Correlation analysis was done to test if the variables were fit to be used for PCA. The PCA clustered the variables into four empowerment components (**Table 1**). Four variables (Woman reads newspaper/magazine at least once a week, is employed in regular paid job, is covered by health insurance, and whether the husband helps with household chores) were dropped off from inclusion in subsequent analysis mainly due to small Eigen-value (< 0.3) in the PCA communalities³⁴. Accordingly, the number of empowerment indicator variables was reduced to 15 (**Table 1**).

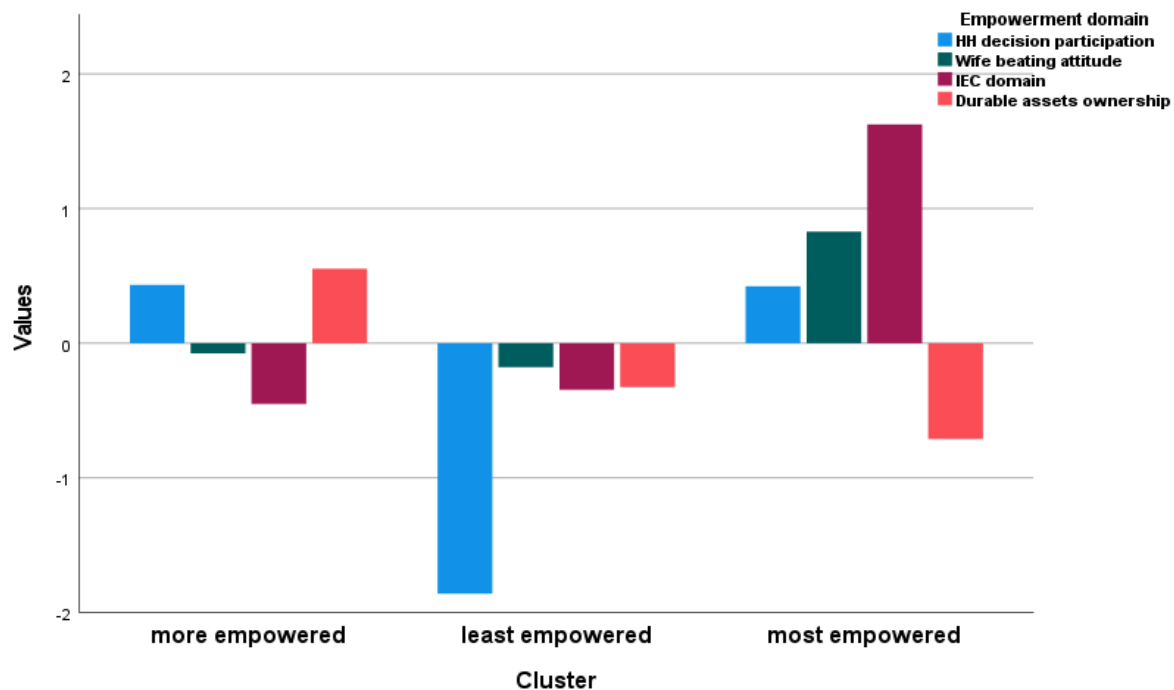
Table 1: Principal Component Analysis (PCA) based woman empowerment domains and empowerment variable definitions.

Empowerment domains and variable definition		
Domain	Indicator	Definition; Empowered Woman
Household Decision Making. # 03 item	Decision on large household purchases	The woman participates in decisions on large household purchases alone or jointly with her partner
	Decision on own health care	The woman participates in decisions on her own health care alone or jointly with her partner
	Decision on visit to family/relatives	The woman participates in decisions on visit to her family or relatives alone or jointly with her partner
Attitude towards wife-beating. # 05 item	Woman argues with her husband	The woman thinks that wife-beating is not justified if the woman argues with her husband
	Woman neglects the children	The woman thinks that wife beating is not justified if the woman neglects the children
	Woman goes out without telling her husband	The woman thinks that wife beating is not justified if the woman goes out without telling her husband
	Woman burns food	The woman thinks that wife beating is not justified if the woman burns the food
	Woman refuses to have sex with her husband	The woman thinks that wife beating is not justified if the woman refuses to have sex with her husband
Information Education and Communication (IEC) domain. # 05 item	Television	The woman watch TV sometimes
	Education level	The woman's education level is secondary and above
	Radio	The woman listens to radio sometimes
	Bank account	The woman has a bank account
	Cell-phone	The woman has cellphone
Durable asset ownership. # 02 item	House	The woman owns house alone or jointly with her partner
	Land	The woman owns Land alone or jointly with her partner

The variables in each component were then computed to form a domain based women empowerment indicators; participation in household decision domain had a scale ranging from **0 -3**, attitude towards wife beating **0-5**, IEC **0-5**, and ownership of durable assets domain scale **0-2**. The domains were then standardized to make appropriate comparisons. This was followed by k-means

cluster analysis to segment homogenous cases in to empowerment clusters (fig 1). The cluster analysis ANOVA table and the post hoc Tukey's HSD test was used to iteratively fix the number of clusters to three (fig 1).

Fig 1: Women Empowerment Clusters



Key: HH; Household, IEC: Information, education, and communication

2.2.2.2. Co-Variates

Drawing from the theories of violence and prior research findings, the following variables; partner drinks alcohol (no, yes), woman afraid her partner (no, yes), and woman father ever beat her mother (no, yes) were included as covariates in addition to the women Sociodemographics. The covariate, 'woman father ever beat her mother', was rephrased to 'childhood violence experience' for this study.

2.3. Statistical analysis

Following the K-means clustering, complex sample analysis plan was created using the sample weight for domestic violence, sample strata for sampling errors, and the clusters variable- in-line with how the EDHS data was collected ³³. Then, complex sample descriptive cross tabulations stratified by each outcome IPV subscale (emotional, sexual, and physical) was done.

To measure the effect size of each predictor variable, complex samples logistic regression analysis model (CSLOGISTIC) with the corresponding odds-ratio (OR) and 95% confidence interval (CI) was employed. Initially, only women empowerment clusters were tested for their effect on each IPV subscale (separately for emotional, sexual, and physical violence). This was followed by a separate full model analysis for each IPV sub-scale by adding the covariates to the main predictor variable. Taylor Series Linearization variance estimation method was used to produce design-adjusted standard errors. No observation deletion or suppression was made during analysis ³⁵.

Only women currently in union or living with a man were involved for the EDHS assessment of the empowerment indicator- participation in household decision making ³³. Accordingly, the analysis in this study was limited to this sub-population group. Data analysis was done using statistical software for social sciences (SPSS) version 27.

III. Result

3.1. Description of respondents by empowerment and IPV experience

A total of 3897 mothers currently married or living with a partner were included in the descriptive analysis. Majority (64.3%) of the respondents were in the middle (more empowered) cluster, while 16.0% were in the most empowered cluster (**Table 2**). Maternal experience of violence was 9.5, 21.9, and 22.7 percent for sexual, physical, and emotional IPV, respectively. Women in the most empowered cluster had the lowest violence experience in all the three IPV subscales. Moving from the highest to the lowest empowerment clusters, maternal experience of violence showed an increasing trend for all IPV subscales (**Table 2**).

Table 2: Description of respondents by empowerment and intimate partner violence experience

S.No	Descriptive features	Sample size (n)	Emotional IPV yes (%)	Sexual IPV yes (%)	Physical IPV yes (%)
I	Women empowerment clusters				
	Most empowered	625	11.0	4.6	12.8
	More empowered	2504	23.5	10.4	23.4
	Least empowered	768	29.9	10.8	24.4
II	IPV correlates				
	Woman afraid her partner				
	No	1474	12.4	4.4	11.4
	Yes	2423	29.0	12.7	28.3
	Childhood violence experience				
	No	2625	17.9	8.0	17.1
	Yes	1064	34.4	12.5	34.4
	Partner drinks alcohol				
	No	2750	18.9	7.6	18.2
	Yes	1147	31.9	14.2	30.7
III	Women sociodemographic				
	Age group				
	15-29	1717	19.1	9.2	21.2
	30-39	1458	24.5	9.4	22.2
	40-49	722	27.8	10.6	23.0
	Region				
	Agrarian	3540	23.5	10.2	22.7
	Pastoralists	207	12.6	2.4	10.5
	City dweller	150	17.5	3.5	18.0
	Residence				
	Rural	3265	24.1	10.6	23.7
	Urban	632	15.7	3.9	12.4
	Wealth index				
	Lower	1540	25.2	12.7	24.1
	Middle	799	24.9	10.5	24.7
	Higher	1558	19.2	5.9	18.3

3.2. Univariate CSLOGISTIC regression analysis.

In this analysis, the effect size of the main predictor variable was assessed by adding to the model only the women empowerment clusters with each IPV subscale. The first CSLOGISTIC univariate model tested the effect of the main predictor variable on emotional IPV, the second on sexual, and the third on physical IPV. The result showed women in the most empowered cluster enjoyed a significant protection from all IPV sub-scales. These women were more than 50% less likely to experience any of the partner violence sub-subscales compared to women from the least empowered cluster (**Table 3**).

Table 3: Univariate CSLOGISTIC regression analysis result on the relationship between women empowerment and IPV subscales.

Empowerment clusters	Univariate CSLOGISTIC regression models					
	Emotional IPV		Sexual IPV		Physical IPV	
	COR	95% CI	COR	95% CI	COR	95% CI
Most empowered	0.29	0.19-0.44	0.39	0.19-0.82	0.45	0.31-0.67
More empowered	0.72	0.54-0.96	0.96	0.63-1.47	0.95	0.71-1.28
Least empowered	1.00		1.00		1.00	

3.3. Multivariate CSLOGISTIC regression analysis

A total of 3689 (weighted) women currently married or living with a partner were used in the CSLOGISTIC cluster analysis with a 5% missingness rate. We performed three separate multivariate logistic regression analysis and assessed the relationship between women empowerment and each IPV sub-subscale controlling for the covariates: model I for emotional IPV, model II for sexual, and model III for physical IPV. Women empowerment was found to have a significant protective effect on emotional IPV. Women in the most empowered cluster were 69% less likely to experience emotional IPV compared to the least empowered cluster counterparts (**aOR: 0.31, CI: 0.17-0.53**). However, we found no significant relationship between women empowerment and sexual or physical partner violence.

The finding for the covariates: woman afraid her partner, childhood violence experience, and partner drinks alcohol was unprecedented. Women empowered with either of the covariates (who said ‘no’ for either of the variable dichotomies) were significantly protected from all IPV sub-scales (**Table 4**).

Table 4: Multivariate CSLOGISTIC regression analysis result on the relationship between women empowerment and IPV subscales.

S.No	Predictor	Multivariate CSLOGISTIC regression models					
		Emotional IPV		Sexual IPV		Physical IPV	
		aOR	95% CI	aOR	95% CI	aOR	95% CI
I	Empowerment clusters						
	Most empowered	0.31	0.17-0.53	1.02	0.42-2.46	0.81	0.50-1.30
	More empowered	0.82	0.60-1.12	1.12	0.70-1.77	1.21	0.88-1.66
	Least empowered	1.00		1.00		1.00	
II	IPV correlates						
	Woman afraid partner						
	No	0.34	0.25-0.47	0.29	0.18-0.45	0.29	0.20-0.42
	Yes	1.00		1.00		1.00	
	Childhood violence experience						
	No	0.43	0.33-0.56	0.66	0.44-0.98	0.42	0.32-0.55
	Yes	1.00		1.00		1.00	
	Partner drinks alcohol						
	No	0.38	0.29-0.49	0.40	0.27-0.58	0.38	0.29-0.50
	Yes	1.00		1.00		1.00	
III	Sociodemographics						
	Age group						
	15-29	0.66	0.48-0.91	0.94	0.57-1.54	1.05	0.72-1.54
	30-39	0.85	0.61-1.19	0.89	0.55-1.46	0.99	0.65-1.50
	40-49	1.00		1.00		1.00	
	Region						
	Agrarian	0.76	0.46-1.24	1.99	0.79-5.0	0.57	0.33-0.99
	Pastoralists	0.50	0.29-0.85	0.60	0.22-1.63	0.31	0.17-0.58
	City dweller	1.00		1.00		1.00	
	Residence						
	Rural	0.69	0.42-1.11	1.31	0.53-3.19	1.42	0.85-2.37
	Urban	1.00		1.00		1.00	
	Wealth index						
	Lower	1.23	0.85-1.78	1.99	1.24-3.20	1.25	0.90-1.73
	Middle	1.13	0.75-1.71	1.47	0.87-2.49	1.15	0.78-1.68
	Higher	1.00		1.00		1.00	

IV. Discussion

We performed a complex sample cluster analysis to assess whether women empowerment has a protective effect on maternal experience of intimate partner violence(IPV). We identified three clusters using the K-means cluster analysis with four standardized empowerment domains-participation in household decision making, attitude towards wife beating, IEC, and ownership of durable assets.

Only 16% of respondents were from the most empowered cluster. Women in this cluster were empowered with three of the four empowerment domains (participation in household decision making, attitude towards wife beating, and information, education and communication (IEC). The group had the highest IEC domain empowerment and the least durable asset ownership related empowerment compared to the other two groups. Women in the more empowered cluster were empowered with participation in household decision making and durable asset ownership. In the least empowered cluster, women were disempowered/least empowered with all domains. In this cluster, participation in household decision making takes the highest tall below zero compared to the other two groups.

Moving from the most empowered to the least empowered cluster, maternal experience of IPV showed an increasing trend for all the subscales in the descriptive statistics. This observation was supported by the univariate CSLOGISTIC regression where women in the most empowered cluster were found to be significantly protected from all forms of IPV subscales, compared to the least empowered cluster. Our finding is in-line with other studies that indicated women empowerment deters maternal experience of IPV.

The result from the multivariate CSLOGISTIC regression analysis showed women in the most empowered cluster are significantly protected from experiencing emotional IPV compared to those in the least empowered cluster. This finding is consistent with the studies that indicated women empowerment to significantly protect women from emotional IPV ^{25, 27}.

However, our finding is different from other studies ^{26, 28-32}. These studies indicated employment and earning more than the partner, ownership of durable asset, participation in a gender and entrepreneurship training program, participation in decision making, and economic independence significantly increased women risk of IPV. The variation in the findings could be attributed partially to the difference in women empowerment conceptualization and coding. While we employed cluster based empowerment category approach utilizing 15 empowerment variables structured in four domains, most of the above studies used few dichotomous variables as women empowerment indicator. The other possible explanation is the contextual nature of empowerment; women empowerment indicator variables could have different results across nations. The variation in findings could also be due-to the difference in the type of study population, sample size, and magnitude of the outcome variable.

We found no significant association between women empowerment and maternal experience of sexual and physical IPV. Other studies, however, indicated women empowered with participation in household decision making and attitude towards wife beating were significantly more likely to experience sexual and/or physical partner violence ³⁰⁻³¹. Among others, the complex and contextual nature of empowerment may underlie the findings in this two studies.

Our study also indicated that women who are not afraid of their partner, or whose partner does not drink alcohol, or those who had no childhood violence experience are significantly protected from all forms of IPV subscales. Although the variables are commonly cited to have significant violence protection effect, that each predictor protects all forms of partner violence is supreme. The finding suggests women empowerment program should also focus on building maternal self-confidence and male partner awareness creation on violence and the untoward effects of alcohol.

Most of the research studies we reviewed assessed the effect of women economic empowerment on IPV. This is so because many women empowerment programs also focus on economic autonomy. We believe that maternal economic wellbeing serves multiple purposes- including for the decision whether to leave the violent partner. However, we would like to underscore that the multidimensional nature of empowerment should be addressed in women empowerment programs as well.

4.1. Strength and limitation of the study

We used a complex sample cluster analysis to assess the relationship between women empowerment and maternal experience of intimate partner violence for the three sub-subscales. To our knowledge, this is the first ever study done utilizing a different conceptualization and coding of women empowerment approach using a national level data. Because our study is based on a cross-sectional survey data, we cannot establish a cause and effect relationship.

V. Conclusion

Our finding that empowerment protects women from emotional partner violence and that the most empowered cluster had the smallest number of respondents, calls for the implementation of more comprehensive empowerment strategies and programs that could empower women more and enable them to live free from partner violence. We believe that our finding would help scholars and policy makers to better understand the link between women empowerment and intimate partner violence. More research on empowerment and IPV is warranted to further uncover the relationship.

Authors contribution: BM, JNC, AG, and ND were involved in the research conceptualization, original draft preparation, manuscript review and editing. BM and JNC were involved in formal analysis, interpretation of data, and project administration. BM, JNC, and ND were involved in developing methodology of the research. All authors read and approved the final manuscript.

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Competing interests: The authors declare no competing interests.

Ethical approval: The de-identified data used in this study is a sub-set of publicly available data from the DHS/ICF Marco International as part of the global DHS program.³³ Permission to use the data set was obtained from measure DHS/ICF International program by registering and submitting the study protocol. No individual-level data are available in EDHS. This nested study was approved by the Addis Ababa University school of nursing and midwifery, and by the College of Health Sciences Ethics Review Committee (# 09/2023, Date: October 25, 2023).

Data availability: The dataset used for this study is available in the DHS repository (<https://dhsprogram.com>) up on registration and submitting research protocols. For further information about the data, please visit: <https://dhsprogram.com/data/Access-Instructions.cfm>.

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