

Intimate partner violence in pregnant women in Ethiopia: Occurrence, consequences and health care

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Dedication

I dedicate this thesis to women who experienced violence and shared their painful experience.

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Scientific environment

This PhD is a result of joint PhD degree programme through the collaboration of the School of Public Health, College of Medicine and Health Sciences, Hawassa University, Hawassa, Ethiopia and the Centre for International Health (CIH), Department of Global Health and Primary Care, Faculty of Medicine, University of Bergen (UiB), Bergen, Norway. The research for this PhD thesis was funded by the Norwegian Programme for Capacity Development in Higher Education and Research for Development (NORHED) through the Southern Ethiopia Network of Universities in Public Health (SENUPH) project: Improving women's participation in postgraduate education, under agreement ETH-13/0025. The coursework was done at both universities and the research was conducted in Ethiopia, with a main supervisor Professor Sven Gudmund Hinderaker from UiB and co-supervisor Associate Professor Ayalew Astatkie from Hawassa University.

Summary

Background

Pregnancy does not protect women from violence. Intimate partner violence (IPV) during pregnancy is associated with fatal and non-fatal ill health for both the mother and the newborn. Although several recent studies have linked IPV with depression, most of these were conducted in cities and institutional-based settings. Moreover, they focused on postnatal depression, making comparison difficult. As detailed information is needed to draw conclusions about what is specifically needed for each region, using validated tools to assess the magnitude and determinants of both IPV and antenatal depression is important. Women exposed to IPV may prefer to deliver at home, and few earlier studies, most of them institutional, show an increased risk of LBW in pregnancies exposed to IPV, although this association may be biased due to missing home deliveries and rural women. When addressing health care regarding IPV, it is known that health workers should be able to recognise signs of IPV and ensure that women who experience IPV receive appropriate care. Nevertheless, some health workers might not know how to respond and often think that reassurance is their only course of action. As a result, it could be that pregnant women who experience violence rarely receive support from health workers. It is therefore important to assess what they know and think about IPV.

Objectives

This study was conducted with the general objective of providing evidence valuable for the design of interventions that could help improve the health status of women and newborns as well as assess health workers' role in providing care to survivors of partner violence. The specific

objectives were to measure the prevalence and assess determinants of IPV and depression during pregnancy (Paper I); investigate the association between maternal exposure to IPV during pregnancy and birth weight within a community (Paper II); and assess knowledge and attitudes of health workers towards their professional roles and pregnant IPV survivors (Paper III).

Methods

To study pregnant women and their newborns, a total of 589 pregnant women with a gestational age of 25-34 weeks were recruited, and an interview about partner violence and depression was conducted during pregnancy at home when enrolled in a cross-sectional survey (Paper I). We followed up 505 pregnant women until after delivery, along with their newborns, which resulted in a prospective cohort study (Paper II) in purposively selected three rural and two urban Kebeles of Wondo Genet district. The birth weight of each baby was measured in grams by field assistants visiting the homes. We excluded twins and mother-baby pairs with late (i.e., invalid) birth weight measurements. In addition, a cross-sectional study of 139 randomly selected health workers working in primary health care units (12 health centres and 55 health posts located in 3 districts) was conducted using a self-administered questionnaire (Paper III).

Results

In Paper I, we found that IPV of any kind had been experienced by 125/589 (21%) of the pregnant women and around 40/589 (7%) experienced antenatal depression. Increased IPV was observed among rural women (adjusted odds ratio [AOR] = 2.1; 95%CI = 1.1–4.1) women whose pregnancy was not desired (AOR = 9.6; 95%CI = 3.4 – 27.0), women with low social support (AOR = 13.9; 95%CI = 7.0 – 27.8) and women with depression (AOR = 4.7; 95%CI = 1.4–16.2). Increased likelihood of depression was found among women who had been exposed to

IPV. Alcohol drinking by the husband appeared as a determinant of both. In Paper II, birth weight was assessed within 24 hours in 234/505 (46.3%) of the newborns, and between 24 and 48 hours in 243/505 (48.1%) of the. Mean birth weight was 3222 grams (range 2048 g to 4325 g). Mothers exposed to IPV had a 203 g lower (B -203 95% CI -320 to -87) birth weight for their newborns. Babies born at facilities had a higher birth weight. Low birth weight (LBW) (<2500 g) was found in 42/505 (8.3%). In Paper III (the study on health workers), nurses and midwives accounted for 54% of the total. Most (77%) of the participants reported having met a pregnant woman who had been exposed to IPV in their work. Few (13%) of the participants had received previous training regarding IPV. More than half of the participants were not confident about how to care for women exposed to IPV. One-third of the participants believed that they did not suspect IPV unless they saw physical injuries.

Conclusions

In the area studied, IPV during pregnancy is a public health concern. It was significantly associated with antenatal depression, and women exposed to IPV during pregnancy tended to have smaller babies than unexposed women. Furthermore, a higher proportion of health workers felt unprepared to provide care to survivors of IPV and would not consider IPV unless there was physical evidence. It is important to screen for IPV and depression at antenatal care visit. Informing the public about providing social support, the potential negative consequences of IPV, and the harmful effects of alcohol use is also essential. Moreover, the practice of identifying babies with lower birth weights at home should be emphasised and strengthened. Finally, training regarding when to suspect a woman has been subjected to violence, and what to do when IPV is reported, should be mandatory.

List of original papers

This thesis is based on the following original research papers, which are referred to in the text by their Roman numerals.

Paper I

Belay S, Astatkie A, Emmelin M, Hinderaker SG. Intimate partner violence and maternal depression during pregnancy: A community-based cross-sectional study in Ethiopia. PLoS ONE. 2019;14 (7):e0220003. [https://doi: 10.1371/journal.pone.0220003](https://doi.org/10.1371/journal.pone.0220003).

Paper II

Belay S, Astatkie A, Hinderaker SG. Birth weight was associated with maternal exposure to intimate partner violence during pregnancy in southern Ethiopia: A prospective cohort study. Front Public Health. 2022;10:960443. Epub 2022/11/22. doi: 10.3389/fpubh.2022.960443. PubMed PMID: 36407992; PubMed CentralPMCID: PMC9667023.

Paper III

Belay S, Astatkie A, Hinderaker SG. Health Workers' Knowledge and Attitude Towards Intimate Partner Violence: A Descriptive Study in Sidama Region, Southern Ethiopia. Journal of multidisciplinary healthcare. 2022;15:1175-85. Epub 2022/06/01. doi: 10.2147/jmdh.s361000. PubMed PMID: 35634567; PubMed Central PMCID: PMC9137946.

Abbreviations

ANOVA	Analysis of variance
ANC	Antenatal care
AOR	Adjusted Odds Ratio
B	Regression coefficient
BW	Birth Weight
CI	Confidence Interval
COR	Crude Odds Ratio
DHS	Demographic and Health Survey
EPDS	Edinburgh Postnatal Depression Scale
HEWs	Health Extension Workers
HSTP	Health Sector Transformation Plan
IPV	Intimate partner violence
IRB	Institutional Review Board
LBW	Low birth weight
LNMP	Last normal menstrual period
MSSS	Maternity Social Support Scale

MUAC	Mid upper arm circumference
NORHED	Norwegian Programme for Capacity Development in Higher Education and Research for Development
SENUPH	South Ethiopia Network of Universities in Public Health
SNNPR	South nations, nationalities and people region
SPSS	Statistical package for social sciences
WHO	World Health Organization

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Story

During our data collection, we met a 17 year-old pregnant woman, with only a primary education. She was a healthy young woman at 29 weeks gestation, and pregnant for the first time. The interview was done at her home and she said nothing about any violence initially. Later, when the data collector gave her multiple chances, she explained about the situation with violence, and asked for help. She was informed about health services and free legal advice and she was given a fee needed for transport.

During the follow-up at home, we heard that she was not in the household anymore and nobody could tell where she had gone.

1 Introduction

Violence against women (VAW) is defined as "any act of gender-based violence that results in, or is likely to result in, physical, sexual, or mental harm or suffering to women, including threats of such acts, coercion or arbitrary deprivation of liberty, whether occurring in public or in private life" [1]. VAW encompasses many forms of violence, including violence by an intimate partner (intimate partner violence), non-partner sexual violence, female genital mutilation, honour killings and the trafficking of women [2].

Intimate Partner Violence (IPV) has been acknowledged as a significant human rights issue characterised by physical, sexual or emotional abusive acts [3]. Physical violence is characterised by the following actions from one's partner: slapping with the palm of the hand; forcing something to fall on someone that could cause harm; pushing, hitting with a fist or some other object; kicking, dragging or beating; purposively choking or burning; or using or trying to use weapons to cause harm. Sexual violence occurs when the partner physically forces sexual intercourse; compels unwanted sexual intercourse due to fear consequences; or forces someone to engage in a sexual act they find shameful. Emotional violence, on the other hand, is when a partner insults someone or makes them feel bad about themselves; belittles or humiliates someone in front of other people; does things that frighten or intimidate; or tries to harm someone the victimised partner cares about [4]. A publication by the United Nations in 1993, suggested countries to treat violence as a criminal act. Moreover, the forty ninth World Health Assembly in 1996 passed a resolution declaring "violence a major and leading public health problem across the world" [5].

1.1 Burden of intimate partner violence

Global estimates from 2018 indicate that 27% (UI 23–31%) of ever-married/partnered women aged 15–49 years have been subjected to physical and/or sexual violence from a current or former husband or male intimate partner at least once in their lifetime. The regions of Southern Asia (35%) and Sub-Saharan Africa (33%) have the highest prevalence rates of lifetime IPV next to Oceania. The lowest rates were observed in Europe, Asia, Australia and New Zealand [6]. A cross-sectional study conducted in three regions of China in 2018 found a lifetime IPV prevalence of 52% [7], and a Nigerian study reported a prevalence of 24% [8]. Furthermore, the lifetime IPV prevalence for Ethiopia was estimated to be 37% [6]. A study that examined data from the national health surveys of 46 low-income and middle-income countries assessed prevalence and inequalities in recent IPV among ever-partnered reproductive aged women, reporting huge disparities across and within countries. In most countries, greater IPV exposure was observed among poorer, younger and rural women [9]. The difference in magnitude of IPV in different regions and countries of the world, and even in different places within the same country, might be due to the use of different settings and samples. In addition, gender-biased attitudes that support IPV in some societies might also influence the results. Some women even justify wife beating by husbands when it occurs as a result of, for example, burnt food, arguments, refusal of sexual intercourse or child neglect. In some circumstances, the percentage of those who justify wife beating is lower in men than in women [10,11].

Globally, as many as 38% of murders with women victims are committed by an intimate partner [12]. The number of women intentionally killed by their intimate partners in 2017 was 30,000, with Africa being the region with the largest number such instances [13]. In 2019, the 19th-

leading Level 2 risk factor for disability-adjusted life years (DALYs) globally was IPV, and it was responsible for 11.0% (95% UI 0.1–24.0) of DALYs, due to depressive disorders [14].

A new indicator proposed in 2021, considering the burden of IPV in women age 15 to 49, estimates the number of years women are expected to live with IPV (YLIPV). Globally, ever-partnered women aged 15 to 49 are expected to live with violence for 4.1 years (95% CI: 2.3-7.1), while in Africa this increases to 6 years (95% CI: 3.7- 9.2). In Ethiopia, a woman is expected to live with IPV for over 8 years on average, which amounts to 25.5% to 28.2% of their reproductive lifespan being spent as victims of physical and sexual IPV [15].

1.2 Intimate partner violence in pregnancy

Pregnancy does not protect women from violence. According to Md Jahirul Islam and colleagues, who examined reports of IPV in Bangladesh before, during and after pregnancy among 426 new mothers in the first 6 months postpartum, it occurs both during and after pregnancy [16]. Studies conducted in Japan and Nigeria also show that women who were exposed to IPV before pregnancy continued to suffer during pregnancy [17,18], but we could not find any papers where IPV started in a formerly peaceful relationship because of pregnancy.

A systematic review of mainly African studies on IPV against pregnant women reported a pooled prevalence of 15% with a range from 2% in Nigeria to 57% in Uganda [19]. The same country could also show different results. Various studies conducted among pregnant women in Ethiopia to assess the magnitude of IPV during the index pregnancy reported prevalence as low as 21% in Tigray [20] and as high as 59% in Bale [21] and Gondar [22]. Furthermore, a systematic review and meta-analysis of eight Ethiopian studies representing different regions reported a 26% pooled prevalence of IPV among pregnant women. The subgroup analysis of this study further

revealed that the highest prevalence was in the Oromia region (35%), followed by Amhara (29%) [23].

1.3 Risk factors for intimate partner violence

1.3.1 Age

A World Health Organization (WHO) multi-country study that assessed physical and or sexual violence in the past 12 months among women of reproductive age who had a partner showed similar risk factors across sites, where young age appeared a risk factor for IPV [24]. A community-based cross-sectional study conducted among 921 women who gave birth in the last 13 months in Rwanda reported increased exposure to sexual violence at younger age (age 15-30 years) [25]. On the contrary, a study conducted in Iran comparing IPV prevalence during the first pregnancy for both adolescents and adults reported no statistically significant difference in IPV prevalence between the groups [26]. Moreover, a secondary data analysis of a national survey among women of reproductive age in Ethiopia found older age was a risk factor for IPV [27].

1.3.2 Education

Higher education was identified as a protective factor for past-year physical and/or sexual IPV in a multi-country cross-sectional study in Asia, the Pacific and middle- and low income countries [28,29]. Another cross sectional study among married women of reproductive age in rural Bangladesh showed higher odds of having experienced physical or sexual IPV in the past year for women with no formal education [30]. A significantly increased risk of physical IPV was also observed during pregnancy among women with a lower than tertiary level education in Iran [31]. A similar result was demonstrated in a systematic review of studies conducted in Sub-Saharan African countries [32]. Moreover, a greater prevalence of IPV was also observed among

pregnant women and their partners with no education in a systematic review that assessed factors associated with IPV among pregnant women in Ethiopia [33].

1.3.3 Parity

In a cross-sectional study among postnatal women admitted to a hospital for delivery, IPV was reported in a higher proportion among women with two or more children compared to those with one or none [34]. Similarly, a study by Haron K and colleagues in Malaysia found an increased risk of IPV during pregnancy in women who had higher parity [35]. The increased IPV in women with higher parity might be due to having a violent partner who does not allow contraception. For instance, a survey indicated that unwillingness to use birth control by the partner was positively associated with IPV, and this increased with parity [36]. However, a large study among women of reproductive age in rural Bangladesh found no association between IPV in the past year and parity [30].

1.3.4 Witnessing violence during childhood

There is evidence that growing up in a violent family increases a woman's likelihood of experiencing IPV in her own marriage. For instance, women who were raised in households with a history of IPV were more likely to experience IPV in the past year [30]. Similarly, a Kenyan study among pregnant women reported that women who witnessed maternal abuse in childhood were more likely to experience IPV during pregnancy [37]. A systematic review of Ethiopian studies, published in 2022, on the determinants of IPV during pregnancy also showed that women who grew up in a family exposed to IPV were more likely to experience the same in their own marriage [38].

1.3.5 Alcohol use by the women and partners

Few studies link alcohol use by women with experiencing IPV. In a meta-analysis, an increased likelihood of subsequent IPV was observed among women who consumed alcohol [39]. Substance use, specifically alcohol consumption by the partner, was identified as a risk factor for IPV during pregnancy [34]. Moreover, alcohol use by women was significantly associated with IPV during pregnancy in a systematic review of Turkish studies [40]. Individual studies conducted in Ethiopia [21,22], and a systematic review of Ethiopian studies [23,38], also mentioned alcohol use by the partner as one of the risk factors that increased IPV among pregnant women.

1.3.6 Social support

Social support refers to the social resources that involve emotional, informational, or instrumental factors that persons perceive to be available or actually provided to them [41] by family, friends, partners or professionals [42]. Various cross-sectional studies identified social support as a risk factor for IPV [25,43,44], where increased likelihood of IPV was observed as the social support score decreased [43]. Moreover, perceiving that the family of origin will not offer support in terms of communication was associated with an increased likelihood of IPV and repeated episodes of IPV during pregnancy [44]. However, a trial in rural Ghana investigated the impact of a maternal mental health intervention on IPV and whether social support mediates the intervention effects among women. The results indicate that social support did not mediate the intervention effects on IPV, and the intervention (improvement/increase in perceived social support) did not reduce women's odds of experiencing IPV [45].

1.3.7 Pregnancy desire

Unwanted pregnancy appeared as a risk factor for IPV in many studies, as well as a consequence of IPV in few studies. Unwanted pregnancy was significantly associated with the IPV of pregnant women [21,38,46]. In fact, a study in Spain reported an increased risk of unintended pregnancy in women exposed to emotional violence at the time of pregnancy [47].

Some studies mentioned additional risk factors for experiencing IPV such as unemployment [28], low income, the educational status of the partner and women with no salary of their own [22,40,48]. Furthermore, depression, attitudes justifying IPV, living in a crowded family, and migration [40,48,49] were also reported.

1.4 Consequences of intimate partner violence

1.4.1 Consequences of intimate partner violence on the mother

A number of substantial adverse health outcomes have been associated with IPV. On the maternal side, IPV affected woman's physical and mental health and resulted in poor utilisation of maternal health care, reduced sexual autonomy, increased risk for unintended pregnancy and abortions. The quality of life of IPV survivors could be impaired significantly by IPV.

Depression

Women battered as a result of IPV reported high levels of anxiety and depression that often led to alcohol and drug abuse [50]. A study conducted in Tanzania by Mahenge and colleagues showed significantly higher odds of depressive symptoms in women who experienced IPV during pregnancy [51]. In addition, a large community-based prospective cohort study conducted in rural south central Ethiopia reported higher IPV scores in pregnancy to be significantly

associated with a greater risk of incident or antenatal depressive symptoms [52]. Several studies also reported evidence in support of these associations [53,54]. The relationship between IPV and depression might be bidirectional, as one study indicated an increased likelihood of IPV in women with depression during pregnancy [55].

Poor utilization of maternal health care

A study that analysed nationally representative data from Malawi and India, and a small scale study conducted in the capital of Ethiopia among women residing in urban and rural areas, indicated that experiencing any type of IPV has been associated with the poor utilisation of maternal health care services, including initiation of first antenatal care (ANC), the use of the recommended number of ANC and delivery by a skilled attendant in a health facility [56-58]. On the contrary, no statistically significant associations between IPV and antenatal care usage was observed in a community-based cross-sectional study in Rwanda among women who gave birth within the past 13 months [25]. The lack of association could be due to a recall bias resulting from IPV assessment up to 13 months after delivery and the inclusion of women who had other relationships besides a wife/partner (18%).

1.4.2 Consequence of IPV on the fetus, neonate and later life

Low birth weight (LBW)

Reviews of observational studies reported that IPV experience during pregnancy increased the risk for LBW [59,60]. Analysis of secondary data from a national family health survey in India reported an increased risk of LBW among babies born from women who experienced IPV [61]. A Norwegian nationwide cohort study showed a significant association between IPV and birth

weight in crude analysis but it disappeared after adjustment with socio-demographic factors [62]. The lack of significant association in the Norwegian study is attested by the large sample size and might be related to a different setting with a lower prevalence of IPV during pregnancy. Few individual studies also reported an increased likelihood of LBW in pregnant women who experienced IPV [63,64]. Associations vary depending on the target population being studied, the setting and the timing at which data was collected. A meta-analysis involving studies conducted in developed countries, with a few studies from developing nations, also showed a significantly larger risk of LBW associated with antenatal depression [65]. Babies with LBW have in turn a higher risk of wasting, stunting and being underweight during childhood [66]. They also have increased risks later in life for being overweight, obese, and developing several diseases, including diabetes mellitus [67,68]. It was also indicated that physical violence during pregnancy was significantly associated with perinatal mortality and neonatal mortality. The significance remained unchanged after adjustment for socioeconomic and demographic variables [69].

Breast feeding and nutrition

Maternal exposure to any IPV, including any physical or sexual IPV, has been associated with a higher likelihood of giving their infant liquids and hence lower odds of exclusive breast feeding in the first 24 hours [70]. It was furthermore shown that mothers exposed to any IPV were less likely to initiate breastfeeding early and breastfeed exclusively in the first 6 months [71]. A Tanzanian study conducted among pregnant women showed that those exposed to IPV were more likely to terminate exclusive breastfeeding before the child was 6 months old compared to

women who were not exposed [72]. Another study found that maternal exposure to IPV was associated with a higher risk of stunting in children 18 to 36 months of age [73].

It was also reported that children whose mothers reported IPV exposure over longer periods (IPV exposure during pregnancy, infancy and early childhood) had an elevated risk for obesity at age 5 compared with those who had no IPV exposure [74]. A study in Bangladesh moreover found more stunting at the age of 15 in children of women with experience of any IPV before and / or during pregnancy compared to women with no experience of IPV [75].

Consequences of intimate partner violence for later life of baby

There is evidence for effects of IPV later in the lives of children who were living in a household with such experiences. A study that assessed adverse childhood experiences, including witnessing maternal abuse, as recalled by adult patients showed that adverse childhood experiences increased the risk for smoking, alcohol abuse, obesity, physical inactivity, use of illicit drugs and suicide attempts in adulthood. Those with adverse childhood experiences were twice as likely to be smokers, 12 times more likely to have attempted suicide, 7 times more likely to be alcoholic, and 10 times more likely to be injected street drug users compared with persons who had no adverse childhood experiences [76]. Furthermore, they are more prone to have higher levels of adulthood sleep disturbance [77].

A Filipino study investigated whether witnessing inter-parental violence affects young adults' relationships with experiences of psychological aggression with non-romantic close friends. Witnessing violence was so common that almost half of both males and females witnessed physical violence among their parents. Among males, witnessing maternal violence during

childhood significantly predicted their experience of psychological aggression, as both perpetrator and victim [78].

It is also observed that witnessing violence between parents is associated with experiencing IPV later in life. Among both female and male young adults, witnessing IPV between parents, where the perpetrator is either the mother, the father or both, predicted experiencing family intimidation and physical abuse [79].

The impact of IPV is multidimensional in that it affects not only the health of individuals but also exerts undue pressure on employment status and stability, which in turn affects families, communities and society at large. A longitudinal study that explored the impact of IPV on employment stability assessed 6 to 8 years later demonstrated a lower level of employment stability in women who experienced IPV [80].

1.5 Maternal response to intimate partner violence

The responses by IPV survivors can be categorised as seeking help, support and protection from friends, family, health workers and police; tolerating/living with IPV; and in extreme cases, attempting or committing suicide.

1.5.1 Seeking help, support and protection

A systematic review of qualitative studies in South Africa, conducted to identify how women deal with their IPV experiences, found help and support seeking as coping mechanisms among the three themes. Many women sought help and support from police and counselling sessions with psychologists and social workers regarding the violence they experienced. They were active in sharing their experiences with others [81]. A localised study conducted in the Oromia region

of eastern Ethiopia among women of reproductive age reported that 20% of those who had experienced IPV reported it [82]. Moreover, analysis of data from the 2016 Ethiopian DHS concerning married women aged 15 to 49 years who had experienced IPV revealed that only one fifth sought help, and only 1.5% of those from medical personnel [83].

Women might do the same when they experience IPV during pregnancy. For instance, the disclosure of IPV that occurred during pregnancy was made by 23 % of women in a study conducted in Tanzania. More than two thirds of the participants disclosed the violence they experienced during pregnancy to a family member, followed by friends and one of their partner's family members [84]. When women disclose their experience of IPV, they desire nonjudgmental, nondirective, and individually tailored responses from health care professionals, and they consider repeated inquiries about partner violence as appropriate, as reported by a meta-analysis of qualitative studies [85].

1.5.2 Living with violence

On the other hand, for a variety of reasons women fail to report the violence. This is partly because they do not want to expose the issue or do not know where to go [82]. Moreover, traditional norms encourage many women to tolerate and hide the challenges they face [86]. IPV is justified in the community, including by the women themselves in certain conditions [10,86]. As a result, women often do not disclose their experience of IPV to health workers and rather disclose it to neighbours, family members, friends, family members of the partner and police [10,84,86].

1.5.3 Suicide

Women who had been exposed to IPV might also decide to commit suicide. A systematic review of studies, mostly from high income countries, examining physical and/or sexual intimate partner violence and symptoms of suicide attempts showed a significant association between IPV and suicide attempts [87]. A study describing the association between women's experiences of IPV during pregnancy and health outcomes, including psychological distress and suicidal thoughts, also reported higher levels of psychological distress and suicidal thoughts among women who experienced IPV [88]. Similar result had been reported by a study conducted in Ethiopia, where IPV during pregnancy was found to be a significant predictor of suicidal ideation [89]. However, a cross-sectional study in South Korea indicated no significant direct effect of IPV victimisation on suicidal ideation. Furthermore, anger and interpersonal dependency had mediating roles on the relationship between IPV victimisation and suicidal ideation. The possible explanation might be the inclusion of males in the sample [90].

1.6 Health system of Ethiopia

The health system of Ethiopia has a three-tier structure. The primary level health care established at the district level comprises a primary hospital, which serves 60-100 000 people; a local health centre, which serves 15-25 000 people; and rural health posts, which serves 3-5 000 people. Each health centre coordinates 5 health posts and each health post is staffed with 2 Health Extension Workers (HEWs). Secondary and tertiary level health care comprises general and specialised hospitals serving 1-1.5 million and 3.5-5 million people, respectively. The district health office and regional health bureau are responsible in the management and coordination of each level of the structure. The federal ministry of health makes policy- and other significant decisions [91].

Ethiopia's health system has made significant improvements in health facility expansion, specifically primary health care facilities and increasing the availability of health care workers across the country. Ethiopia met most of the health related millennium development goals (MDGs) targets, including a 67% decline in under-five mortality and 71% decline in maternal mortality in 2015 from the baseline in 1990 [92]. In 2015, Ethiopia targeted reducing maternal and under-five mortality to 199/100 000 and 30/1000 live births, respectively, by 2020 [91].

The Government of Ethiopia has developed a Health Sector Transformation Plan (HSTP) (July, 2015 – June, 2020) after the successful implementation of a 20 year national Health Sector Development Plan (HSDP) that ended in June 2015. The Health Extension Program (HEP) played a significant role in the expansion of essential health service packages to all Ethiopians, with a specific focus on women and children [91,93]. Identifying pregnant women within their catchment area, delivering antenatal and postnatal care and referring them in case of risk or complications are the major responsibilities of HEWs [93]. A fifteen-year roadmap that lasts from 2020 to 2035 was developed by the government with an overall goal of universal health coverage realisation in which all Ethiopians will have access to needed health services. It has been stated that the Government focused on bringing equity into health care access, and quality into health services provision [93]. A big challenge in the health system has been a triple burden of disease: communicable diseases, non-communicable diseases and injuries. Furthermore, inequitable achievements between urban and rural areas, regions and levels of socioeconomic status complicate the picture [92].

1.7 Policy and health system responses to address intimate partner violence

The health system's role in preventing and addressing IPV with a coordinated and multi-sectoral collaboration effort is critical. A recommendation by the WHO encourages health care providers to identify women experiencing IPV by asking about exposure to IPV whenever assessing conditions that may be caused or complicated by IPV and addressing the woman's most urgent health needs at her first point of contact [94]. At all levels of health service delivery, first-line support, as a minimum standard of care, should be provided to all survivors who disclose IPV to health-care providers [95]. The WHO included vulnerable populations (such as pregnant women who experience IPV) in a recent policy document and recommended identifying pregnant women who are being subjected to IPV and responding to violence experienced during pregnancy. Nevertheless, there was no specific action regarding the management of IPV during pregnancy [96]. Nine percent of countries in the African region had policies that recognised the specific risks of violence against pregnant women and included specific services for them, where the global rate is at 6%. Survivors of violence should also receive mental health care including basic psychosocial support, assessment of depression, referral to specialist care where applicable, and treatment for mental health conditions such as depression. Thirty five percent of countries globally, and 25% in the African region, include these in their policies, particularly mental health assessment and referrals to specialist services [97].

According to a success story by the Centre for Disease Control and Prevention in the United States of America, Ethiopia is among 30 countries receiving training for their staff at the Ministry of Health. It is also an implementing partner regarding routine screening for gender-based violence, specifically intimate partner violence and how to provide the first line support to

women who disclosed IPV [98]. Ethiopia's "The Pathway to Prosperity: Ten Years Perspective Development Plan (2020-2030)" planned to strengthen social welfare and the protection of women with a specific target to create conditions to make women free from physical and emotional abuse, increasing the 2015 level of 24% to 100%, as well as reduce the rate of sexual abuse from 10% to 5% by 2030 [99].

Ethiopia's second growth and transformation plan recognised violence against women as an issue that needs attention and aimed to eliminate it [100]. However, the plan is not stated in measurable terms. There are no clear guidelines for identifying and giving care to IPV survivors in primary health care units in Ethiopia, specifically health centres and health posts. Few shelters have been identified that provide comprehensive service to women and girl survivors of violence, and the majority are not owned and fully funded by the government. Moreover, they are only located in regional capitals and some do not accommodate pregnant women and those with mental health problems [101].

1.8 Study rationale and research questions

By the time the study was conceptualised, we found very few studies from Ethiopia using validated tools in assessing both IPV and depression among pregnant women in a community setting. Later studies from Ethiopia that link IPV with depression have been published [102,103]; however, one focused on postnatal depression [102] and the other assessed only the emotional aspect of IPV [103], making comparison difficult. The previously mentioned study conducted in south central Ethiopia assessing depressive symptoms during pregnancy and after child birth showed that depressive symptoms persisted in 39% of these women, and a higher degree of antenatal depressive symptom score was associated with more postnatal depressive symptoms

[52]. This supports the idea that unrecognised and untreated antenatal depression can persist as post-natal depression. Nevertheless, few studies had been conducted on assessing the magnitude and determinants of antenatal depression. Very recent studies that assessed both IPV and antenatal depression have the weaknesses of a small sample size, institutional basis and urban setting [104-106]. Therefore, a study that assesses IPV, antenatal depression and their determinants during pregnancy, using a validated tool, is necessary and important.

A national survey published in 2019 estimated that 48% of births took place in health institutions [107]. This means that more than half of all births in Ethiopia are non-institutional, and data about them are not routinely recorded, including the reporting of birth weights. An earlier study in Ethiopia showed a 37% increased risk of LBW in pregnancies exposed to IPV; however, this study was only undertaken in two hospitals [108], and women exposed to IPV may prefer to deliver at home [58]. Based on this, there seems to be justification for rural- and population-based studies on this topic.

Ultimately, health workers should be able to identify and support pregnant women who experience violence. Lack of training within the health system and societal beliefs that make health workers blame survivors, such as the 'normalisation' of IPV and the idea that women are unreliable, are among the barriers that deter health care practitioners from identifying and giving care to women exposed to IPV [109]. In antenatal settings, when pregnant women are screened for IPV, they are more likely to disclose IPV, and as a result, there was an increased identification of IPV survivors [110]. The disclosure of IPV during pregnancy to anybody in Tanzania was less than 25%, and less than 10% of the participants disclosed the violence they experienced to health care workers [84]. While IPV disclosure during pregnancy in Ethiopia has not been studied, the environments in the two countries are quite similar.

When health workers lack an appropriate understanding of IPV and have the wrong attitude towards their professional role and IPV survivors, they do not make a clinical enquiry into pregnant women who experience violence but do not disclose it. In addition, those who do disclose it might not get appropriate care and miss opportunities. Therefore, a better understanding of what health workers know and think is needed to develop educational initiatives to identify and provide care to survivors.

The research questions are as follows:

- How common is IPV in pregnancy and what are the risk factors?
- How common is maternal depression during pregnancy and what are the risk factors?
- Is there an association between IPV during pregnancy and the birth weight of the neonate?
- What is the level of knowledge and attitudes of health workers towards their professional roles and survivors of IPV?

2 Objectives of the study

2.1 General objective

The general objective of this thesis is to provide evidence that could support the design of interventions aimed at improving the health status of women and indirectly contribute to the survival of newborns in Sidama regional state, southern Ethiopia.

2.2 Specific objectives

1. To measure the prevalence of IPV and depression during pregnancy and assess the association between IPV and depression and other determinants (Paper I).
2. To investigate the association between maternal exposure to IPV during pregnancy and birth weight (Paper II).
3. To assess the knowledge and attitudes of health workers, and their professional roles, concerning survivors of IPV (Paper III).

3 Methods

3.1 Study setting

Ethiopia, formerly known as Abyssinia and officially the Federal Democratic Republic of Ethiopia is a landlocked country on the Horn of Africa, located in the east of the continent. It is bordered by Djibouti, Eritrea, Kenya, Somalia, South Sudan, Sudan and Somalia. Having an estimated population of more than 114 million inhabitants (in 2020) makes the country the second-most populous nation in Africa next to Nigeria. The country covers an area of 1 million square kilometres and its capital city is Addis Ababa with a population of 3 million. The country comprises more than 80 ethnic groups and multiple languages are spoken. The official working language of the federal government is Amharic, and the primary foreign language taught in school is English. The currency of Ethiopia is the Ethiopian Birr (ETB). In 2020, the country had an annual population growth rate of 2.5% (down from 3% in 2000 and 2.8% in 2010) and 21% live in urban settings. Life expectancy at birth was 68 years and the infant mortality rate was 30 per 1,000 live births in 2020. Ethiopia aims to reach middle income status by 2022 and reduce the proportion of people living below the poverty line from the current 19% in 2020 to 7% in 2030 [99,111-113].

This thesis was conducted in the former Sidama zone (transformed into the new Sidama regional state in 2020). Based on the 2007 census [114], and a population growth rate of 2.9% per year, in 2017, the Sidama zone has a total population of 3,820,928. Given a birth rate of around 30/1000 persons per year, around 115,000 live births are expected in one year and a similar number of pregnancies [115]. Sidaamu Afoo is spoken as a first language by 94.2% of the inhabitants. Most

residents are subsistence farmers, and 84% of the population are said to be Protestants. Several crops grow in the region; coffee being the major and popular agricultural product. The Sidama region has 20 districts (locally called “woredas”) [116]. It also has 553 health posts, 137 health centres, 13 primary hospitals, 4 general hospitals and one tertiary hospital [115].

The study on pregnant women was conducted in Wondo Genet district, which is one of 20 districts located in south east of Shashemene ($7^{\circ}1'N$ and $38^{\circ}35'E$) at an altitude of 1700 meters. The projected total population of the district in 2017 was 200 078, based on the 2007 census and an annual population growth of 2.7%. The estimated number of women of reproductive age was 46 618 with 6 923 expected pregnancies in a year. Wondo Genet has a high population density and ethnic diversity, as several different ethnic groups live in Wondo Genet area. The major ones are Sidama, Oromo, Wolayita, Kambata, Hadiya and Amhara. The district has 3 urban and 12 rural kebeles (the smallest administrative units) as well as 16 health posts and 5 health centres serving the population [117].

The study on health workers was conducted in three districts: Boricha, Gorche and Aleta Wendo. These districts are located around 300 km south of Addis Ababa and 30-70 km south of Hawassa city, the capital city of the Sidama regional state. The Boricha district has 3 urban and 39 rural kebeles, Gorche has 1 urban and 21 rural kebeles and Aleta Wendo has 2 urban and 27 rural kebeles. Based on the 2007 census and a growth rate of 2.8%, the estimated projected population in 2017 was 311 509 in Boricha, 184 237 in Gorche and 249 021 in Aleta Wendo. The Boricha district had 1 primary hospital, 10 health centres and 38 health posts; Gorche had 6 health centres and 21 health posts; and Aleta Wendo had 1 primary hospital, 7 health centres and 29 health posts serving the population. Leku primary hospital, 22 km away, is the closest primary hospital

to Gorche district. The closest secondary hospital with maternity care for the study population in the three districts is Yirgalem general hospital. The coordination of mother- and child-health care is the responsibility of the district health office.

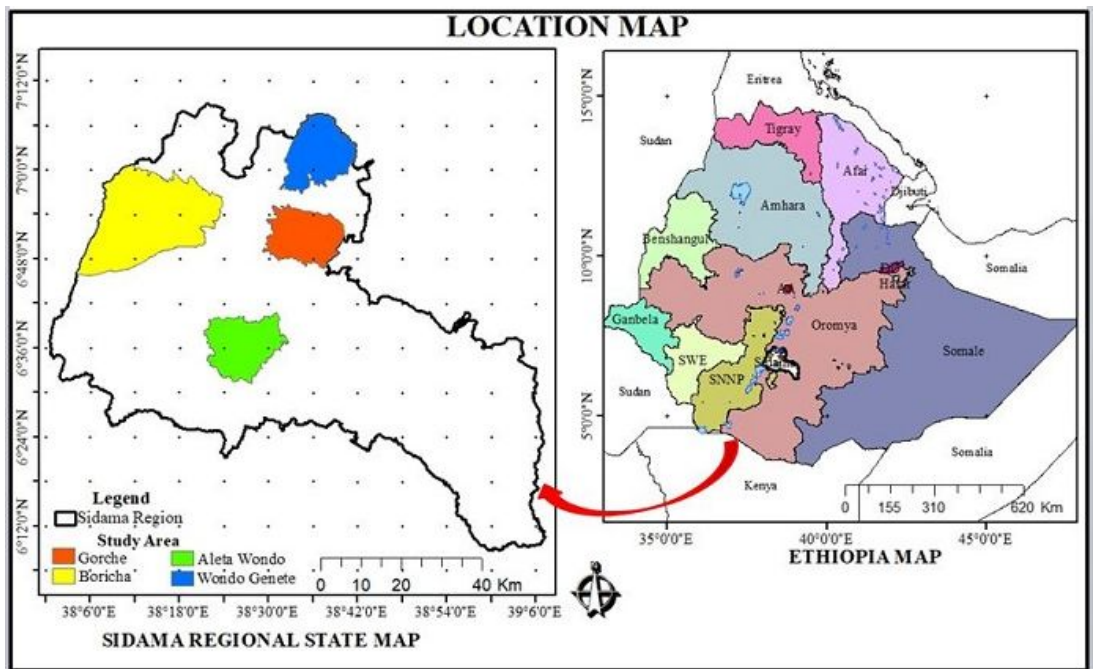


Figure 1. Geographic location of the study areas – Ethiopia, Sidama regional state, and the four districts (Source: Sidama regional state administration).

3.2 Study design and outcome variables

The main study was a community-based cross-sectional study conducted as part of a prospective cohort study among pregnant women with a gestational age of 25–34 weeks as listed by the Health Extension Workers (HEWs). The women lived in two urban and three rural kebeles in the Wondo Genet district. We followed up those pregnant women who were enrolled for the baseline study to investigate the association between IPV and birth weight using a community-based prospective cohort study, and an institutional-based cross-sectional study was employed for the study on health workers in primary health care facilities (Paper III).

In Paper I, data on exposure and outcome variables were collected by interview when the women were enrolled through home visits during pregnancy. We determined the magnitude and assessed the determinants of IPV and maternal depression during pregnancy. The main outcome variable, IPV, was assessed using questions adapted from the WHO multi-country study on women's health and domestic violence against women questionnaire [4], which was coded as yes when the woman had experienced any of the three types of violence and no if not. Intimate partner was defined as a current male intimate partner within the context of marriage, cohabitation or any other formal or informal union [6]. The secondary outcome variable, maternal depression, was measured by ten questions from the Edinburgh Postnatal Depression Scale (EPDS) [118], which had been validated in Ethiopia [119,120]. Each item has a score of 0–3, with a total score of 0–30. Moreover, a cut-off point of 13 and above was used to identify women with depression. Depression was coded as yes if there was an EPDS score of ≥ 13 and no if it was < 13 [121].

In Paper II, we followed up 505 pregnant women with their neonates and measured the birth weight of their neonates as soon as possible or within 72 hours after delivery using a digital baby weight scale (Paper II).

In Paper III, we assessed the knowledge and attitudes of health workers towards their professional roles and survivors of IPV. The main outcome variable was the proportion of wrong responses to the knowledge questions, and the score calculated from the Likert items of attitudes towards survivors of IPV was considered a secondary outcome. The 10 knowledge questions about IPV required “True”, “False” or “Don’t know” responses. All questions had equal weight (0 if answered wrongly or don’t know and 1 if answered correctly), and hence the maximum total score was 10. The ten Likert item statements that assessed attitudes about IPV had a 5-point response format from 1 (strongly disagree/most negative) to 5 (strongly agree/most positive). The participants were asked to record their degree of agreement or disagreement with the statements; seven of them required “disagree” responses to be considered a “positive attitude” and these scores were reverse scored to calculate the total attitude score, to be used as a measure of attitude.

3.3 Sample size considerations

The sample size was determined by the OpenEpi Version 3.03 software (www.openepi.com) [122] for epidemiological statistics (Paper I and II).

For paper 1, the sample size to estimate the prevalence of IPV with a 5% precision, based on a presumed prevalence of 32% and design effect of 1.5 to compensate for non-random sampling, adding 10% for non-response, was estimated to be 606 (Paper I).

For paper 2, the estimated sample size to investigate the association between IPV and birth weight (Paper II) was 435, assuming an average birth weight of 3000 g among unexposed neonates and 2850 g among exposed neonates, with a standard deviation of 423 g and 450 g, respectively, and a ratio of unexposed to exposed of 4:1, including an 80% statistical power and 95% confidence level (Paper II). As Paper II was part of a larger project that required a larger sample size (606), we followed all pregnant women who were enrolled for the baseline study (Paper I). Therefore, the sample size requirement for Paper II was met.

For paper 3, as there was no clear sample size determination formula for a Likert scale study, we considered a sample size of 139 sufficient to detect a difference between groups when correct knowledge is 80% in one group and 90% in the other, with a standard deviation of 20%, a power of 80% and confidence level of 95%. To account for non-response, we added 10% to the calculated sample size.

3.4 Exposure variables

The exposure variables in Paper I about IPV and maternal depression, and those in Paper II about birth weight and IPV, were the socio-demographic, economic and behavioural characteristics of the woman and her husband such as pregnancy desire, depression and social support received from the husband, family and friends. The woman's age was defined at the time of the interview. The educational status of the woman and her husband was defined as the highest educational level attained by the woman and her husband and was categorised as no education, primary and secondary, or above. Regarding occupation, a woman's usual work as a means of earning a living was categorised as housewife along with others such as general employment, merchant worker and daily labourer. The monthly income of the family consisted of the total amount of money a

woman and her husband earn per month expressed in Ethiopian Birr, while their religion was categorised as Protestant, Orthodox or other. Ethnicity was defined as the state of belonging to a social group whose members identify with each other. These were categorised as Sidama, Oromo and others. Age at first marriage was defined as the age in years of a woman when she began living with her first husband. Duration in marriage was defined as the number of years that the woman spent with her current partner. Parity was defined as the number of children born alive by a woman, while residence concerned the place where the woman lived, categorised as urban or rural. Pregnancy desire involved whether they wanted the pregnancy then or sooner, did not want the pregnancy at all or were unsure of whether they wanted the pregnancy, categorised as yes, no or don't know. Witnessing violence between parents was defined as observing violence that occurred between parents where father perpetrated mother during childhood and was categorised as no and yes. A woman's and her partner's frequent alcohol drinking, khat chewing or cigarette smoking were categorised as no and yes. Finally, social support was measured by a maternity social support scale with six items, each item having a score of 1-5, and a total score ranging from 6 – 30 [42]. It was categorised as low, score < 18; medium, score 18 – 23; and high, score 24 – 30 (Paper I).

In addition to the aforementioned variables, Paper II had the following exposure variables: depression, clinical characteristics, and prior adverse outcomes of pregnancy and birth characteristics. Mid-upper arm circumference (MUAC), preterm birth, whether a woman had a baby born before 37 weeks, stillbirth, whether a woman had a baby born with no signs of life at or after 28 weeks of gestation were categorised as no and yes. The sex of the newborn was categorised as male or female. Gestational age at birth was defined as the number of weeks of gestation calculated based on the woman's last menstrual period, that is, the period from the last

menstrual period until the date when the woman delivered. The place of delivery was defined as the place where the delivery happened and was categorised as home or health institution.

3.5 Statistical analysis

Data was double entered using EpiData version 3.1 software (EpiData Association, Odense, Denmark), and all data were analysed using SPSS version 20 software (Armonk, NY: IBM Corp. USA). Data were described using a univariate analysis of individual variables to know the distribution of the data and provide summaries about the sample. Then a bivariate analysis was carried out to analyse any relationship between the two different variables. Chi-square and Fisher's exact tests were used to compare categorical variables. Mean values were compared using t-tests and analyses of variance, and multivariate analysis was also performed to analyse any relationship between three or more different variables and identify factors associated with outcome variables. Statistical significance was set at p-value < 0.05.

In Paper I, the outcome variables were IPV and depression during the current pregnancy. IPV was coded as yes when the woman had experienced any of the three types of violence and no if not, and depression was coded as yes if had an EPDS score of ≥ 13 and no if < 13 . We used logistic regression analysis to assess determinants of IPV and determinants of depression and adjusted for potential confounders. The model was built by adjusting for variables with bivariate associations with $p < 0.25$. Moreover, multicollinearity was checked using Collinearity diagnostics, and Model goodness of fit was assessed using Hosmer and Lemeshow goodness-of-fit.

In Paper II, we used multiple linear regression to investigate the association between birth weight and maternal exposure to IPV during pregnancy. Other selected determinants were also studied. There was no violation of assumption of normality, linearity, multicollinearity and homoscedasticity ensured by preliminary analysis. Complete case analysis was used for missing values to minimise potential bias. Variables with correlation at $p < 0.2$ levels were entered into the adjusted regression model. Regression coefficient (B), which is an estimate of the unknown population parameter representing the change in birth weight given a one unit change in the predictor variable with a 95% confidence interval, was reported. R^2 was calculated to assess how much of the variation of the dependent variable could be explained by the full model. Sensitivity analysis was also performed in a group of neonates, which included birth weights taken within the first 48 hours after birth and excluded those taken after 48 hours (Paper II). Statistical significance was set at $p\text{-value} < 0.05$ (Paper I, II and III).

In Paper III, we used analysis of variance (ANOVA) for our cross tabulations to analyse scores of knowledge, and for statistically significant associations we added Tukey HSD post hoc test. In addition, multivariable linear regression was used to analyse determinants of attitude scores among health care workers.

3.6 Ethical considerations

This study had ethical approval from the Institutional Review Board (IRB) at the College of Medicine and Health Sciences, Hawassa University (Ref No: IRB/006/09) and the regional ethical committee of Western Norway (Ref No: 2016/1908/REK vest). Written permission was obtained from the Sidama zone health department and Wondo Genet district health office,

respectively. For the study on pregnant women and their neonate (Paper I and II) in the study area (Wondo Genet district), as the issue is sensitive and women do not like to give signatures, informed oral consent was considered acceptable for the participants, and this was obtained from each participant and recorded by the interviewer. We followed the ethical and safety guidelines recommended by the World Health Organization [123] including making the interviews with only the participant woman, giving information about available support to all women who participated in the study, referring those women who wanted psychological support to Kela health centre to receive counselling and referring women who requested legal support to a relevant body, supported by the study project. In addition, the data collectors linked those women and their neonates who became ill during pregnancy and the immediate postpartum periods to HEWs. For the study on health workers (Paper III), written consent was obtained from the health workers.

4 Results

This thesis studied pregnant women in southern Ethiopia and concerns various aspects of IPV. The findings are given in three publications: In Paper I, we focused on the relation between IPV and mental health; in Paper II, we studied potential associations between IPV and the health of the baby; and in Paper III, we described the knowledge of and attitude towards IPV among health workers.

4.1 Paper I: Intimate partner violence and maternal depression during pregnancy: A community-based cross-sectional study in Ethiopia

In this paper, published on PLOS ONE, we aimed to study IPV and depression among pregnant women, specifically measuring the prevalence of IPV and maternal depression and assessing determinants of IPV and depression during pregnancy. A community-based cross-sectional study, as part of a prospective cohort study, was conducted among 589 pregnant women living in 2 urban and three rural kebeles of the Wondo Genet district, southern Ethiopia, from February to August, 2017. Data were collected using an interviewer administered questionnaire. The main outcome variables were IPV and depression during the current pregnancy. IPV was assessed using questions adapted from the WHO multi-country study on women's health and domestic violence against women questionnaire, which was coded as yes when the woman had experienced any of the three types of violence and no if not, while depression was assessed by ten questions from the Edinburgh Postnatal Depression Scale (EPDS). It was coded as yes if it had an EPDS score of ≥ 13 and no if < 13 . Multivariable logistic regression analysis was carried out to assess the determinants of IPV and depression, as well as adjust for any potential confounders.

The overall prevalence of IPV was 21% (95% confidence interval [CI] = 18.1–24.7). Emotional violence had been experienced by 15% of the pregnant women, and physical and sexual violence by 10%; many had experienced both.

After adjusting for potential confounders, an increased risk of IPV remained among rural women (adjusted odds ratio[AOR] = 2.1; 95% CI = 1.1–4.1), women who had parental exposure to IPV (AOR = 14.0; 95% CI = 6.4–30.5), women whose pregnancy was undesired (AOR = 9.6; 95% CI = 3.4–27.0), women with depression (AOR = 4.7; 95%CI = 1.4–16.2) and women with low social support (AOR = 13.9; 95% CI = 7.0–27.8). In addition, women whose husbands drink alcohol (AOR = 17.1; 95% CI = 3.8- 76.2) had increased odds of IPV during pregnancy.

The prevalence of antenatal depressive symptom (with EPDS score above 13) was 6.8% (95% CI 6.2–11.3). Increased odds of depression were found among women who had been exposed to IPV (AOR = 17.6; 95% CI = 6.2–50.1) and whose husbands use alcohol (AOR = 3.3; 95% CI = 1.3–8.2).

In conclusion, we found that one in five pregnant women experienced IPV, and this was strongly associated with depression. Screening for IPV and depression at antenatal visits with referral to relevant care and service is recommended.

4.2 Paper II: Birth weight was associated with maternal exposure to intimate partner violence during pregnancy in southern Ethiopia: A prospective cohort study

In this paper, published in the *Frontiers in Public Health* journal, we aimed to investigate the association between maternal exposure to intimate partner violence during pregnancy and birth weight in a community in the Wondo Genet district, southern Ethiopia. We followed up 505 pregnant women and their newborns from February to December, 2017. The data was collected by an interview about partner violence done during the current pregnancy. We added follow-up data on birth characteristics, including birth weight measured in grams by field assistants with a digital baby scale visiting the homes as soon as possible after delivery. The main outcome variable was birth weight. Factors associated with birth weight were assessed by multiple linear regression. Sensitivity analysis was also performed. The result showed that the association between IPV and birth weight remained significant when limiting birth weight measurements to 0-48 hours.

Out of 589 pregnant women who were enrolled for the baseline study, we excluded 84 cases from analysis for the follow up study. These comprised 8 twin births; 1 preterm and 2 stillborns; 22 cases where the mother declined to have the baby weighed; 26 assessed after 72 hours; 2 early neonatal deaths; and 23 lost at follow up. In total, we followed up 505 pregnant women until after delivery, whereof 365 (72.3%) were institutional deliveries.

Birth weight was assessed within 48 hours for 477 (94.5%) newborns, and between 48 and 72 hours for the remaining 28 (5.5%). The mean birth weight for all newborns was 3221 grams (range 2048 g to 4325 g).

Birth weight was 203 g lower (B -203 95% CI -320 to -87) among newborns of women exposed to intimate partner violence than for those unexposed. Birth weight was also lower for girls than boys among newborns delivered at home rather than at a health facility and after a shorter gestation. The R^2 of the model was 0.283, which mean the model explains 28% of the variation in birth weight.

In conclusion, our findings in this paper showed that maternal exposure to IPV during pregnancy was associated with a lower birth weight for the baby. Antenatal clinics should consider routinely identifying women suffering from IPV and consider possible referrals to appropriate agencies.

4.3 Paper III: Health workers' knowledge and attitudes towards intimate partner violence: a descriptive study in Sidama region, southern Ethiopia

This was published in the Journal of Multidisciplinary Healthcare. Here we aimed to assess the knowledge and attitudes of health workers towards their professional roles and survivors of IPV; we also examined the determinants of their attitudes towards IPV. Data were collected from 139 health workers working in 12 health centres and 55 health posts located in 3 districts of the former Sidama zone (currently transformed in to Sidama regional state) using a self-administered questionnaire. Knowledge and attitude scores were outcome variables. Knowledge was assessed by ten yes/no questions with each correct answer giving 1 score unit, where the corresponding knowledge score was 0-10. Attitude was assessed by ten attitude questions where the response was given a weight of 1-5 according to the level of agreement with the statements, resulting in attitude scores from 10 (minimum) to 50 (maximum). The mean knowledge score by exposure variables were compared using independent sample t-tests and a one-way analysis of variance (ANOVA). A Tukey HSD (honestly significant difference) post-hoc test was performed for significant ANOVA results. Linear regression was performed to investigate determinants of attitude, and regression coefficient (B) with a 95% confidence interval was reported.

Among the 139 participants, 78% were females, and the median age of the participants was 26 years. Although nurses and midwives accounted for 54%, few (13%) had received training regarding IPV. Seventy-seven percent reported having had a pregnant client exposed to IPV seeking health care, but more than half of the participants lack confidence in their ability to care for these women. Furthermore, wrong responses to knowledge questions ranged from 5.8% to 30.9%.

The mean knowledge score was higher among women aged above 30 years compared to those 30 and below ($p=0.03$). Among the health workers, negative attitudes ranged from 4-47%. One third of the participants believed they were unable to identify IPV without evidence of physical injuries. In comparison, greater knowledge of IPV was associated with better attitudes.

Neither the socio-demographic characteristics nor the training of IPV management were associated with attitude scores among health workers.

In conclusion, this study showed that around half of the health workers felt unprepared to provide care to survivors of IPV, and a third would not consider IPV unless there was physical evidence. Thus, increasing knowledge may improve attitudes and situations for women suffering IPV.

5 Discussion

In this project, we have studied IPV and depression during pregnancy, measuring their prevalence and associated risk factors. We also investigated the association between exposure to IPV during pregnancy and the birth weight of the baby within a community. Further, we assessed the knowledge and attitudes of health workers towards victims of IPV, their professional roles and their preparedness to provide care to women exposed to IPV. In this section, we will first discuss the methodological aspects of the study and then some of the main findings.

5.1 Methodological discussion

5.1.1 Study design

This project enrolled pregnant women at the household level and followed up both them and their neonates. It also studied the knowledge and attitudes found among health workers in the area. This provided data for a study with a cross-sectional design (Paper I) that examined the prevalence and risk factors for IPV. In Paper II, we used a prospective cohort design to study the determinants of birth weight, including IPV and depression. Paper III also had a cross sectional design, which was used to analyse the knowledge and attitudes among the health workers. A cross-sectional design is suitable for measuring prevalence and its risk factors, and all measurements are done at a single point in time or over a short period of time [124]. In a prospective cohort study, however, the investigator begins by defining and assembling a sample of subjects, measuring characteristics and following these subjects to observe the outcomes of interest [125]. A cohort design is regarded as a stronger epidemiological design for measuring

effects because the measurement of risk factors is done before the outcome is known. The outcome cannot therefore affect the exposure (risk factor) as it was decided prior to the outcome.

Initially, the pregnant women were recruited and enrolled through home visits for the cross-sectional study and used in Paper I. Home recruitment was preferred over recruiting at antenatal clinics as it avoided a potential selection bias, namely a “healthy clinic attendee” bias. The main exposure variable (IPV exposure during the pregnancy) was collected by trained data collectors using a structured and pretested questionnaire at home during the baseline study, and exposure status was determined. If the woman had experienced any of the three types of violence, namely emotional, physical or sexual abuse, she was categorised as “IPV exposed”.

The pregnant women who were enrolled in the study were followed up until after delivery to assess the association between IPV and birth weight. The main outcome variable (birth weight) for Paper II was collected during a home visit as soon as possible after birth, or within 72 hours after delivery (time after delivery was noted for each participant).

5.1.2 Sample size

Sample size calculation, an essential step in planning any investigation, involves deciding how many people need to be studied [124], and when planning the study researchers must ensure that the sample has sufficient power and precision. The precision of an estimate is a measure of random error in the study, and power is a measure of how likely it is that the researchers find an association when a true association exists. A study may be under-powered in detecting statistical significance even in the presence of a true effect; or estimates produced by the study may lack precision if a study has too few participants [126]. We estimated sample sizes based on reasonable assumptions for each paper. For Paper I, which aimed to estimate the prevalence of

IPV and maternal depression during pregnancy, we planned for a desired precision of 5%, according to the calculated sample size for the estimation of prevalence. For IPV, our results gave a 95% confidence level between 18% and 25%, and for depression this was between 6% and 11%. For Paper II, we followed a group of pregnant women (both those exposed and unexposed to IPV) enrolled during the baseline study in order to assess the birth weight (an outcome) of their babies, and we planned for a power of 80 % to detect any actual differences in birth weight. The study achieved the planned sample size, and results of reasonable validity were obtained consistent with previously published studies (the birth weight among IPV-exposed women's babies had a mean of 3054 grams vs. 3269 grams for non-exposed women's babies). We did a post-hoc power analysis using birth weight as an outcome and IPV as exposure and we found a statistical power of 98%. We also did a post-hoc power analysis for non significant associations and found a lower statistical power. Therefore, the lack of significance could be due to inadequate power as a result of small sample size.

5.1.3 Validity

In the following sections, I will first discuss the internal validity of the findings of this data set and then the external validity.

5.1.4 Internal validity

Internal validity reflects the extent to which a study establishes a trustworthy relationship between an exposure and an outcome. The internal validity of a study can be threatened by systematic error (bias), confounding and chance [126]. There are several types of bias, and we

assess the following: selection bias, information bias, recall bias, social desirability bias and non-response bias.

Selection bias

Selection bias is a form of bias resulting from procedures used to select participants or factors that influence loss at follow up [127].

To minimise selection bias resulting from the selection of pregnant women, we tried to make our sample representative by recruiting at home all pregnant women with a gestational age of 25-34 weeks. The number of women who declined to participate when asked was very low. It would have been easier to select participants from antenatal clinics, but we were concerned about a potential selection bias, so we selected from households.

We recruited only those at a gestational age of 25-34 weeks, and as we followed them up through the pregnancy until after delivery, we found that this criterion did not bias our result. However, we have no information about the women who declined to participate, so some unknown selection bias could have occurred during the selection of pregnant women, however unlikely.

In a follow-up or cohort study, if a substantial proportion of subjects cannot be traced to determine the outcome, the study validity can be compromised. The more missing data concerning outcome there is in a cohort study, the greater the potential for selection bias. If the proportion traced is greater than 75%, it is not an important validity concern [127]. Since we had only lost 4% to follow up, there is minimal selection bias resulting from loss to follow up.

Information bias (Measurement bias)

Information bias is a form of bias resulting from problems with the measurement of study variables as a result of challenges with the recall of information, social desirability or the use of sub-optimal measurement tools [127]. In our investigation of birth weight, errors might occur as a result of wrongly calibrated instruments, measurement procedures or instrument imprecision. In order to minimise these errors, we standardised the measurement methods (operating procedures), trained the data collectors, used a digital scale with high precision and checked the scale by measuring something of known weight before measuring each birth weight. We did not blind the data collectors assessing the outcome to the “risk factors” but used the same data collectors from the baseline study (Paper I) and assessment of birth weight (Paper II).

Recall bias

Recall bias is a bias that occurs as a result of forgetting [127]. As exposure status (IPV) was assessed during enrolment at a later stage of pregnancy (second and third trimester pregnancy), there might have been some recall bias and thus under-reporting of IPV, as participants may have forgotten about certain IPV experiences. While these might be remembered for a very long time, especially if it is very stressful or otherwise highly impactful, we took measures to minimise recall bias, such as giving the women several opportunities to disclose their experiences of IPV during the interview. Recall accuracy tends to increase when the participant is given more time to think [127] and guaranteed complete privacy during the interview. Special training for the interviewers and the use of female interviewers also can also lead to greater accuracy [123].

Some mothers may have trouble remembering their exact age, which can result in recall bias. For some mothers, age measurement was improved by approximating birth dates with the help of a

local events calendar, via reference to any document that contains age. A histogram of the age of the participants shows an obvious digit preference for 20, 25 and 30 years, and this shows that the age recorded is not biologically precise. Therefore, using 5-year groups in the analysis may have skewed the association to some degree, but the use of multiple groups may also have minimised the effect of these errors. We do not know whether the recorded age was actually slightly lower or higher, but we think the digit preference may have been for both directions.

Social desirability bias

Responses to questions may be affected by a wish to present one-self as more normal than one actually is. For example, a respondent may wish to seem closer to an ideal in their culture, e.g., healthier. This affects measurement through an under-reporting of socially undesirable attributes or over-reporting of socially desirable attributes [127]. Although we motivated the participants by ensuring them it is socially acceptable to provide accurate information about their substance use, very few participants responded that during their current pregnancy they had been drinking alcohol, smoking tobacco or chewing khat; nevertheless, while we think there might be under-reporting due to social desirability bias, we did not analyse mothers' alcohol drinking and smoking apart from simple descriptive measures.

Non-response bias

Non-response can bias findings if abused women are more or less likely than non-abused women to participate or decline. In our prevalence study, only 17 (3%) pregnant women declined. As a worst-case scenario, where all the women who declined were exposed to IPV, the estimated prevalence of IPV would only change from 21% to 23%. Nevertheless, we have no reason to

believe that women exposed to IPV declined to participate when asked, as we heard from our data collectors that some women were happy that someone wanted to talk to them about IPV.

Confounding

A confounder is an exposure variable that is associated with both the outcome and another exposure variable [124]. It can be controlled at the design stage by using restrictions (which eliminates variation in the confounder by selecting subjects of the same confounder variable), matching (which involves the selection of a comparison group with respect to the distribution of one or more potential confounders) and randomisation (the random allocation of individuals to the different exposure categories); it can also be controlled at the analysis stage by using stratification (restricting comparisons to individuals who have the same value of the confounding variable) or multivariate regression analysis techniques that control for measured covariates. Failure to control for confounding can produce findings that are biased, and both known and unknown confounders can affect findings.

In the association between alcohol drinking by the husband and maternal depression, alcohol drinking by the husband had a COR (crude odds ratio) of 8.3 (95% CI 4.1 – 16.6) in the crude analysis. However, in the adjusted analysis (when alcohol drinking by the husband is adjusted for IPV), it had an AOR (adjusted odds ratio) of 2.3 (95% CI 1.1 – 5.0). In our studies, we have controlled for those known confounders for which we have information in the adjusted analysis. However, unknown confounders might have influenced the results. The cross-sectional study did not assess the presence of other co-morbid mental health conditions that could contribute to depression, such as anxiety and stress, which could create confounding effects. Some variables

that could affect birth weight were not collected, including hypertension, HIV, malaria and anaemia, thus some residual confounding effects cannot be excluded.

Chance

Chance refers to a random error that may affect the statistical precision of a study, but not with a trend in a specific direction. Results depend on the sampling variability of the point estimate. A larger sample size gives a smaller sampling variability, resulting in a narrower confidence interval and therefore more precise estimates. We addressed the role of chance by choosing our main outcomes with the appropriate power and precision needed for calculating our sample size. Our main outcomes resulted in the precision we planned for, but the sub-analysis had wider confidence intervals.

5.1.5 External validity

External validity refers to the extent that the findings of the study can be generalised to a population that did not participate in the study. It also indicates to what extent our conclusions can be generalised to a wider population and/or across populations [128]. It is a basis for inference about other geographical areas with similar settings. Of course, internal validity must be established before evaluating external validity. The conclusions that we drew concerning the sample hold for all pregnant women in the district (meaning it is representative of the population), as our sample shared characteristics similar to those of the population from which the sample was drawn. Moreover, our study had already established internal validity. In this study, we recruited pregnant women with a gestational age of 25-34 weeks, but as the participants reported IPV for the entire pregnancy, the findings are relevant for that entire period. In principle, pregnant women with a lower gestational age could have been exposed to more or

less violence, but we have no information about such a difference; further, the women did report on their situation during the entire pregnancy. Culture is particularly important to mention in studies on violence, as some societies have attitudes and practices that increase IPV; that is, IPV is culturally “justified” under certain conditions. There are also traditional norms that encourage women to tolerate and hide the challenges they face, specifically IPV [86]. Therefore, our results are probably generalisable to areas with similar cultures, but they cannot be assumed in different cultures where relationship between men and women are different. Making generalisations concerning different contexts must be undertaken with care.

5.2 Discussion of the main findings

The general objective of this thesis is to discover how common domestic violence and maternal depression are during pregnancy. This involves examining relevant risk factors, the association between IPV and birth weight, as well as assessing the level of knowledge and attitudes of health workers towards their professional roles and IPV survivors. This can provide evidence to support the design of interventions aimed at improving the health status of pregnant women and indirectly contributing to the survival of newborns in Sidama region, Southern Ethiopia.

Prevalence of intimate partner violence

We found that more than 20% of pregnant women experience IPV. Our prevalence figure of IPV was lower than other studies conducted in Kenya, Tanzania and Vietnam [37,44,129]. The Kenyan study was conducted in one hospital, and consequently it may not be representative. Moreover, the reported prevalence was higher than in many other studies, as acknowledged by the authors. Cultural differences could account for such differences. Compared to our study, there was a higher consumption of alcohol by the pregnant women in the Tanzanian (11%) and Vietnamese (6%) study, and this may contribute to the higher prevalence in these studies.

Our study also documented lower exposure to IPV compared to other studies conducted in Ethiopia. For example, in Jimma city (Southwest Ethiopia) 36% [130], Bale zone (Southeast Ethiopia) 59% [21], Debre Markos (Northwest Ethiopia) 41% [131], Abay Chomen district (Western Ethiopia) 45% [132], the higher prevalence might be explained by the higher percentage of partners who were alcohol drinkers (more than 50%) [21,131,132]. Other factors include the assessment of IPV using different tools, a definition of IPV that includes strangers

and ex-husbands in addition to the current husband and cultural differences in the studied areas. In addition, the Bale study focused on predominantly rural areas where more violence was reported than urban areas, whereas ours was conducted in both rural and urban kebeles. Our findings also indicate that there was more violence in the rural areas, and our prevalence figures of IPV are consistent with studies conducted in Ethiopia 23% [63], Uganda 28% [133], Nigeria 29% [134] and China 18% [135].

Prevalence of depression in pregnancy

We found that around 7% of the pregnant women experienced maternal depression during pregnancy. Our result is comparable with a 9% prevalence reported in India [136], a 11.8% prevalence in Debretabor, Ethiopia [137] and a 10.8% prevalence in three districts of Southwest Ethiopia [103]. However, several studies reported higher prevalence figures than ours. For instance, a cross-sectional study conducted in rural Pakistan reported a 27% prevalence of antenatal depression assessed using a "Patient health questionnaire (PHQ9)" [138]. A higher prevalence of antenatal depression was also reported in rural Bangladesh (18%) and China (24%), which assessed depression by EPDS ([139,140]. Possible reasons might be differences in the screening tool they used and the cut-off points applied to define depression. A review of Ethiopian studies on antenatal depression shows that the prevalence of antenatal depression was lower (18.3%) when assessed using EPDS than when using Beck depression inventory (26.5%); it was also lower in community settings (15.5%) than institutional settings (25.8%) [141].

Determinants of intimate partner violence

We found an increased prevalence of IPV in women residing in rural areas. The higher prevalence in rural areas may be related to various misconceptions held by the rural community. They might think that violence is natural and inevitable when men and women live together. For instance, the Ethiopian DHS shows that physical violence (wife beating) is regarded as justified in some circumstances, and these misconceptions are more prevalent in rural areas [10]. Furthermore, the gender-based perspective held by the community, where patriarchal culture is prevalent, might support male privilege and supremacy, which can lead to further violence when women deviate from their assigned gender role. A review conducted to understand IPV perpetrated by men argued that patriarchal privileges and the normative use of violence in relationships increased poor mental health and substance misuse, which also affected IPV [142]. No association was observed between rural/urban residence and IPV in a Malawian DHS [143].

We also observed that women who had witnessed domestic violence in their childhood were more exposed to IPV during their pregnancy. This result was supported by various studies conducted in the field. An analysis of the 2014 Kenyan DHS data showed that pregnant women who witnessed partner violence were more likely to experience violence during pregnancy, in which 42.0% of the pregnant women had witnessed their fathers abusing their mothers [144]. A systematic review published in 2022 of Ethiopian studies on determinants of IPV during pregnancy showed that a woman who grew up in family exposed to IPV was more likely to experience the same in her own marriage [38].

An increased risk of IPV has been observed in women with depression. One review reported a five-fold increased chance of having experienced IPV among women with depressive symptoms

in antenatal periods examined in cross-sectional studies [145]. In a cross-sectional study conducted in Nigeria, having psychiatric morbidity, including depression, was identified as a predictor for IPV during pregnancy [146].

Alcohol drinking by the husband appeared as a risk factor for both IPV and depression. In our study, we found that that only 1% of the participants had taken alcohol over the last month, compared to around 10% of their husbands. A review of African studies on IPV against pregnant women showed that a woman's chances of being abused during pregnancy was increased when a partner drank alcohol [19]. A review of Ethiopian studies on IPV also showed that alcohol drinking by the partner increased IPV among pregnant women [38]. This association between alcohol drinking by a husband and IPV against pregnant women had been evidenced by individual cross-sectional studies conducted in Nigeria [18,146], Nepal [147] and Ethiopia [21]. Several papers suggested the following mechanisms for alcohol increasing IPV: alcohol produces key neuropsychological changes that alter executive functioning and hinder self-regulatory capacities; alcohol produces a state of negative affect that may subsequently generate a state of anger, where anger promotes aggression [148]; acute alcohol consumption leads people to focus on the immediate rather than peripheral aspects of a situation [149]; and women may be taken as an “immediate” target.

Determinants of depression

In our study, IPV exposure during pregnancy was identified as a risk factor for antenatal depression. A review reported a three-fold increase in the chance of depressive symptoms in the postnatal period after having experienced IPV during pregnancy [145]. Similarly, an increased risk of prenatal depression was observed in women who had experienced IPV during pregnancy

in cross-sectional studies conducted in Bangladesh [139] and China [135]. Similar results have also been reported in Ethiopia [106,150]. However, a case-control study conducted in Jimma, Ethiopia showed no association between IPV and depression [151]. The lack of association might be due to the small sample size, the differential distribution of risk factor frequency among the population as a result of using a different tool and the inclusion of participants almost exclusively from urban areas with a low prevalence of IPV.

The association between alcohol drinking by the husband and antenatal depression was also shown in a cross-sectional study conducted in Gondar, Ethiopia [150].

According to Bradford Hill, a number of issues need to be considered to establish a causal relationship between an exposure and outcome. These issues include: strength of association, consistency, specificity, temporality, biological gradient, biological plausibility, coherence, experiment and analogy. With temporality being a condition that the cause (exposure) is followed by the effect (outcome), we cannot in our cross-sectional study infer causality as a temporal sequence cannot be established and it is not possible to say which one is the cause and which one is the effect. Thus, this could be considered a limitation.

Determinants of birth weight

We found that babies from pregnancies exposed to IPV were on average almost 200 g smaller, and 20% of the women who had experienced IPV during pregnancy gave birth to babies with a low birth weight. In comparison, a cross-sectional study in Nigeria reported that exposure to any form of violence during pregnancy was associated with reduced birth weight [152].

We also found higher birth weights among babies born at health facility compared to at home, even when adjusted for socio-economic status, including residence. A community-based prospective cohort study in central Nepal [153], for example, reported significantly lower mean birth weight among home-born infants compared to their facility-born counterparts. Similar results have also been reported in Bangladesh [154] and India [155].

To evaluate whether IPV can cause lower birth weight, we need to assess the criteria of Bradford Hill. In our study, a stronger association has been observed between IPV and birth weight, and it is less likely the relationship is due to chance or confounding. A consistent association has been observed by studies conducted by different persons, places and times. As IPV experience was collected and recorded at the time of pregnancy during the baseline study, it preceded the outcome, and the study therefore establishes a temporal relationship. We did not, however, assess whether increased exposure to IPV during pregnancy resulted in a greater degree of outcome, the so-called biological gradient (dose-response relationship), where the development of a lower birth weight might be related to the duration or total “amount” of exposure to IPV during the pregnancy period. The associations that we have shown were biologically plausible, thus the associations make sense supported by various studies in the field. Some factors fit the criteria to prove causality, but they are not complete in this study. A possible non-causal explanation for the association may be that IPV could be a marker of other risk factors like damage to placenta after being hit or deprivation of proper food.

In our study, even though most health workers had met a pregnant client exposed to IPV seeking medical help, the majority had not received training regarding IPV management.

More than half of the participants were not confident about how to provide care to IPV survivors. Similarly, a qualitative study conducted in Jimma, Ethiopia showed that health care workers had a limited understanding of the adverse impacts of IPV on pregnancy outcomes and thus limited assistance was offered to the survivors [156]. This study accordingly emphasised the need for training in the management of IPV during pregnancy.

As mentioned earlier, a third of the health workers in our study said they would not consider acknowledging IPV unless they saw physical evidence. This result was in line with the aforementioned qualitative study in Jimma, which described that health workers only gave medical treatment for visible trauma during pregnancy [156]. This coincides with a Palestinian study, where health care workers primary focus on physical issues was mentioned as one of the barriers to domestic violence disclosure in health services [157].

6 Conclusion and recommendations

6.1 Conclusion

This thesis presents results from a study that enrolled pregnant women at the household level and followed up both them and their neonates. We also assessed the knowledge and attitudes of health workers about intimate partner violence (IPV) in the area. The conclusion for each specific objective is presented below.

In Paper I, we aimed to assess the magnitude of IPV and maternal depression during pregnancy and their risk factors and concluded that one in five pregnant women experience IPV, confirming that pregnancy does not protect women from IPV. Moreover, around 7% of the participants suffered from symptoms of depression. Rural residence, witnessing IPV during childhood, unwanted pregnancy, low social support, and depression were determinants of IPV. All three types of IPV were highly associated with depression. In addition to IPV, alcohol drinking by the husband appeared as a determinant of maternal depression and IPV.

In Paper II, we aimed to assess the association between IPV during pregnancy and the birth weight of the neonate, concluding that maternal exposure to IPV during pregnancy was associated with the lower birth weight of the neonate. Birth weight was also lower among girls, newborns delivered at home rather than at a health facility, and babies with a younger gestational age.

In Paper III, we aimed to assess the level of knowledge and attitudes of health workers towards their professional roles and survivors of IPV, and we concluded that up to around a third and half of health workers gave incorrect responses and showed negative attitudes. Moreover, around half

of the health workers felt unprepared to provide care to survivors of IPV, and a third of them would not consider the possibility of IPV unless there was physical evidence.

6.2 Recommendations

Based on the above conclusions for each paper, the recommendations that we suggest are presented below.

There should be efforts to better inform the public about providing social support, the potential negative consequences of IPV for mothers and babies, as well as the harmful effects of alcohol use by husbands, in order to reduce alcohol related IPV, depression and the harmful effects of witnessing IPV during childhood. Special attention should be given to those living in rural areas and unwanted pregnancy. It is also important to inform pregnant women about IPV and encourage them to disclose this to health workers whenever they experience it during pregnancy in order to receive help.

It is important to train health workers regarding when to suspect that a woman has been subjected to violence and what they should do when IPV is reported. Furthermore, training regarding IPV should be included in the curriculum of health workers. Policy should also include screening for both IPV and maternal depression during routine antenatal care combined with referrals of those cases to relevant available services. The efforts in identifying babies with lower birth weights at home should also receive due emphasis and be strengthened. As mental health problems are being increasingly identified, it is important to train and deploy mental health professionals in order to make mental health services accessible. Moreover, the police need to know that IPV is a trespass as any other violence. Health workers may need to involve police

based on the woman's request. Finally, we recommend a study on interventions to reduce IPV in settings like this.

7 References

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Original papers I-III and Supplementary information

Paper I

RESEARCH ARTICLE

Intimate partner violence and maternal depression during pregnancy: A community-based cross-sectional study in Ethiopia

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Abstract

Introduction

Intimate partner violence (IPV) is regarded an important public health and human rights issue, characterized by physical, sexual or emotional abuse. Globally more than one in three women report physical or sexual violence by their intimate partners. Though the association between IPV and depression is known, we found no study investigating depression as a risk factor for IPV and very few studies using standard tools in assessing both IPV and depression among pregnant women.

Aim

To measure the prevalence of IPV and depression during pregnancy and assess the association between IPV and depression and other determinants.

Methods

A community-based cross-sectional study was conducted among 589 pregnant women living in Wondo-Genet district, southern Ethiopia. IPV experience was assessed using a structured questionnaire of the World Health Organization (WHO), and maternal depression was measured by the Edinburgh Postnatal Depression Scale (EPDS). Descriptive statistics were computed and multivariable logistic regression was carried out to estimate risk and adjust for confounders.

Results

The overall prevalence of IPV was 21% (95% confidence interval [CI] = 18.1–24.7). After adjusting for potential confounders, increased risk of IPV remained among rural women (adjusted odds ratio[AOR] = 2.09; 95%CI = 1.06–4.09), women who had parental exposure to IPV (AOR = 14.00; 95%CI = 6.43–30.48), women whose pregnancy was not desired (AOR = 9.64; 95%CI = 3.44–27.03), women whose husbands used alcohol (AOR = 17.08; 95%CI = 3.83–76.19), women with depression (AOR = 4.71; 95%CI = 1.37–16.18) and

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women with low social support (AOR = 13.93; 95%CI = 6.98–27.77). The prevalence of antenatal depressive symptom (with EPDS score above 13) was 6.8% (95% CI 6.2–11.3). Increased risk of depression was found among women who had been exposed to IPV (AOR = 17.60; 95%CI = 6.18–50.10) and whose husbands use alcohol (AOR = 3.31; 95%CI = 1.33–8.24).

Conclusion

One in five pregnant women experienced IPV and it was strongly associated with depression. Screening for IPV and depression at antenatal visits with referral to relevant care and service is recommended.

Introduction

Intimate partner violence (IPV) is regarded as an important public health and human rights issue, and is characterized by physical, sexual or emotional abuse. Usually the woman is the victim. Globally, more than one in three women report having experienced physical or sexual violence by their intimate partner. According to a report developed by the World Health Organization (WHO), the London School of Hygiene and Tropical Medicine and the South African Medical Research Council, in all regions of Sub-Saharan-Africa, the prevalence of IPV among ever partnered women is above the global average of 30.0% [1, 2]. In Ethiopia, the reported life time prevalence of domestic violence against women ranges from 20% to 78% [3]. Several studies indicated that women who had experienced IPV before pregnancy, continued to suffer during pregnancy [4, 5]. Among pregnant women reported IPV prevalence ranges from 2% to 57% [6], as shown in a systematic review of mainly African studies. Pun and colleagues through their large prospective cohort study which recruited 2,004 pregnant women seeking antenatal care reported a 20% IPV during pregnancy [7]. The prevalence of IPV during pregnancy has been reported to be 30% in Tanzania [8], 35% in Vietnam [9] and 44% in Egypt [10]. A few studies conducted in Ethiopia reported the prevalence during the current pregnancy to range from 23% to 36% [11–14], suggesting that the magnitude is not far from the prevalence among non-pregnant women.

Previous research has shown that IPV during pregnancy is associated with fatal and non-fatal ill health for both the mother and the new-born. Demelash et al through their hospital based case-control study conducted among 129 cases and 258 controls demonstrated that mothers who experienced any type of IPV during pregnancy were three times more likely to have a newborn with low birth weight [11]. Sanchez et al through a case-control study showed that, exposure to any IPV during pregnancy had a two-fold increased odds of spontaneous preterm birth [15]. The association between IPV and low birth weight and preterm birth were also evidenced by studies conducted by Ibrahim et al [10], Hassan et al [16] and Koen et al [17]. A large cross-sectional survey conducted among 1180 pregnant women attending antenatal care in Dares Salaam, Tanzania by Mahenge and colleagues revealed significantly higher odds of post traumatic stress disorder, anxiety and depressive symptoms in women who experienced physical and or sexual IPV during pregnancy [18]. Several studies reported evidence in support of these associations [19, 20]. Smoking, alcohol use and poor utilization of maternal health care are also associated with IPV [5, 20–23].

The Ethiopian Health Sector Transformation Plan (HSTP) did not address the issue of violence in spite of a strong political momentum for addressing violence against women in health

and development agenda globally [24]. Recent studies conducted in Addis Ababa [25] and rural Ethiopia [26] linked IPV with depression; however, one focused on postnatal depression and the other assessed only the emotional aspect of IPV, making comparison difficult. Although it is known that unrecognized and untreated antenatal depression can persist as post-natal depression, few studies were conducted on assessing the prevalence of antenatal depression.

We found very few studies from Ethiopia using standard tools in assessing both IPV and depression among pregnant women. Therefore, we aimed to study IPV and depression among pregnant women. Our specific objectives were to: 1) measure the prevalence of IPV during pregnancy; 2) measure the prevalence of antenatal depression; 3) assess determinants of IPV; and 4) assess the determinants of antenatal depression. This study is part of a larger study on intimate partner violence in Sidama zone, southern Ethiopia.

Methods

Study design

This was a community based cross-sectional study conducted as part of a prospective cohort study from February to August, 2017.

Study setting

The study was conducted in Wondo Genet district which is one of the 19 districts located in Sidama zone of the Southern Nations, Nationalities and Peoples Region. The district had an estimated total population of 153,283 based on the 2007 population and housing census. The total population of reproductive age women was 35,715 and the expected number of pregnancy was 5,304 [27]. It has 3 urban and 12 rural kebeles and 16 health posts and 5 health centers serving the population.

Study population

Pregnant women living in Wondo-Genet district were the target population for this study.

The study population was pregnant women with gestational age 25–34 weeks enlisted by the Health Extension Workers (HEWs), living in the selected two urban and three rural kebeles. Those not currently living with an intimate partner were excluded.

Sample size and sampling

Sample size was estimated in order to have sufficient sample size to estimate the prevalence of IPV with a 5% precision, and calculated based on a presumed prevalence of 32% [13] and design effect of 1.5 to compensate for non-random sampling. Adding 10% for non-response settled for a sample size of 606.

Two urban and three rural Kebeles were selected purposively based on ethnic diversity, population size and convenience for data collectors. The pregnant women were enrolled through home visits using lists available at Health Extension Workers (HEWs). The sample size was allocated to each kebele based on the current available list of pregnant women provided by the one-to-five network leaders and HEWs. Pregnant women who fulfilled the inclusion criteria were consecutively enrolled in to the study until the required sample size was obtained.

Data collection and quality control

Data was collected using a structured questionnaire which composed of socio-demographic and obstetric characteristics, exposure to IPV and depression and social support received from different people. The questionnaire was translated into local languages (Sidaamu afoo) and Amharic and back to English by an expert on the local languages to ensure consistency. The translation and back translation of the EPDS was checked by a psychiatrist. A pilot study was conducted before commencing the actual data collection. Data was collected by face-to-face interview based on the questionnaire, and performed by five female field assistants. They had been trained for one week in interviewing techniques, based on WHO ethical guidelines for studies about violence experiences [28]. The data collection was closely supervised by two health officers and the principal investigator.

Variables

The main outcome variables were intimate partner violence and depression during current pregnancy. IPV was assessed using questions adapted from the WHO multi-country study on women's health and domestic violence against women questionnaire [29]. IPV exposure in "the past 12 month" in the WHO study was changed to "during this pregnancy" in this study since our focus was assessing IPV during pregnancy. Intimate partner violence was separated into three types of violence; 1) Physical violence (partner had slapped her with the palm of the hand; forced something to fall on her that could harm her; pushed her, hit her with fist or something else; kicked, dragged or beat her up; purposely choked or burnt her; or tried or actually used weapons); 2) Sexual violence (partner had physically forced her to have sexual intercourse; had sexual intercourse when she did not want to, because she was scared of what her partner might do; or had forced her to do something sexual that she found shameful); 3) Emotional violence (partner had insulted or made her to feel bad about herself; had belittled or humiliated her in front of other people; had done things purposely to frighten or intimidate her; and had tried to harm someone she cared about during the current pregnancy). Intimate partner violence during current pregnancy was coded "yes", if the woman had experienced any of the three types of violence. IPV was also used as a covariate for analysing risk of maternal depression.

Maternal depression was measured by ten questions of the Edinburgh Postnatal Depression Scale (EPDS) [30] validated in previous studies conducted in Ethiopia [31, 32]. Each of the EPDS items has a score of 0–3, which allowed the total score to range from 0–30. To identify women with depressive symptoms we used a cut-off point of 13 and above [33–35]. Reliability test was performed using Cronbach's alpha and was found to be 0.83, which indicated a high level of internal consistency of the items in the scale. Maternal depression was also used as a covariate for IPV as an outcome.

The covariates included in the analysis were age (years), own and partner's education (no education, primary and secondary and above), occupation (housewife and others), residence (rural and urban), income (<1500, 1500–2999 and >3000 Ethiopian Birr), age at first marriage (years), duration in marriage (years), parity (number of alive children), desired pregnancy (desired, not desired, don't know), history of violence between parents (yes, no, don't know), own and partner's use of alcohol, khat and cigarettes in the last 30 days (yes, no) and social support was measured by six items of the Maternity Social Support Scale [36]. Each item of the MSSS has a score of 1–5, which allowed the total score to range from 6–30 (low <18, medium 18–23 and high social support 24–30).

Data analysis

Data was double entered by two data entry clerks using Epi-Data v.3.1 software (Odense, Denmark) and was analyzed using SPSS version 20 software. Means, frequency and percentages were computed. Bivariate and multivariable logistic regression analysis was carried out to assess determinants of IPV and determinants of depression, and adjust for potential confounders. The multivariable model was built by entering variables with associations $p < 0.25$ using “Enter” method. Multicollinearity was checked using Collinearity diagnostics. Model goodness of fit was assessed using Hosmer and Lemeshow goodness-of-fit. Statistical significance was set at p -value ≤ 0.05 and odds ratios with 95% confidence interval (CI) were reported.

Ethics considerations

Ethical approval was obtained from the Institutional Review Board (IRB) at the College of Medicine and Health Sciences, Hawassa University (Ref No: IRB/006/09) and regional ethical committee of Western Norway (Ref No: 2016/1908/REK vest). In the study area generally people do not like to sign, as they are skeptical to signing any official document; informed oral consent was approved by IRB and was acceptable to participants. It was obtained from each participant, and recorded by the interviewer. The study followed the ethical and safety guidelines recommended by the World Health Organization [28]. All the interviews were done with only the participant woman present. Information about available support was given to all women who participated in the study and those who wanted psychological support, were referred to Kela health center to get counseling, and a woman requesting legal support was referred to a relevant body, supported by the study project.

Results

[Table 1](#) shows the socio-demographic characteristics of the participants. A total of 589 pregnant women out of 606 invited were interviewed and enrolled, making a response rate of 97%. The mean age of the participants was 25 years, ranging from 16 to 45 years. Almost half (49.2%) of the participants had attended primary education, while one in five had no formal education. The majority (80.1%) of the participants were housewives. Almost half (48.8%) of their husbands had attended secondary education.

Emotional abuse had been experienced by 86 of the pregnant women (14.6%), sexual abuse by 56 (9.5%) and physical abuse by 54 of the women (9.2%). Many had been exposed to several of these types of IPV. Intimate partner violence of any kind had been experienced by 125 out of 589 pregnant women, making the overall prevalence 21.2%.

[Table 2](#) shows that there was an association between each type of IPV and depression during pregnancy ($p < 0.001$).

[Table 3](#) shows determinants of IPV among the participants. The adjusted risk of IPV was higher among pregnant women who were rural residents, who had as a child witnessed IPV among their parents, in which their pregnancy was not desired, reporting alcohol use by their husband, had low social support and for pregnant women who had depressive symptoms.

The prevalence of antenatal depressive symptom among the participants (with EPDS score above 13) was 6.8% (95% CI 6.2–11.3).

[Table 4](#) shows determinants of depression among participants; women exposed to IPV had a much higher risk of depression. Women whose husbands drank alcohol had 3 times higher risk of depression.

Table 1. Socio-demographic characteristics of pregnant women in Wondo Genet district, Ethiopia, 2017.

Characteristics	Number (N = 589)	Percent (%)
Age		
15–19	41	7.0
20–24	192	32.6
25–29	254	43.1
≥30	102	17.3
Parity		
Nulli parous	129	21.9
Primi parous	155	26.3
Multi parous	246	41.8
Grand multi para	59	10
Education		
No education	145	24.6
Primary	290	49.2
Secondary and above	154	26.1
Occupation		
Housewife	472	80.1
Others ^a	117	19.9
Religion		
Protestant	540	91.7
Others ^b	49	8.3
Ethnicity		
Sidama	404	68.6
Oromo	99	16.8
Others ^c	86	14.6
Residence		
Rural	304	51.6
Urban	285	48.4
Monthly income (Ethiopian birr)		
<1500	273	46.3
1500–2999	214	36.3
≥3000	102	17.3
Educational status of husband		
No education	113	19.2
Primary	188	32.0
Secondary and above	287	48.8

^aOthers occupation = Merchant, Government employee, and Daily laborer

^bOthers religion = Orthodox Christian, Muslim and Catholic Christian

^cOthers ethnicity = Wolayta, Amhara, Gurage, Hadiya and Selte

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Discussion

In this community based study in southern Ethiopia we found that more than 20% of pregnant women suffer from intimate partner violence: emotional violence in 15% of participants, physical in 10% and sexual in 10%, many with a combination. Pregnancy seems not to protect against IPV. We also found that around 7% of them suffered from clinical symptoms of depression. There was a very strong association between IPV and depression.

Table 2. Association between the different types of IPV and depression.

	All	Depression		P-value
		Depressed	Not depressed	
Emotional IPV				
No	503	14 (2.8)	489 (97.2)	<0.001
Yes	86	26 (30.2)	60 (69.8)	
Physical IPV				
No	535	18 (3.4)	517 (96.6)	<0.001
Yes	54	22 (40.7)	32 (59.3)	
Sexual IPV				
No	533	18 (3.4)	515 (96.6)	<0.001
Yes	56	22 (39.3)	34 (60.7)	

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Our prevalence figures of IPV are consistent with other studies from sub-Saharan Africa focusing on IPV during pregnancy showing prevalence of 25.8% and 23% in Ethiopia [11, 12], 27.7% in Uganda and [37], 28.7% in Nigeria [38]. All these papers used standard and validated tools, had fairly large sample size, are fairly recent, and has a reliable selection of similar participants in terms of setting and residence. Our prevalence figure was also within the range indicated in a systematic review of African studies [6].

There are also some studies about IPV in Africa that showed a higher prevalence of IPV than ours. A community based cross sectional study conducted in Abay Chomen district of Ethiopia showed 44.5% [39] and in Hulet Ejju district of Ethiopia reported 32.2% [13]. The difference in prevalence might be explained by cultural differences of the study areas. In addition, these studies were done in predominantly rural areas, whereas ours was conducted both in rural and urban kebeles. Our finding also confirmed that there was more reported violence in the rural areas. A study conducted in Kenya reported 37% prevalence of IPV, and this study was conducted among pregnant women seeking antenatal care in a district hospital [40]. A review indicated frequent use of health service by women who have experienced IPV [20]. As the Kenyan study was conducted among women visiting a hospital the likelihood of getting women who have experienced IPV is higher than in a community based study. The authors of the Kenyan study themselves acknowledged that the study was conducted in one hospital and consequently that it may not be representative and the reported prevalence was higher than many other studies. Cultural differences could also account for such differences. A study in Tanzania reported 30.3% prevalence of IPV among pregnant women recruited before 24 weeks of gestation [8]. The higher consumption of alcohol by the participants (11%) of the Tanzanian study, and the significant association between alcohol consumption and exposure to IPV might result in higher prevalence in this Tanzanian study than ours. The higher prevalence in the Tanzanian study might also be due to more assertive women so that they tend to disclose IPV as supported by the Tanzanian DHS that more than half of the women who experienced violence sought help from someone to stop the violence [41].

A community based predominantly rural study from Ethiopia reported a 5% IPV prevalence [26]. The lower prevalence could be due to using a different assessment tool. A study from Ghana showed a lower prevalence of IPV (5%), which was collected using tools not standardized for IPV. They assessed only physical violence and used data collected during a demographic and health survey; such a multipurpose study might result in under-reporting as the topic is so sensitive we think they may have missed several cases [42]. A Nigerian study among women in a tertiary hospital reported a prevalence of 2.3%, there may be selection bias with

Table 3. Determinants of intimate partner violence among pregnant women in Wondo Genet district, Ethiopia, 2017.

Characteristics	Total participants	Participants with IPV	Crude odds ratio (95%CI)	Adjusted odds ratio ¹ (95%CI)
All participants	589	125		
Age				
15–19	41 (7.0%)	7 (17.1%)	0.47 (0.19–1.18)	0.58 (0.09–3.81)
20–24	192 (32.6%)	43 (22.4%)	0.66 (0.39–1.14)	0.74 (0.21–2.59)
25–29	254 (43.1%)	44 (17.3%)	0.48 (0.28–0.82)	0.72 (0.25–2.03)
>30	102 (17.3)	31 (30.4%)	1	1
Education				
No education	145 (24.6%)	26 (17.9%)	0.69 (0.42–1.14)	0.55 (0.24–1.25)
Primary	290 (49.2%)	70 (24.1%)	1	1
Secondary and above	154 (26.1%)	29 (18.8%)	0.73 (0.45–1.19)	0.99 (0.42–2.29)
Occupation				
Housewife	472 (80.1%)	86 (18.2%)	1	1
Others	117 (19.9%)	39 (33.3%)	2.24 (1.43–3.52)	1.91 (0.92–3.97)
Residence				
Rural	304 (51.6%)	70 (23.0%)	1.25 (0.84–1.86)	2.09 (1.06–4.09)
Urban	285 (48.4%)	55 (19.5%)	1	1
Income				
<1500	273 (46.3%)	70 (25.6%)	2.00 (1.09–3.69)	0.61 (0.22–1.70)
1500–2999	214 (36.3%)	40 (18.7%)	1.33 (0.70–2.55)	0.99 (0.35–2.78)
>3000	102 (17.3%)	15 (14.7%)	1	1
Age at first marriage				
12–18	338 (57.4%)	65 (19.2%)	0.74 (0.50–1.11)	
19–25	239 (40.6%)	58 (24.3%)	1	
26–32	12 (2.0%)	2 (16.7%)	0.62 (0.13–2.93)	
Duration in marriage				
<5 years	254 (43.1%)	54 (21.3%)	0.71 (0.42–1.18)	0.62 (0.19–2.04)
6–10 years	223 (37.9%)	40 (17.9%)	0.57 (0.33–0.98)	0.70 (0.25–1.95)
>10 years	112 (19.0%)	31 (27.7%)	1	1
Parity				
0	129 (21.9%)	26 (20.2%)	0.94 (0.57–1.54)	
1–4	401 (68.1%)	85 (21.2%)	1	
>4	59 (10.0%)	14 (23.7%)	1.16 (0.61–2.21)	
Violence between parents*				
No	352 (59.8%)	33 (9.4%)	1	1
Don't know	116 (19.7%)	22 (19.0%)	2.26 (1.26–4.07)	1.50 (0.61–3.66)
Yes	118 (20.0%)	70 (59.3%)	14.10 (8.44–23.55)	14.00 (6.43–30.48)
Pregnancy desiredness				
Not desired	45 (7.6%)	31 (68.9%)	10.76 (5.50–21.02)	9.64 (3.44–27.03)
Don't know	11 (1.9%)	3 (27.3%)	1.82 (0.47–7.00)	0.59 (0.06–5.81)
Desired	533 (90.5%)	91 (17.1%)	1	1
Husband's education*				
None	113 (19.2%)	27 (23.9%)	0.97 (0.56–1.67)	1.12 (0.44–2.83)
Primary	188 (32.0%)	46 (24.5%)	1	1
Secondary & above	287 (48.8%)	52 (18.1%)	0.68 (0.44–1.07)	1.12 (0.52–2.45)
Alcohol use by husband				
No	527 (89.5%)	82 (15.6%)	1	1
Yes	62 (10.5%)	43 (69.4)	12.28 (6.81–22.14)	17.08 (3.83–76.19)

(Continued)

Table 3. (Continued)

Characteristics	Total participants	Participants with IPV	Crude odds ratio (95%CI)	Adjusted odds ratio ¹ (95%CI)
Khat use by husband				
No	526 (89.3%)	93 (17.7%)	1	1
Yes	63 (10.7%)	32 (50.8%)	4.81 (2.79–8.27)	1.30 (0.33–5.11)
Depressive symptom²				
No	549 (93.2%)	91 (16.6%)	1	1
Yes	40 (6.8%)	34 (85.0%)	28.52 (11.64–69.91)	4.71 (1.37–16.18)
Social support				
Low	166 (28.2%)	97 (58.4%)	19.83 (12.12–32.44)	13.93 (6.98–27.77)
High	423 (71.8%)	28 (6.6%)	1	1

¹ Adjusted for age, educational status of the mothers and their husband, occupation, residence, income, duration in marriage, violence between parent’s, pregnancy desiredness, alcohol and khat use by husband, depressive symptom and social support.

² According to the Edinburgh Postnatal Depression Scale

CI: confidence interval

*: missing information from few participants.

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many women of relatively higher socioeconomic status not representative for the community, as well as reporting bias [5].

In agreement with previous studies [5, 8, 14, 43–45], this study revealed that rural residence, parental exposure to IPV, undesired pregnancy, low social support, depression and use of alcohol by husbands were determinants of IPV. The higher prevalence in rural areas may be related to various misconceptions held by the community that accepts violence. Though the exact mechanism how social support reduces IPV exposure not known, various studies [8, 43, 44] indicated the link between the two.

Our prevalence figure of depressive symptoms was close to figures reported by three studies conducted in Ethiopia ranging from 10.8% to 12% [26, 46, 47]. It is also comparable with a situational analysis result in five low and middle income countries including Ethiopia [48], a study conducted in Malawi [49] and Nigeria [50]. This could be due to the similarity in the setting and time at which the data was collected (antenatal vs postnatal). However several studies reported a higher prevalence figure ranging 23% to 34% [25, 51–55]. Possible reasons might be differences in time at which the data was collected and the screening tool they used.

In order to design prevention strategies based on the patterns found, it is useful to know which specific type of IPV had been associated with depression. Our analysis revealed that all types of IPV were highly associated with depression. This result was evidenced by a population based study conducted on 720 pregnant women in rural Bangladesh which reported an association between physical violence and antepartum depressive symptoms [56]. Varma and colleagues also reported higher depression symptoms in pregnant women with history of sexual abuse [57]. This result highlights the need for due considerations for all types of IPV.

Consistent with previous studies conducted in Ethiopia [26, 33], Malawi [49], Nepal [58] and Bangladesh [59] in this study, exposure to IPV during pregnancy and alcohol use by husband were determinants of antenatal depressive symptoms. Intimate partner violence is among the chronic stressful conditions that increases the risk of depression. Several studies indicated that stressful life events are among the factors significantly associated with depressive symptoms [60–62].

The close association between IPV and depression is not surprising. It is very common to see the conditions in the same individuals, but it is not possible to say which one is cause and

Table 4. Determinants of depression¹ among pregnant women in Wondo Genet district, Ethiopia, 2017.

Characteristics	Total participants N (%)	Participants with depression N (%)	Crude odds ratio (95%CI)	Adjusted odds ratio ² (95%CI)
All	589 (100)	40 (6.8)		
Age				
15–24	233 (39.6)	16 (6.9)	1	1
25–34	332 (56.4)	22 (6.6)	0.96 (0.49–1.88)	1.68 (0.68–4.14)
35–45	24 (4.0)	2 (8.3)	1.23 (0.27–5.72)	2.05 (0.32–13.23)
Residence				
Rural	304 (51.6)	25 (8.2)	1	1
Urban	285 (48.4)	15 (5.3)	0.62 (0.32–1.20)	0.56 (0.23–1.34)
Income				
<1500	273 (46.3)	32 (25.6)	6.64 (1.56–28.23)	4.06 (0.82–19.98)
1500–2999	214 (36.3)	6 (18.7)	1.44 (0.29–7.27)	0.97 (0.16–5.83)
≥3000	102 (17.3)	2 (2.0)	1	1
Pregnancy desiredness				
Not desired	45 (7.6)	8 (17.8)	3.63 (1.55–8.47)	1.12 (0.39–3.18)
Don't know	11 (1.9)	2 (18.2)	3.73 (0.77–18.01)	2.66 (0.31–23.10)
Desired	533 (90.5)	30 (5.6)	1	1
Exposure to IPV				
No	464 (78.8)	6 (1.3)	1	1
Yes	125 (21.2)	34 (27.2)	28.52 (11.64–69.91)	17.60 (6.18–50.10)
Education				
No education	145 (24.6)	6 (4.1)	0.51 (0.19–1.40)	0.48 (0.13–1.72)
Primary	290 (49.2)	22 (7.6)	0.97 (0.47–2.02)	0.73 (0.28–1.88)
Secondary and above	154 (26.1)	12 (7.8)	1	1
Occupation				
Housewife	472 (80.1)	25 (5.3)	1	1
Others	117 (19.9)	15 (12.8)	2.63 (1.34–5.17)	1.65 (0.71–3.3.82)
Alcohol use by husband				
No	527 (89.5)	23 (4.4)	1	1
Yes	62 (10.5)	17 (27.4)	8.28 (4.12–16.62)	3.31 (1.33–8.24)
Parents violence				
No	352 (59.8)	8 (2.3)	1	1
Don't know	116 (19.7)	13 (11.2)	5.43 (2.19–13.45)	3.42 (1.14–10.26)
Yes	118 (20.0)	19 (16.1)	8.25 (3.51–19.42)	1.74 (0.61–4.97)

¹Depression was assessed using the Edinburgh Postnatal Depression Scale.

²Adjusted for age, educational status, occupation, residence, income, violence between parents, pregnancy desiredness, alcohol use by partner and exposure to IPV.

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which one is effect. A systematic review and meta-analysis of longitudinal studies indicated a double risk of incident depressive symptoms among women exposed to IPV and a double risk of incident IPV among depressed women [63]. Depression can make the daily life miserable so that the partner uses IPV, or IPV may be so devastating that the woman develops depression. With our study design we cannot conclude about causation.

This study had several strengths. A fairly large sample size with a good response rate should reflect the situation in the study area. The use of standardized validated tools ensured a fair reliability and validity of our findings. Also, the interview setting ensured confidentiality which is crucial in sensitive topics. Still, the estimated prevalence of IPV in our study should probably be regarded as minimum because of the sensitive topic that makes over-reporting

unlikely. The study also had some limitations. The study did not consider the presence of other co-morbid mental health conditions that could contribute to depression, such as anxiety and stress, which could create confounding effects.

Conclusions

In our study one in five pregnant women experienced domestic violence, confirming that pregnancy does not protect from IPV; and it was strongly associated with depression. There is a need for a change in mentality in the society about IPV; this may help survivors of IPV to know that this is not “normal” but wrong and illegal. Screening for IPV at routine antenatal care can make it more open, but must be combined with an action plan with links to relevant services. There is a need to increase community awareness about the harmful effects of alcohol use by husband in order to reduce alcohol related IPV and depression. Future studies should focus on testing interventions to prevent and reduce IPV.

Supporting information

S1 File. Questionnaire used to conduct the study in Wondo Genet district, Ethiopia, 2017. (PDF)

S2 File. Raw data used to construct Tables 1, 2, 3 and 4 in Wondo Genet district, Ethiopia, 2017. (SAV)

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Paper II



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Birth weight was associated with maternal exposure to intimate partner violence during pregnancy in southern Ethiopia: A prospective cohort study

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Introduction: Birth weight is defined as the first weight of the newborn, ideally measured soon after birth. A recent Ethiopian survey estimated that 48% of births took place in health facilities. Data for women exposed to intimate partner violence (IPV) may be lacking in official statistics because these women may prefer to deliver at home, where data from non-institutional births, including reporting of birth weights, are not routinely recorded.

Objective: The aim of this study was to investigate the association between maternal exposure to IPV during pregnancy and birth weight in a community in the Wondo Genet district of southern Ethiopia.

Methods: We carried out a community-based prospective cohort study from February to December 2017. We followed up with 505 pregnant women and their newborns until after delivery. An interview about partner violence was done during pregnancy at home when enrolled. Field assistants who visited the homes measured the birth weight of each baby in grams. Twins and late birth weight measurements were excluded. Factors associated with birth weight were assessed by multiple linear regression.

Results: Birth weight was assessed within 48 h for 477 (94.5%) newborns and between 48 and 72 h for an additional 28 (5.5%). There were 365 (72.3%) institutional deliveries. In an adjusted regression analysis (IPV adjusted for socio-economic status), birth weight was 203 g lower (B = -203 95% CI = -320 to -87) among newborns of women exposed to IPV than among the unexposed. Birth weight was also lower in girls than in boys, in newborns delivered at home rather than in a health facility, and in babies with a younger gestational age.

Conclusion: Maternal exposure to IPV during pregnancy was associated with lower baby birth weights. Antenatal clinics should consider routinely identifying IPV-exposed women, and identifying babies with lower birth weights at home is an important indicator.

KEYWORDS

birth weight, newborn, intimate partner violence, pregnancy, Ethiopia

Introduction

The birth weight of a fetus is an indicator of intrauterine growth and is the result of interactions between genetic, environmental, and social factors (1). Birth weight is defined as the first weight of the fetus or the newborn obtained after birth, ideally measured as soon as possible after birth to avoid the normal slight loss of bodyweight post-partum (2). The World Health Organization defines low birth weight (LBW) as a birth weight of <2,500 grams (5.5 pounds), irrespective of gestational age (2). LBW is either the result of preterm birth or restricted fetal growth (3). In 2015, 15% of babies globally (20.5 million) had LBW. About 25% of all babies with low birth weight are found in Africa, with the highest proportion being located in Eastern and Western Africa (4). Lower birth weight is also associated with increased perinatal and infant mortality (5). Babies with low birth weight have a higher risk of wasting, stunting, and being underweight during childhood (6). They also have increased risks later in life for being overweight, obese, and for developing several diseases, including diabetes mellitus (7). In 2012, the World Health Assembly published plans aiming to reduce the low birth rate by 30% before 2025 (8).

Does intimate partner violence (IPV) during pregnancy harm the baby? A systematic review and meta-analysis of studies conducted mainly in high-income countries showed that women who experienced IPV during pregnancy had an 18% higher chance of having a baby with LBW (9). A large study in Vietnam found that household economy and the educational status of the woman were factors associated with birth weight (10). Moreover, LBW was more common among neonates of mothers with prior experience of stillbirth, abortion, and heavy physical activities (11–13).

In Ethiopia, the proportion of newborns with LBW has been reported to be between 8 and 28% (14, 15). A Demographic and Health Survey (DHS) in 2016 suggested a national level of 13% (16). A national survey published in 2019 estimated that 48% of births took place in health facilities (17). This means that more than half of Ethiopian births are non-institutional, and data on them, including birth weights, are not routinely recorded.

An earlier study in Ethiopia showed a 37% increased risk of LBW in pregnancies exposed to IPV; however, this study was only undertaken at two hospitals (18). Women exposed to IPV may prefer to deliver at home (19). We recently reported the prevalence of IPV among pregnant women in Ethiopia to be around 20%, with a higher prevalence among rural women than among urban women (20). Therefore, the aim of the current study was to investigate the association between exposure to IPV during pregnancy and birth weight within a community involving women in different home settings.

Materials and methods

Study setting

The study was conducted in the Wondo Genet district located in the former Sidama zone of the Southern Nations, Nationalities, and Peoples Region (SNNPR). Based on the 2007 census and an annual population growth rate of 2.7% (21), the district's projected total population in 2017 was 200 078. The number of women of reproductive age was estimated to be 46 618 with 6 923 expected pregnancies in a year. Wondo Genet district has a high population density and ethnic diversity. The district has three urban and 12 rural kebeles (Kebele is the smallest administrative unit in Ethiopia). There are 16 health posts and five health centers serving the population. The nearest hospital is in a neighboring district. Among the pregnant women attending antenatal care, 88% had four visits in 2016; only 10% of women in this area delivered at home (Wondo Genet district health office report, 2017). The 2016 Ethiopian DHS indicated that around 69% of women attended antenatal care at least once during their last pregnancy and institutional delivery was 26% in the region (SNNPR). Among women who delivered their most recent live birth in a health facility, 53% of them stayed in the facility for up to 11 h following vaginal birth (16). In this study area, women are often discharged from health facilities 6 h after a normal delivery.

Study design and participants

This was a community-based prospective cohort study investigating IPV. It was conducted between February and December 2017 among pregnant women who were enrolled at gestational age 25–34 weeks as listed by health extension workers (22) in two urban and three rural kebeles of the Wondo Genet district. The mothers and their babies were visited at home. We excluded twins and mother–baby pairs with late (i.e., invalid) birth weight measurements. In this article, we focused on IPV and its association with birth weight.

Sample size and sampling procedure

The sample size to investigate the association between IPV and birth weight was calculated using OpenEpi version 3.03 software (23). The total sample size was estimated to be at least 435 based on an average birth weight of 3,000 g among unexposed and 2,850 g among exposed, with standard deviations of 423 g and 450 g, a ratio of unexposed to exposed of 4:1 (20), 80% statistical power, and 95% confidence level. The present work was part of a larger project (20) that required a sample size larger than this, so the sample size requirement for this study was met.

Pregnant women living in the selected kebeles were enrolled through home visits. The sites were identified as being “urban” or “rural” according to the Ethiopian DHS definition of these terms (16). The selection of kebeles was decided based on the number of pregnant women in the areas as reported by the health extension workers. Pregnant women who fulfilled the inclusion criteria were consecutively enrolled in the study until the required sample size was obtained.

Variables

The main outcome variable was birth weight measured in grams. The main exposure variable for this study was IPV during pregnancy, assessed in a home visit at enrollment using questions adapted from the WHO multi-country study questionnaire on women's health and domestic violence against women (24). In the present study, IPV exposure in “the past 12 months” in the WHO study was changed to “during this pregnancy.” IPV was classified as being physical, sexual, or emotional. The respondents were given examples of physical violence including: partner had slapped or thrown something at her that could hurt her, pushed or shoved her, hit her with fist or something else that could hurt her, kicked, dragged or beaten her up, choked or burnt her on purpose, threatened to use or actually used a gun, knife, or other weapon against her. Examples of sexual violence included: partner had physically forced her to have sexual intercourse when she did not want to, had sexual intercourse when she did not want to because she was afraid of what her partner might do, and had forced her to do something sexual that she found degrading or humiliating. Examples of emotional violence included: partner had insulted her or made her feel bad about herself, had belittled or humiliated her in front of other people, had done things to scare or intimidate her on purpose, and had threatened to hurt someone she cared about. If the woman had experienced any of the three types of violence defined above, she was categorized as “IPV exposed.”

Other covariates included the mother's age (years), educational status of the mother and her partner (no education/primary/secondary and above), monthly income (Ethiopian Birr), residence (rural/urban), prior history of preterm birth and stillbirth (no/yes), antenatal care at least one visit (no/yes), smoking (no/yes), and regular alcohol use (no/yes) by participants or their partner. The Edinburgh Postnatal Depression Scale (EPDS) was used to measure maternal depression (25), and has been validated by previous studies in Ethiopia (26). Each of the 10 items in the EPDS has scores of 0–3; giving a maximum score of 30. Maternal depression was measured as a continuous variable with an EPDS score; we defined depression in this analysis as an EPDS score of 13 or more (27). A Maternity Social Support Scale with six items was used to measure social support. Each item has a score of 1–5, and the total score ranges from 6 to 30. Social support

was categorized as low (score 0–18), medium (score 19–24), and high (score > 24) (28). Maternal malnutrition was assessed by mid-upper arm circumference (MUAC) and was measured in centimeters; undernutrition was set at MUAC <23 cm. The sex of the newborn (male/female/unknown) and its birth order (first/second and above) were recorded.

Data collection

The data were collected between February and December 2017. The data used to achieve the objectives of the present study are the same as described for the previously mentioned survey of IPV in the study area (20), with the same baseline data. We added follow-up data on birth characteristics, such as time of birth; whether the birth was live or not; sex of the newborn, and birth weight collected at a home visit as soon as possible within 72 h (time after delivery was noted for each participant). We collected data on selected variables that could be potential confounders. The main exposure variables were collected by trained data collectors using a structured and pretested questionnaire. The exposure status was determined based on the survey data from the baseline study. Birth weight was measured using a digital baby scale (Beurer BY 80), and the reliability of the scale was routinely checked by regularly measuring something of known weight. The mid-upper arm circumference (MUAC) was measured using a centimeter tape at the midpoint between the shoulder and elbow with the arm hanging down at the side relaxed. A MUAC below 23 cm defined a participant as being “malnourished.” The woman was asked for the date of her last menstrual period, which was used to calculate gestational age. When the exact date was unknown, the mother was asked to provide the alleged month.

The field assistants actively sought out the women in person to check for delivery. They also used mobile phones. In addition, they were notified through mobile phone by the 1-to-5 network leaders as well as by the participants themselves, so that they recorded the exact date and time of birth for all births, whether they took place at home or at a health facility. The field assistants measured birth weight using a digital scale as soon as possible after delivery according to the operating instructions. They also recorded whether it was a live birth or stillbirth. Based on the last menstrual period, the principal investigator later determined whether the birth was term or not.

Data analysis

Data were analyzed using SPSS version 20 (Armonk, NY: IBM Corp. USA) software. Chi-square and Fisher's exact tests were used to compare categorical variables. Mean values were compared using *t*-tests and analyses of variance. Multiple linear regression was performed to investigate the association between

birth weight and maternal exposure to IPV during pregnancy (shown in Table 3). Other selected determinants were also studied. Preliminary analyses ensured that there was no violation of the assumption of normality, linearity, multicollinearity, and homoscedasticity. Complete case analysis was used for missing values to minimize potential bias. Variables having a correlation with birth weight at $p < 0.2$ levels and socio-economic and demographic variables were entered in the adjusted regression model. Maternal age, MUAC, and monthly income were entered as continuous variables. An adjusted regression coefficient (B) with a 95% confidence interval was reported. A p -value was considered statistically significant when < 0.05 . Sensitivity analysis was also performed in a group of neonates whose birth weights were taken within the first 48 h after birth. We also analyzed risk factors for LBW (birth weight $< 2,500$ g) using logistic regression analysis (data not presented in a table).

Ethical consideration

The study was conducted after obtaining approval from the Institutional Review Board (IRB) at the College of Medicine and Health Sciences, Hawassa University (Ref No: IRB/006/09) and regional ethical committee of Western Norway (Ref No: 2016/1908/REK vest). Permission from the parents as well as assent was obtained for those < 18 years. In this setting, written consent was not culturally acceptable, but participants were comfortable with oral consent. Informed oral consent was obtained from each participant > 18 years and recorded by the interviewer, according to the protocol approved by IRB. The study followed the ethical and safety guidelines recommended by the World Health Organization (29). All women who participated in the study were given information about the psychological and legal support available and how access could be provided if needed. This support would be paid for by the study project.

Results

Out of 589 pregnant women enrolled in the large follow-up study, we excluded 84 cases from the analysis: including eight women with twins, one preterm and two stillborns, 22 cases where the mother refused to have the baby weighed, 26 assessed after 72 h, two early neonatal deaths and 23 lost to follow-ups.

Table 1a shows the socio-demographic characteristics of the pregnant women enrolled in the large follow-up study, comparing women whose babies were weighed with those whose babies were not. Women with missing birth weights formed a significantly lower proportion of these participants. They tended to be rural dwellers, women with no formal education, women of the protestant religion, and women whose husbands were farmers. Otherwise, the characteristics of these women

were not significantly different from the women for whom birth weights were collected. Among the 505 mother-singleton newborn pairs who were analyzed for birth weight, the mean age of the mothers was 25 years, ranging from 16 to 45. A quarter (26%) of the women had no formal education and many (80.8%) were housewives. Only five participants (1.0%) responded that during the current pregnancy they had been drinking alcohol and one (0.2%) that she had been smoking; therefore, alcohol and smoking were not included in any further analysis of determinants. Among the 505 births, 365 (72.3%) took place at health facilities and 140 (27.7%) were home deliveries.

Table 1b shows the clinical characteristics of the pregnant women enrolled in the large follow-up study, comparing women whose babies were weighed with those whose babies were not, and there was no significant difference between them. The mean maternal MUAC was 24.2 (standard deviation = 1.9) cm.

Birth weight was assessed within 24 h for 234 (46.3%) newborns, between 24 and 48 h for 243 (48.1%) newborns, and between 48 and 72 h for 28 (5.5%) newborns. Mean birth weight by mother's characteristics is shown in Tables 2a,b. The mean birth weight among all singleton newborns was 3,222 grams (range 2,048–4,325 g) and was similar irrespective of the day of measurement: Day 1 mean 3,205 g (95% CI 3,147–3,264 g); Day 2 mean 3,244 g (95% CI 3,183–3,305 g); and Day 3 mean 3,159 g (95% CI 2,946–3,372 g). The mean birth weight among newborns of women who had experienced IPV was lower (3,054 g, 95% CI 2,962–3,147) than among newborns of women not exposed to IPV (3,269 g, 95% CI 3,223–3,314). The mean birth weight was significantly higher among newborns of Protestant mothers; mothers whose husbands did not drink alcohol; and mothers with no prior history of preterm birth and stillbirth. In a one-way ANOVA, there was no statistically significant difference in the mean birth weight between the different categories of residence, age, occupational status, MUAC, birth order, and sex of the newborn, and also among the different categories of income, educational status of the woman, educational status, and occupational status of the husband (Tables 2a,b).

Associations between birth weight and potential determinants including maternal exposure to IPV during pregnancy were analyzed by multivariable linear regression and are shown in Table 3. In adjusted regression analysis babies of mothers exposed to IPV had 203 g (B -203 95% CI -320 to -87) lower birth weight than babies of mothers without. Babies born at health facilities had higher birth weight than those born at home; girls had a lower birth weight than boys; and increasing gestation was associated with higher birth weight. Prior stillbirth and prior preterm delivery were associated with birth weight in the crude analysis but were not statistically significant in the adjusted analysis.

Low birth weight ($< 2,500$ g) was found in 42 babies (8.3%). It was identified among 23 of the newborns of women exposed to IPV (20.9%; 95% CI 14.1–29.3),

TABLE 1A Socio-demographic characteristics of pregnant women enrolled in the study whose baby's birth weight was measured or not, in Wondo Genet district, Ethiopia, 2017.

Characteristics	Birth weight measurement			P-value
	Total participants, n (%)	Missing, n (%)	Measured, n (%)	
Total	589 (100)	84 (100)	505 (100)	
Residence				
Rural	304 (51.6)	32 (38.1)	272 (53.9)	0.007
Urban	285 (48.4)	52 (61.9)	233 (46.1)	
Age of the mother				
15–24 years	233 (39.6)	35 (41.7)	198 (39.2)	0.670
25–45 years	356 (60.4)	49 (58.3)	307 (60.8)	
Education of the mother				
No education	145 (24.6)	12 (14.3)	133 (26.3)	0.018
Formal education	444 (75.4)	72 (85.7)	372 (73.7)	
Occupation of the mother				
Housewife	472 (80.1)	64 (76.2)	408 (80.8)	0.328
Others	117 (19.9)	20 (23.8)	97 (19.2)	
Monthly income (ETB*)				
<1,500	273 (46.3)	38 (45.2)	235 (46.5)	0.742
1,500–2,999	214 (36.3)	29 (34.5)	185 (36.6)	
≥3,000	102 (17.3)	17 (20.2)	85 (16.8)	
Religion of the mother				
Protestant	540 (91.7)	71 (84.5)	469 (92.9)	0.010
Others	49 (8.3)	13 (15.5)	36 (7.1)	
Alcohol drinking by mother				
No	583 (99.0)	83 (98.8)	500 (99.0)	1.000
Yes	6 (1.0)	1 (1.2)	5 (1.0)	
Husband's education				
No education	113 (19.2)	11 (13.1)	102 (20.2)	0.091
Primary	188 (31.9)	23 (27.4)	165 (32.7)	
Secondary and above	288 (48.9)	50 (59.5)	238 (47.1)	
Husband's occupation				
Farmer	251 (42.6)	23 (27.4)	228 (45.1)	0.011
Merchant	168 (28.5)	26 (31.0)	142 (28.1)	
Government employee	44 (7.5)	9 (10.7)	35 (6.9)	
Others	126 (21.4)	26 (31.0)	100 (19.8)	
Alcohol drinking by husband				
No	527 (89.5)	74 (88.1)	453 (89.7)	0.657
Yes	62 (10.5)	10 (11.9)	52 (10.3)	
Social support				
Low	40 (6.8)	9 (10.7)	31 (6.1)	0.247
Medium	126 (21.4)	15 (17.9)	111 (22.0)	
Adequate	423 (71.8)	60 (71.4)	363 (71.9)	

*ETB, Ethiopian Birr. P-value from chi-square test.

compared to 19 among newborns of women not exposed to IPV (4.8%; 95% CI: 3.0–7.3). This represents a risk ratio of 4.3.

Maternal undernutrition (thinness) and exposure to IPV during pregnancy were significantly associated with LBW in the multivariate logistic regression analysis after controlling

TABLE 1b Clinical characteristics of pregnant women enrolled in the study whose baby's birth weight was measured or not, in Wondo Genet district, Ethiopia, 2017.

Characteristics	Birth weight measurement			P-value
	Total participants, n (%)	Missing, n (%)	Measured, n (%)	
Total	589 (100)	84 (100)	505 (100)	
MUAC*				
≥23 cm	504 (85.6)	75 (89.3)	429 (85.0)	0.295
<23 cm	85 (14.4)	9 (10.7)	76 (15.0)	
IPV* exposure				
Not exposed	464 (78.8)	69 (82.1)	395 (78.2)	0.415
Exposed	125 (21.2)	15 (17.9)	110 (21.8)	
Depression				
No	549 (93.2)	76 (90.5)	473 (93.7)	0.282
Yes	40 (6.8)	8 (9.5)	32 (6.3)	
Prior stillbirth				
No	555 (94.2)	80 (95.2)	475 (94.1)	0.805
Yes	34 (5.8)	4 (4.8)	30 (5.9)	
Prior preterm birth				
No	558 (94.7)	81 (96.4)	477 (94.5)	0.602
Yes	31 (5.3)	3 (3.6)	28 (5.5)	
Birth order				
First	129 (21.9)	23 (27.4)	106 (21.0)	0.190
Second and above	460 (78.1)	61 (72.6)	399 (79.0)	
ANC*				
No	140 (23.8)	17 (20.2)	123 (24.4)	0.412
Yes	449 (76.2)	67 (79.8)	382 (75.6)	
Delivery place				
Home	163 (28.8)	23 (37.7)	140 (27.7)	0.104
Health facility	403 (71.2)	38 (62.3)	365 (72.3)	
Sex of the baby*				
Male	304 (54.1)	29 (50.9)	275 (54.5)	0.607
Female	258 (45.9)	28 (49.1)	230 (45.5)	

*MUAC, mid-upper arm circumference; IPV, intimate partner violence; ANC, antenatal care.

*Sex of the baby does not add up 84 in the missing birth weight group due to lost to follow-up, early neonatal deaths, and stillbirths. P-value from the chi-square test.

for potential confounders. LBW was eight times more likely to occur in women exposed to IPV during pregnancy (AOR: 7.8; 95% CI: 3.4–17.7) and five times more likely in women with undernutrition (thinness) (AOR: 5.4; 95% CI: 2.0–14.1). Another factor associated with LBW was place of delivery, with around five times increased likelihood of LBW in home deliveries (AOR: 5.4; 95% CI: 2.5–11.6) than in facility deliveries, both crude and adjusted. The result did not change when analyzing the effects of interaction between IPV and nutrition (not shown in Tables).

Discussion

In this community-based follow-up study of 505 mother-singleton infant pairs in southern Ethiopia, the babies from

IPV-exposed pregnancies were on average almost 200 g smaller. Among the women who experienced IPV during pregnancy, one in five gave birth to babies with low birth weight, whereas one in 20 unexposed women gave birth to babies with low birth weight.

Associations between IPV and low birth weight have been reported by studies conducted in Egypt (30), Vietnam (31), and also in Ethiopia in Harari (18) and Tigray (32) regions. The large hospital-based Egyptian study found that pregnant women who experienced IPV had a double risk of LBW compared with women who had not (30). The Vietnamese study reported that women who were exposed to physical violence were six times more likely to have LBW infants (31). A potential mechanism for IPV causing low birth weight is a direct mechanism through trauma, perhaps causing damage to the placenta resulting in effects on the fetal nutrient supplies, premature rupture of

TABLE 2a Mean birth weight of babies by socio-demographic characteristics of their mothers in Wondo Genet district, Ethiopia, 2017.

Variable	Birth weight			
	N (%)	Mean (gram)	(95% CI*)	p-value
Total	505 (100)	3,222	(3,181–3,263)	
Residence				
Rural	272 (53.9)	3,237	(3,181–3,292)	0.454
Urban	233 (46.1)	3,205	(3,142–3,267)	
Age of the mother				
15–24	198 (39.2)	3,223	(3,157–3,289)	0.962
25–45	307 (60.8)	3,221	(3,168–3,274)	
Education of the mother				
No education	133 (26.3)	3,173	(3,086–3,260)	0.356
Primary	244 (48.3)	3,233	(3,173–3,293)	
Secondary and above	128 (25.3)	3,252	(3,176–3,328)	
Occupation of the mother				
Housewife	408 (80.8)	3,231	(3,183–3,278)	0.345
Others	97 (19.2)	3,185	(3,102–3,268)	
Monthly income (ETB*)				
<1,500	235	3,254	(3,196–3,313)	0.274
1,500–2,999	185	3,207	(3,138–3,277)	
≥3000	85	3,163	(3,056–3,270)	
Religion of the mother				
Protestant	469 (92.9)	3,235	(3,192–3,277)	0.028
Others	36 (7.1)	3,055	(2,896–3,215)	
Alcohol drinking by the mother				
No	500 (99.0)	3,224	(3,183–3,266)	0.252
Yes	5 (1.0)	2,981	(2,370–3,592)	
Husband's education				
No education	102 (20.2)	3,190	(3,096–3,284)	0.746
Primary	165 (32.7)	3,234	(3,160–3,308)	
Secondary and above	237 (46.9)	3,226	(3,166–3,285)	
Husband's occupation				
Farmer	228 (45.1)	3,219	(3,158–3,279)	0.443
Merchant	142 (28.1)	3,257	(3,175–3,340)	
Government employee	35 (6.9)	3,267	(3,097–3,436)	
Others	100 (19.8)	3,163	(3,074–3,252)	
Alcohol drinking by husband				
No	453 (89.7)	3,240	(3,197–3,283)	0.012
Yes	52 (10.3)	3,066	(2,924–3,208)	
Social support				
Low	31 (6.1)	3,300	(3,183–3,416)	0.335
Medium	111 (22.0)	3,172	(3,078–3,267)	
High	363 (71.9)	3,231	(3,182–3,279)	

*CI, confidence interval; ETB, Ethiopian Birr. P-values were obtained from t-test and one-way ANOVA.

membranes, premature labor, and low birth weight (33). It may also involve an indirect mechanism *via* related risk factors, such as the use of alcohol, resulting in impaired fetal growth (34). Other factors include changes in nutritional habits or

reduced food intake, perhaps as a result of loss of appetite during depression (35). Moreover, a Norwegian nationwide population-based prospective cohort study also did not find any significant association between violence during pregnancy and low birth

TABLE 2b Mean birth weight of babies by clinical characteristics of their mothers in Wondo Genet district, Ethiopia, 2017.

Variable	Birth weight			
	N (%)	Mean (gram)	(95% CI*)	p-value
Total	505 (100)	3,222	(3,181–3,263)	
MUAC*				
≥23 cm	429 (85.0)	3,224	(3,180–3,269)	0.791
<23 cm	76 (15.0)	3,209	(3,094–3,323)	
IPV* exposure				
Not exposed	395 (78.2)	3,269	(3,223–3,314)	<0.001
Exposed	110 (21.8)	3,054	(2,962–3,147)	
Depression				
No	473 (93.7)	3,217	(3,174–3,261)	0.413
Yes	32 (6.3)	3,288	(3,142–3,435)	
Prior stillbirth				
No	475 (94.1)	3,398	(3,260–3,536)	0.035
Yes	30 (5.9)	3,211	(3,168–3,254)	
Prior preterm birth				
No	477 (94.5)	3,418	(3,272–3,565)	0.023
Yes	28 (5.5)	3,210	(3,168–3,253)	
ANC*				
No	123 (24.4)	3,210	(3,126–3,293)	0.739
Yes	382 (75.6)	3,226	(3,178–3,274)	
Delivery place				
Home	140 (27.7)	2,953	(2,881–3,026)	<0.001
Health facility	365 (72.3)	3,325	(3,279–3,371)	
Birth order				
First	106 (21.0)	3,268	(3,183–3,352)	0.263
Second and above	399 (79.0)	3,210	(3,162–3,257)	
Sex of baby				
Male	275 (54.5)	3,255	(3,197–3,312)	0.090
Female	230 (45.6)	3,183	(3,124–3,242)	

*CI, confidence interval; MUAC, mid-upper arm circumference; IPV, intimate partner violence; ANC, antenatal care. P-values were obtained from t-test and one-way ANOVA.

weight (36). In the Norwegian study, the significant crude association between sexual violence and LBW became no longer significant when adjusted for socio-demographic factors. But we found no change in the adjusted regression coefficient (B) when we controlled for socio-economic and demographic variables in our analysis. The authors also acknowledged that the lack of association could be related to the low prevalence of abuse noted during the pregnancy, as they assessed only sexual IPV once at a gestational week of 17 and may have missed any violence that occurred later.

We observed lower birth weight among girls than boys and this finding has been observed in many other studies and reports (37). Female baby becomes highly significant in the adjusted model while not significant in the crude analysis. It is certainly a known fact that female babies weigh less than boys. There may be confounding here if more girls of low gestational age

were counted. Adjusting for gestational age in the model made the difference statistically significant. When adjusted for socio-economic status, we found that birth weight was over 300 g higher at a health facility than at home. Similar results had been reported from Nepal (38), Bangladesh (39), and India (11). This could partly reflect that IPV-exposed women are more likely to deliver at home. In addition, premature labor is more likely to happen at home since delivery is not yet expected, and hence smaller babies from premature births are more likely. In our study, mothers' socio-economic status and partners' alcohol consumption did not affect birth weight. It may be because of the setting where most participants are poor and few are rich. This reduces the statistical power of our analysis. Alcohol drinking was a strong predictor in the crude analysis but adjusting by IPV reduced the effect. Surprisingly, there was only one preterm birth. The pooled prevalence of preterm birth in Ethiopia was

TABLE 3 Multivariable linear regression of factors associated with birth weight in Wondo Genet district, southern Ethiopia, 2017 (n = 505).

Variables	Crude B	95% CI*	Adjusted B	95% CI*
IPV exposure*	-215	-313 to -116	-203	-320 to -87
Age in years (increase by 1 year)	2.4	-7 to 12	4	-7 to 16
Any maternal education	67	-27 to 160	71	-18 to 160
Residence (urban compared to rural)	-32	-115 to 51	3	-79 to 85
House wife compared to other maternal occupation	46	-59 to 151	85	-11 to 182
Protestant compared to other religion	179	19 to 339	104	-39 to 247
Alcohol drinking by husband	-174	-309 to -39	-49	-185 to 86
Monthly income (increase by 100 ETB*)	-3	-7 to 1	-4	-8 to 0
Social support (increase by total score)	7	-3 to 17	3	-10 to 16
Maternal depression (increase by total score)	1	-8 to 10	2	-9 to 13
Parity (increase in number)	-3	-26 to 21	5	-26 to 35
Maternal MUAC (increase by 1 cm)	-10	-32 to 12	7	-13 to 28
Prior history of preterm birth	208	28 to 388	106	-63 to 276
Prior history of still birth	187	13 to 362	143	-21 to 307
Antenatal care use	16	-80 to 113	-25	-111 to 62
Facility delivery compared to home delivery	372	286 to 458	340	256 to 424
Female baby compared to male	-72	-154 to 11	-131	-206 to -57
Increase in 1 week of gestation	86	64 to 109	79	58 to 101

*CI, confidence interval; ETB, Ethiopian Birr; IPV, intimate partner violence; B is unstandardized beta coefficient.

Regression coefficients were obtained from multivariable regression analysis. Monthly income and week of gestation at birth, MUAC, social support, depression, parity, and age were entered as continuous variables. The value of the regression coefficient is for yes, i.e., yes is compared to no for IPV exposure, any maternal education, alcohol drinking by husband, preterm birth, stillbirth, and antenatal care use. Model was considered significant at $p < 0.001$, R^2 of the model = 0.283. IPV was adjusted for: all variables in the table.

10.5% in a systematic review (40), a community-based study from rural Ethiopia that assessed intrauterine growth patterns using ultrasound measurement found a 4.9% preterm birth (41), and a study in Hawassa town found a 3.6% of preterm birth (42). The lower prevalence of preterm birth in this study might be due to a recall bias of the last menstrual period.

In line with our figure of LBW (8.3%), the study that was conducted in rural Ethiopia reported a LBW of 7.9% (41). But, it was not as common in our study as reported by the Ethiopian DHS, 2016 (13%) (16). However, we noticed that the DHS data were based on birth weight collected from both written records and subjective assessment reports by the mother from births that occurred within 5 years of the survey, which could be imprecise and subject to recall bias. Also, the lower prevalence of low birth weight in our study may be partly due to the nutrition screening program that was transformed from being campaign-based into routine activities in the region, and the scaling up of nutrition-specific interventions in the country. However, this program had just started when our data collection was done and likely had little impact on our study (43). Another possibility is that the women lost to follow-up could have a higher proportion of small babies, but we have no way of confirming this. Women who had babies with no recorded birth weight were fairly similar to the

rest in terms of their other baseline characteristics, and their effect of exclusion on the main result is likely small.

This study had several strengths. A reasonably large study population of pregnant women was enrolled consecutively in the area, and the participants were, as far as we know, representative for the area. This ensured a good representation of rural women and home births.

The study also had some limitations. A few pregnant women may have been missed in the households, including women who try to hide their pregnancy, and we have no information about this. The birth weight was missing for 14% of the women including 4% who were lost to follow-up. However, there were no large differences in their background characteristics, and this likely represented no major selection bias. The proportion of LBW was slightly higher (8.3%) among those measured at 0–72 h than when measurements were limited to 0–48 h (7.7%), but this had little impact on the association between IPV and birth weight in our sensitivity analysis (see Supplementary Tables 1, 2). An early ultrasound before 24 weeks of gestation is important for accurate gestational age estimation (44) but this was not possible and we calculated the gestational age using the woman's reported date of last menstrual period, which may also be

subject to recall bias. Furthermore, some variables that could affect birth weight like medical diseases, body mass index, weight gain during pregnancy, and prior history of LBW were not collected and some residual confounding effects cannot be excluded.

Conclusion

Women exposed to intimate partner violence during pregnancy tended to have smaller babies than unexposed women. Birth weight was also associated with the sex of the newborn, gestational age at birth, and place of delivery. Antenatal clinics may consider routinely identifying women suffering from IPV and then referring them to the relevant organizations. The positive efforts by the Ministry to enhance facility delivery should include identifying babies with lower birth weights who need special care.

Data availability statement

The original contributions presented in the study are included in the article/supplementary files, further inquiries can be directed to the corresponding author/s.

Ethics statement

The studies involving human participants were reviewed and approved by Institutional Review Board (IRB) at the College of Medicine and Health Sciences, Hawassa University (Ref No: IRB/006/09) and regional Ethical Committee of Western Norway (Ref No: 2016/1908/REK vest). Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin. Informed oral consent was obtained from each participant > 18 years and recorded by the interviewer.

Author contributions

SB conceptualized, designed and implemented the study, analyzed the data, and drafted the manuscript. AA and SGH contributed with planning, analyzed the data, revised and edited the manuscript, and supervised. All authors have read and approved the final manuscript.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fpubh.2022.960443/full#supplementary-material>

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Supplementary information for Paper II

Table S1

Sensitivity analysis on simple linear regression of the association of IPV with birth weight, comparing birth weight taken on days 1 and 2 with birth weights taken on days 1, 2 and 3 in Wondo Genet district, Southern Ethiopia, 2017

Variables	Crude B	95% CI	p-value
IPV exposure (yes)			
Birth weight taken on day 1 and 2 (n=477)	-219	-318, -119	0.000
Birth weight taken on day 1, 2 and 3 (n=505)	-215	-313, -116	0.000

Note: The adjustment was done to see whether or not the result is affected, if we analyse only birth weight taken on days 1 and 2 and to compare with birth weight taken on days 1, 2 and 3.

Table S2

Sensitivity analysis on simple linear regression of the association of IPV with birth weight, comparing weight loss adjustment with a total sample size of 505 in Wondo Genet district, Southern Ethiopia, 2017

Variables	Crude B	95% CI	p-value
IPV exposure (yes)			
Birth weight adjusted for weight loss (n=505)	-197	-294, -99	0.000
Original birth weight (n=505)	-215	-313, -116	0.000

Note: We do not have weight loss when we compare birth weight taken on days 1, 2 and 3. The adjustment was done to see whether or not the result is affected, if there was weight loss on days 2 and 3 by subtracting 5% of the birth weight measurement from day 2 and 10% from day 3 and to compare with the original.

Paper III

Health Workers' Knowledge and Attitude Towards Intimate Partner Violence: A Descriptive Study in Sidama Region, Southern Ethiopia

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Background: It is important that health workers understand intimate partner violence (IPV) and its link with ill health. Increasing their awareness will help them play a stronger role in identifying survivors and providing appropriate health care. We assessed the knowledge and attitude of health workers towards IPV survivors taking into account their professional roles.

Methods: Data was collected in 2018 in 12 health centers and 55 health posts located in 3 districts of the former Sidama zone using a self-administered questionnaire. The main outcome variable was proportion of wrong responses of the knowledge questions. We also calculated scores from the 10 knowledge questions and 10 Likert items of attitude. Proportions of wrong responses were compared between health post and health center staff. Mean knowledge score was compared using an independent samples *t*-test and a one-way analysis of variance. A Tukey's honestly significant difference test was performed to determine significant analysis of variance results.

Results: There were 139 participants. Most (78%) of them were females. Nurses and midwives accounted for 54% of the total. Few (13%) of the participants had received previous training regarding IPV. More than half of the participants were not confident about how to care for women exposed to IPV. "Wrong responses" (incorrect or "don't know") ranged from 5.8% to 30.9%. The mean knowledge score was higher for women older than 30 years ($p = 0.03$). Negative attitudes ranged from 4 to 47%. One-third of the participants believed that they could not suspect IPV unless they saw physical injuries. More knowledge about IPV was associated with better attitude scores.

Conclusion: Around half of the health workers felt unprepared to provide care to IPV survivors, and a third would not consider IPV unless they saw physical evidence. Increasing knowledge may improve attitudes and support for IPV survivors.

Keywords: health workers, knowledge, attitude, intimate partner violence, Ethiopia

Introduction

Intimate partner violence (IPV) can affect a woman's health in many ways.¹⁻³ It can also affect the baby when the woman experiences violence during her pregnancy.^{4,5} According to the World Health Organization, the prevalence of life time IPV in 2018 for the African region and Ethiopia was 33% and 37%, respectively.⁶ Furthermore, the reported prevalence of IPV among pregnant women ranges from 2% to 57%, as shown in a systematic review of mainly African studies.⁷

Though women experiencing violence (now called "survivors", not "victims")⁸ in relationships may seek health care for ensuing emotional or physical harm, they often do not disclose the connection to partner violence.⁹ A finding from a study conducted among women of reproductive age in eastern Ethiopia reported that only 20% of those experiencing IPV ever reported it.¹⁰ A qualitative study in western Ethiopia revealed that traditional social norms encourage women to tolerate and hide any challenges they face.¹¹

A study conducted in Tanzania showed that health care workers thought men should be allowed to use IPV as a disciplinary tool.¹² A study conducted in Guyana also indicated that 30% of health care providers, men and women

alike, thought that physical violence was justified if the woman argues with the man, or if she spends too much time with friends, or if she is unfaithful.¹³ A majority of Jordanian nurses reported that the survivors' personalities contributed to the violence committed against them by men.¹⁴ However, a recommendation by the World Health Organization suggests that health care providers should be able to recognize signs of IPV and should ensure that women who experience IPV receive appropriate care and are referred to other resources and services when necessary.¹⁵

When some nurses meet women exposed to IPV seeking professional health care, they do not know how to respond. They do not know the services they could refer survivors to, and often think that reassurance was their only course of action.¹⁶ Other studies have shown that women experiencing violence may find little support in the health services,¹⁷ and health workers felt that assisting survivors of IPV was difficult, low-paying and stressful. In addition, health workers who were married have been shown more likely to feel negatively about providing services to survivors of IPV.¹⁸ Several factors, including lack of training on the subject, fear of getting involved in legal issues, a concept that violence is a private issue, and fear of offending the patient were identified as common barriers in routine health care work to inquiring about IPV and providing care in Nicaragua.¹⁹ A study from Nigeria showed that health professionals who received training were three times more likely to inquire about IPV.²⁰ Health workers should be able to identify and support pregnant women who experience violence. However, unless health workers have positive, informed attitude, they might be less interested in identifying and providing care.²¹ As a result, pregnant women experiencing violence might be rarely supported by health workers. Therefore, we undertook this study to gain a better understanding of what health workers know about the issue, and what they think to develop educational initiatives to identify and provide care to survivors.

This paper is part of a larger study on IPV in the former Sidama zone, Ethiopia. In this study, we aimed 1) to assess knowledge and attitude of health workers towards pregnant IPV survivors and their professional roles, as well as 2) to assess determinants of attitude of health workers towards IPV among health workers.

Materials and Methods

Study Setting

The study was conducted in three districts of the former Sidama zone: Boricha, Gorche, and Aleta Wendo. In 2020, Sidama zone was transformed to the new Sidama regional state and now has 19 districts. Boricha, Gorche and Aleta Wendo districts are located around 300 km south of Addis Ababa, the capital city of the country, and 30–70 km south of Hawassa city, the capital city of Sidama regional state. Boricha district has 3 urban and 39 rural Kebeles (Kebele is the smallest administrative unit in Ethiopia, similar to a localized group of people). Gorche has 1 urban and 21 rural Kebeles, and Aleta Wendo has 2 urban and 27 rural Kebeles. Based on the 2007 census and a growth rate of 2.8%, the estimated projected populations in 2017 were 311,509 in Boricha, 184,237 in Gorche and 249,021 in Aleta Wendo. Boricha district has 1 primary hospital, 10 health centers and 38 health posts, while Gorche has 6 health centers and 21 health posts, and Aleta Wendo has 1 primary hospital, 7 health centers and 29 health posts serving their populations. Leku primary hospital is (22 km) the closest primary hospital for Gorche district. The closest secondary hospital with maternity care for the study population is Yirgalem general hospital for all the three districts. The coordination of mother- and child-health care is the responsibility of the district health office.

Study Design

This was a cross-sectional study conducted among health workers in Sidama. The main outcome variable was proportion of wrong responses of the knowledge questions, and score calculated from Likert items of attitudes to survivors of IPV during pregnancy was considered as secondary outcome.

Sample Size

A sample size of 139 would be sufficient to detect a difference between groups when correct knowledge is 80% in one group and 90% in the other, and with a standard deviation of 20%, a power of 80% and confidence level of 95%. To account for non response, we added 10% to the calculated sample size.

Sampling Procedure

The study employed multistage random sampling technique. First, the 20 districts found in the zone were listed alphabetically. Their list was randomized using list randomizer and the 3 districts were randomly selected using random number generator of random.org. Then, 50% of the health centers in each district were selected randomly. Accordingly, 5 health centers and 24 health posts from Boricha, 3 health centers and 13 health posts from Gorche, and 4 health centers and 18 health posts from Aleta Wendo were selected. Finally, we selected 50% of the health workers working in the health centers and 1 health extension worker from each health post by lottery method.

Data Collection

Data was collected between April and June, 2018, among health workers giving maternal health care services at the sampled health centers and health posts. All participants had been working for at least 1 year in the former Sidama zone, southern Ethiopia. Data was collected via paper using a structured self-administered questionnaire read and filled-in by the participants themselves. The questionnaire was developed by reviewing various published studies^{13,14,16} on related topics. It was first prepared in English and was then translated into Amharic then back to English language by the principal investigator. The questionnaire included socio-demographic data, 10 items assessing knowledge and 10 items assessing attitudes. It was tested on a few health care professionals and revised accordingly before the start of actual data collection. Data collection was facilitated by three trained nurses who were employed in the same district health office. If the participant was unavailable at the first visit, the nurses came back to do it later. All the completed questionnaires were checked for completeness by the principal investigator and the nurses who facilitated the data collection in the respective districts.

Variables

The main outcome variable was proportion of wrong responses of the knowledge questions and score calculated from Likert items of attitudes to survivors of IPV was considered as secondary outcome. The 10 knowledge questions about IPV required “True”, “False” or “Don’t know” response. All questions had equal weight (0 if answered wrongly or do not know, 1 if answered correctly), and hence the maximum total score was 10. The ten Likert item statements to assess attitudes about IPV had a 5-point response format from 1 (strongly disagree/most negative) to 5 (strongly agree/most positive). The participants were asked to record their degree of agreement or disagreement to the statements; seven of them required “disagree” responses to be considered a “positive attitude” and these scores were reverse scored to calculate total attitude score, to be used as a measure of attitude.

Exposure variables or determinants were age, sex, education, religion, qualification, type of job, years of experience, and previous participation in training on IPV.

Data Analysis

Data was entered in Epi-Data software and analyzed using SPSS version 20 (Armonk, NY: IBM Corp. USA) software. The characteristics of the participants were described using frequency and percentage for categorical variables and mean with standard deviation for continuous variables. Mean knowledge score was compared using independent samples *t*-test (when the independent variable has two categories) and one-way analysis of variance (ANOVA) (when the independent variable has greater than two categories). A Tukey’s honestly significant difference post-hoc test was performed for significant ANOVA results. Level of significance was set at $P < 0.05$. Knowledge and attitude scores were described using frequency and percentage of each statement. Originally, we developed 15 knowledge questions and later it was reduced to 10 as the reliability test of dichotomous items measured by Kuder-Richardson 20 Test (KR-20) was improved from a value of 0.5 to 0.7 when the 5 items were deleted. The final questionnaire showed good internal consistency. A single composite score of attitude was developed by calculating total scores from the 10 Likert items of attitude and the Cronbach’s alpha of the attitude scale was found to be 0.6, which indicated an acceptable level of internal consistency for the items in the scale. Linear regression was performed to investigate determinants of attitude after calculating the total attitude score. Assumptions for linear regression were checked. Variables with a correlation at $p < 0.25$ and known

confounders including age, sex and residence were selected for the regression analysis. Regression coefficient (B) with a 95% confidence interval was reported.

Ethical Consideration

The study complies with the Declaration of Helsinki.²² Ethics approval was obtained from the Institutional Review Board at the College of Medicine and Health Sciences, Hawassa University (Ref No: IRB/006/09), and from Regional Committees for Medical and Health Research Ethics, Western Norway (Ref No: 2016/1908/REK vest). Written informed consent was obtained from each participant.

Results

A total of 139 health workers were included. **Table 1** shows the socio-demographic and institutional characteristics of the participants. The majority (78%) were females. The median age of the participants was 26 years, with the ages ranging from 20 to 45 years. Most (75%) had attained an educational level higher than certificate. A certificate level education is given after a successful completion of the 10th grade national examination plus a 1–2 year technical vocational education. Nurses and midwives accounted for 54% of the participants, health extension workers accounted for 40%,

Table 1 Characteristics of Health Workers Included in the Study in Sidama Region, Southern Ethiopia, 2018 (n=139)

Characteristics of Participants	Number	%
Residence		
Rural	64	46.0
Urban	75	54.0
Age in years		
20–30	121	87.1
31–45	18	12.9
Sex		
Male	31	22.3
Female	108	77.7
Education		
Certificate	35	25.2
Diploma	86	61.9
Degree	18	12.9
Occupation		
Health extension worker	55	39.6
Nurse	58	41.7
Midwife	17	12.2
Health officer	9	6.5
Ethnicity		
Sidama	114	82.0
Amhara	15	10.8
Others	10	7.2
Religion		
Protestant	103	74.1
Orthodox	20	14.4
Others	16	11.5

(Continued)

Table 1 (Continued).

Characteristics of Participants	Number	%
Marital status		
Single	39	28.1
Married	97	69.8
Others	3	2.1
Recruited from district		
Gorche	39	28.1
Boricha	50	36.0
Aleta Wendo	50	36.0
Recruited from		
Health post	55	39.6
Health center	84	60.4
Received pre-service training in IPV management		
No	121	87.1
Yes	18	12.9
Received in-service training in IPV management in the last 6 months		
No	116	83.5
Yes	23	16.5
Cared pregnant women experiencing IPV		
No	32	23.0
Yes	107	77.0

Abbreviation: IPV, intimate partner violence.

and health officers 7%. Only a few of the participants had received pre-service (13%) and in-service (17%) training regarding IPV. Many (77%) reported having met a pregnant client exposed to IPV seeking their medical help.

Table 2 shows the responses to the knowledge questions. The proportion of incorrect responses to the knowledge questions ranged from 5.8% to 30.9%. The 95% CI for the percentage of incorrect responses for knowledge items was fairly wide and overlapped between the groups of respondents.

Among our participants, the mean knowledge score was 8.38 (SD 1.79) out of 10. Table 3 shows a comparison of the mean knowledge scores across socio-demographic and other institutional characteristics. The mean knowledge score was higher among those aged 31–45 years than those who were younger (20–30 years; $p = 0.03$). However, there was no significant difference in the mean knowledge score between the different categories of residence, sex, training, years of experience and type of health institution for recruitment. A one-way ANOVA revealed that there was a statistically significant difference in the mean knowledge score for categories grouped by education and ethnicity. A post-hoc comparison using the Tukey HSD test found a statistically significant difference in the mean knowledge score between diploma and degree level health workers ($p = 0.04$), but no such difference between diploma and certificate level health workers ($p = 0.54$).

Table 4 shows the attitude towards IPV assessed among health workers through their responses to 10 attitude items measured by Likert scores. The results showed that among the health workers negative attitudes based on each of the ten attitude items ranged from 4% to 47%.

Table 5 shows the results of linear regression of determinants of total attitude score. An increase in total knowledge score was associated with an increase in total attitude score. None of the socio-demographic characteristics or training on IPV management was associated with attitude score among the health workers.

Table 2 Responses from Health Workers to 10 Knowledge Questions About Intimate Partner Violence, in Sidama Region, Southern Ethiopia, 2018

Knowledge Questions	Incorrect Response			
	Health Post (n = 55)		Health Center (n = 84)	
	n (%)	95% CI	n (%)	95% CI
IPV can occur in all settings, among all socioeconomic, religious and cultural groups (True).	4 (7.3)	2.4–16.6	10 (11.9)	6.2–20.2
Being slapped, pushed, shoved or pulled, hit, choked or burnt on purpose is IPV (True).	3 (5.5)	1.4–14.1	5 (6.0)	2.2–12.7
Being physically forced to have sexual intercourse when a woman did not want to is IPV (True).	5 (9.1)	3.4–19.0	6 (7.1)	3.0–14.3
Sexual intercourse when a woman did not want to because of fear of a partner is violence (True).	14 (25.5)	15.3–38.2	19 (22.6)	14.6–32.5
Being forced to do something sexual that is degrading or humiliating is IPV (True).	5 (9.1)	3.4–19.0	6 (7.1)	3.0–14.3
Insulting, humiliating in front of other people, scare or intimidate her on purpose, threatened to hurt someone she cared about is IPV (True).	11 (20.0)	11.0–32.1	11 (13.1)	7.1–21.6
IPV might be caused by alcohol drinking (True).	12 (21.8)	12.4–34.1	18 (21.4)	13.6–31.2
IPV never happens during pregnancy (False).	15 (27.3)	16.8–40.1	21 (25.0)	16.6–35.1
IPV in pregnancy cannot cause adverse health outcome for the pregnant woman or baby (False).	9 (16.4)	8.3–27.9	8 (9.5)	4.5–17.3
We cannot suspect IPV unless we see physical signs/injuries and bruises (False).	19 (34.5)	22.9–47.8	24 (28.6)	20.0–38.9

Note: Total = 139, no missing value in all the questions.

Abbreviation: CI, confidence interval.

Table 3 Comparison of Mean Knowledge Scores (Range 0–10) by Basic Characteristics of Health Workers Included in the Study in Sidama Region, Southern Ethiopia, 2018 (n=139)

Characteristics	Number (%)	Mean (SD)	P-value
Residence			0.143 ^a
Rural	64 (46.0)	8.1 (2.0)	
Urban	75 (54.0)	8.6 (1.6)	
Age in years			0.032^a
20–30	121 (87.1)	8.3 (1.8)	
31–45	18 (12.9)	9.2 (1.2)	
Sex			0.718 ^a
Male	31 (22.3)	8.5 (2.0)	
Female	108 (77.7)	8.4 (1.7)	
Education ^c			0.042^b
Certificate	35 (25.2)	8.5 (1.3)	
Diploma	86 (61.9)	8.1 (2.0)	
Degree	18 (12.9)	9.3 (1.1)	

(Continued)

Table 3 (Continued).

Characteristics	Number (%)	Mean (SD)	P-value
Occupation			0.266 ^b
HEW	55 (39.6)	8.2 (1.7)	
Nurse	58 (41.7)	8.3 (2.0)	
Midwife	17 (12.2)	8.8 (1.6)	
Health officer	9 (6.5)	9.3 (1.1)	
Ethnicity ^c			0.027^b
Sidama	114 (82.0)	8.2 (1.9)	
Amhara	15 (10.8)	9.3 (1.1)	
Others	10 (7.2)	9.1 (1.3)	
Religion			0.107 ^b
Protestant	103 (74.1)	8.2 (1.8)	
Orthodox	20 (14.4)	9.0 (1.3)	
Others	16 (11.5)	8.8 (1.9)	
Marital status			0.650 ^b
Single	39 (28.1)	8.4 (2.0)	
Married	97 (69.8)	8.4 (1.7)	
Others	3 (2.2)	9.3 (1.2)	
Received pre-service training in IPV management			0.252 ^a
No	121 (87.1)	8.3 (1.8)	
Yes	18 (12.9)	8.8 (1.3)	
Received in-service training in IPV management in the last 6 months			0.323 ^a
No	116 (83.5)	8.5 (1.8)	
Yes	23 (16.5)	8.0 (1.9)	
Years of experience			0.534 ^a
1–7	94 (67.6)	8.5 (1.8)	
8–14	45 (32.4)	8.2 (1.8)	
Recruited from			0.441 ^a
Health post	55 (39.6)	8.2 (1.7)	
Health center	84 (60.4)	8.5 (1.9)	
Recruited from district			0.338 ^b
Gorche	39 (28.1)	8.2 (1.8)	
Boricha	50 (36.0)	8.7 (1.4)	
Aleta Wendo	50 (36.0)	8.2 (2.1)	

Notes: p-value^a obtained from independent sample t-test. p-value^b obtained from One-way analysis of variance (ANOVA). Education^c: certificate = diploma; p = 0.54, diploma < degree; p = 0.04 Ethnicity^c: Sidama = Amhara = Others, though ANOVA was significant, the post-hoc test appeared non significant. This might be due to lack of statistical power, as the categories have small numbers. **Bold** indicates significant values.

Discussion

In this facility-based cross-sectional study of 139 health workers in southern Ethiopia, most (77%) of the participants reported having met a pregnant woman who had been exposed to IPV in their work. However, few had received pre-service or in-service training on IPV. More than half of the participants (57%) did not feel confident about caring for survivors of IPV. In addition, more than half of the health workers felt that dealing with violence meant interfering with privacy of the family, as well as that there was no time to discuss about IPV with the survivors. More knowledge about IPV was associated with better attitude.

Table 4 Attitude Towards Intimate Partner Violence Among Health Workers Assessed by Responses to 10 Items Measured by Likert Scores,¹ in Sidama Region, Southern Ethiopia, 2018 (n=139)

Likert Items to Assess Good Attitude	Response ¹				
	Score 1 n (%)	Score 2 n (%)	Score 3 n (%)	Score 4 n (%)	Score 5 n (%)
An intimate partner is not justified to beat or insult his wife even if the pregnancy is mistimed or unwanted (agree means good).	20 (14.4)	15 (10.8)	2 (1.4)	46 (33.1)	56 (40.3)
Physical violence is not an acceptable way to resolve conflict in a relationship (agree means good).	30 (21.6)	35 (25.2)	7 (5.0)	39 (28.1)	28 (20.1)
Dealing with violence is pertinent not only to the fields of police and justice, but also to health (agree means good).	12 (8.6)	11 (7.9)	2 (1.4)	55 (39.6)	59 (42.4)
An intimate partner can beat his wife during pregnancy unless he directly focused the abdomen (disagree means good).	87 (62.6)	43 (30.9)	3 (2.2)	3 (2.2)	3 (2.2)
A woman should tolerate violence in order to keep her family together (disagree means good).	59 (42.4)	50 (36.0)	1 (0.7)	20 (14.4)	9 (6.5)
Violence will not happen unless the woman has done something that would trigger the perpetrator to abuse her (disagree means good).	37 (26.6)	54 (38.8)	7 (5.0)	26 (18.7)	15 (10.8)
Health care professionals should not screen for violence in order not to offend the woman (disagree means good).	54 (38.8)	59 (42.4)	3 (2.2)	16 (11.5)	7 (5.0)
Dealing with violence means interfering with privacy of the family (disagree means good).	32 (23.0)	49 (35.3)	4 (2.9)	32 (23.0)	22 (15.8)
Health care professionals should suggest abused women to leave their home (disagree means good).	67 (48.2)	61 (43.9)	1 (0.7)	6 (4.3)	4 (2.9)
Health care professionals do not have any role except treating physical injuries caused by intimate partner violence (disagree means good).	57 (41.0)	57 (41.0)	2 (1.4)	17 (12.2)	6 (4.3)

Notes: Likert Scores¹, Score 1=strongly disagree, score 2=disagree, score 3=neutral, score 4=agree and score 5=strongly agree. "Agree" meant good attitude for score in questions 1-2-3, and "disagree" meant good attitude for questions 4-10.

In our study, almost one-third of the participants believed that they could not suspect IPV unless they see physical injuries such as bruises. A qualitative study conducted among health professionals working in an emergency hospital in Kenya, assessed health workers' responses to patients who had experienced IPV. The results showed that the participants recognized IPV patients because of their obvious injuries and stated that they could not identify IPV patients in the absence of obvious physical injuries.²³ However, as explained earlier in the definition of IPV, the phenomena involves more than simply visible physical injuries. It is therefore recommended that health professionals should consider the following situations as possibly indicating that a woman has experienced IPV: if she has ongoing emotional health issues such as stress or anxiety, harmful behaviors such as misuse of alcohol, thoughts or acts of self-harm or (attempted) suicide, repeated sexually transmitted infections, or unexplained chronic pain or repeated health consultations with no clear diagnosis in addition to visible physical injuries. When health workers see situations like these, they are encouraged to ask about exposure to IPV to identify and respond to the violence experienced in women including during pregnancy.²¹ Health workers expressed that personal limitations and feelings of inadequacy due to lack of interpersonal skills and knowledge were challenges to managing survivors of IPV.²³

We found good attitude in persons with more knowledge, but with our cross-sectional design we have not proved that giving more knowledge will improve attitude. In our study, few (13%) of the participants had received training regarding IPV. A cross-sectional study in Spain investigated factors associated with primary care professionals' readiness to respond to IPV. Its results showed that age, type of profession, years of experience and hours of IPV training were

Table 5 Linear Regression of Determinants of Total Attitude Scores (Range 10–50) of Health Workers from Their Responses to Questions About Intimate Partner Violence in Sidama Region, Southern Ethiopia, 2018 (n=139)

Characteristics	B	95% CI	P-value
Residence			
Rural	Reference		
Urban	-1.5	-3.4 to 0.3	0.102
Age in years	-0.1	-0.3 to 0.2	0.719
Sex			
Male	Reference		
Female	-0.4	-2.7 to 2.0	0.770
Educational status			
Certificate	-1.7	-6.2 to 2.7	0.442
Diploma	-2.4	-6.1 to 1.3	0.208
Degree	Reference		
Occupational status			
Health extension worker	1.5	-3.7 to 6.7	0.576
Nurse	0.9	-3.6 to 5.4	0.688
Midwife	2.5	-2.3 to 7.4	0.305
Health officer	Reference		
Ethnicity			
Sidama	-1.6	-4.8 to 1.5	0.304
Others	Reference		
Religion			
Protestant	-1.3	-3.7 to 1.1	0.284
Others	Reference		
Marital status			
Single	-0.4	-2.6 to 1.8	0.714
Others	Reference		
Years of experience	0.1	-0.2 to 0.4	0.624
Pre and or in-service Training on IPV			
No	Reference		
Yes	-1.1	-3.0 to 0.8	0.242
Cared pregnant women experiencing IPV			
No	Reference		
Yes	1.5	-0.5 to 3.6	0.144
Knowledge level score	0.9	0.5 to 1.4	<0.001

Note: Bold indicates significant results.

Abbreviations: CI, confidence interval; B, unstandardized beta coefficient; IPV, intimate partner violence.

associated positively with knowledge, opinion and practice of health care professionals regarding IPV.²⁴ Referring patients to other departments, individual counseling and information delivery about IPV were the most frequent actions reported by the health workers. The likelihood that the health workers would investigate IPV was higher among respondents who had been trained, those with advanced training level, those with knowledge of policies and programmes, and those who had an appropriate protocol and reference resources. Professionals who reported a higher level of training in IPV and provision of case management protocol asked more questions about IPV. This underlines that investing in health care personnel IPV training improved the health of many women.²⁵ We also found that one tenth of the health

workers do not know that IPV can occur in all settings and among all socioeconomic groups. The identification of possible IPV survivors can be enhanced when health care providers had higher level of awareness due to advanced training.

This study had several strengths. It had a high response rate, and the recruitment from various districts made it reflective of the situation in the area. Also, in spite of some periods of national instability, the data collection was successfully carried out without much disturbance. This study was important in helping to build an impression of the situation in the area and providing information about some risk factors for unhelpful attitudes. However, it did not give high precision findings. Another limitation is that some of the items had not been tested before. Hence, exact comparison with “scores” in other studies could not be undertaken. In addition, we cannot infer causality as temporal sequence cannot be established in this cross-sectional study.

Conclusion

Around half of the health workers felt unprepared to provide care to survivors of IPV, and a third would not consider IPV unless there was physical evidence. Increasing knowledge may improve attitudes thereby improving the situation for women suffering IPV. It is therefore recommended to give health workers training regarding when to suspect a woman has been subjected to violence and what they should do in such cases. In addition, it is important to include IPV in the curriculum of health workers. There should also be efforts to better inform the public about this matter and its potential negative consequences for mothers and babies. It is also important to inform the police that violence is not an ordinary criminal case, as health workers sometimes have to involve police based on the woman’s desire.

Abbreviations

ANOVA, one-way analysis of variance; CI, confidence interval; IPV, intimate partner violence.

Data Sharing Statement

The data underlying the study are available within the manuscript and its supporting files.

Acknowledgments

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Disclosure

The authors declare that they have no competing interests.

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Appendices

Appendix 1: Questionnaire for the survey

Questionnaire for the survey

Information sheet and informed consent form

Read this information sheet and informed consent form to the participant.

Good morning/good afternoon.

My name is _____

I am a data collector for the study conducted in Wondo Genet Woreda to assess the health and social welfare of pregnant women and their newborns. We are based at Hawassa University. Your household has been selected by chance to participate in a research study on women's health, so if you agree I will ask some questions about your health and your use of health services. Your participation in this study is completely voluntary.

When the study is finished your name will be replaced by a number to keep your participation anonymized. You do not have to answer any of the questions if you do not want to, and you may end this talk at any time you want to. If you refuse to participate in this study it has no consequences for you. However, your honest answers to these questions we hope will help us improve women's health and the services provided.

You will not get any monetary/material benefit for participation in this study. If you agree to participate in the study, there will be an interview at the start (at enrollment), and a visit as soon as possible after birth to measure the baby's birth weights.

Do you have any questions? If you have any questions to be clarified further you can talk to the principal investigator Sewhareg Belay via +251 916 874105.

The interview may take 40 minutes.

Do you agree to be interviewed and followed up? Agree [] Disagree []

If Disagrees:

Thank the participant for her time and END the interview.

If Agrees:

It is very important that we should talk in private, with only you and me (excluding visitors, neighbors, husband, relatives and children above two years)

Is now a good time to talk? Yes _____ No _____

Is this a good place to hold the interview? Yes _____ No _____

Or would you suggest another place to hold the interview?

If the time and the place are not convenient, take an appointment.

Appointment Date _____ Place _____

If the time and the place are convenient, continue the interview

Some of the topics are sensitive in nature and difficult to discuss, but many women have found it useful to have the opportunity to talk. Memorizing painful events may cause distress. Those women who need psychological support will be referred to Kela health center and Hawassa University referral hospital.

Name of interviewer-----Signature-----Date (Ethiopian) ---/---/---

Name of the Kebele _____ Respondent's code: _____

Part I- Socio-demographic and economic characteristics of respondent.

No	Questions	Response
101	Where is your place of residence?	Rural-----1 Urban-----2
102	Your age in completed years	_____ Years
103	What is the highest education status you have attained	Not able to read and write-----1 Able to read and write-----2 Grade 1-6-----3 Grade 7-12-----4 college and above-----5
104	What is your ethnic group?	Sidama-----1 Oromo-----2 Amhara-----3 Wolayta -----4 Gurage -----5 Others (specify)-----6
105	What is your husband's ethnic group?	Sidama-----1 Oromo-----2 Amhara-----3 Wolayta -----4 Gurage -----5 Others (specify)-----6
106	What is your religion	Protestant -----1 Muslim-----2 Orthodox-----3 Catholic-----4 Traditional belief -----5 Others(specify)-----6
107	What is your husband's religion	Protestant -----1 Muslim-----2 Orthodox-----3

		Catholic-----4 Traditional belief -----5 Others(specify)-----6
108	What is your occupation? Do not read the responses to the respondents	Housewife -----1 Government employee-----2 Merchant -----3 Daily laborer-----4 Student-----5 Others(specify)-----6
109	What is your current marital status?	Never married-----1 Married-----2 Divorced-----3 Widowed-----4 Unmarried but in stable union----5 Separate-----6
110	Duration with in marriage	_____ years
111	How much is your estimated average monthly income?	_____ Ethiopian birr
112	Age at first marriage	_____ years
113	Number of children born alive	___ children in total . ___ children with another man
114	Is the current pregnancy desired ?	No-----1 Don't know-----2 Yes-----3
115	Was there violence between your parents? (Father perpetrated mother)	No-----0 Yes-----1
116	Partner's educational status	Not able to read and write-----1 Able to read and write-----2 Grade 1-6-----3 Grade 7-12-----4 College and above-----5
117	Partner's occupational status	Government employee-----1 Farmer-----2 Merchant -----3 Daily laborer-----4 Student-----5 Others(specify)-----6
118	Did you drink alcohol in the last 30	No-----0

	days?	Yes-----1
119	If YES, how many days did you drink alcohol in the last 30 days?	_____ days
120	Did your partner drink alcohol in the last 30 days?	No-----0 Yes-----1
121	If YES, how many days did he drink alcohol in the last 30 days?	_____ days
122	Did you chew Khat in the last 30 days?	No-----0 Yes-----1
123	If yes, then how many days did you chew Khat in the last 30 days	_____ days
124	Did your partner chew Khat in the last 30 days?	No-----0 Yes-----1
125	If yes, then how many days did he chew Khat in the last 30 days	
126	Did you smoke cigarettes /used tobacco of any kind in the last 30 days?	No-----0 Yes-----1
127	If yes, then how many cigarettes did you smoked in the last 24 hours?	_____ cigarettes
128	Did your partner smoke cigarettes /used tobacco of any kind in the last 30 days?	No-----0 Yes-----1
129	If yes, then how many cigarettes did he smoke in the last 24 hours?	_____ cigarettes
130	Last menstrual period(LMP)	On _____
131	Gestational age in completed weeks estimated based on LMP	_____ weeks
132	If LMP not known, guessed month	_____ months
133	Antenatal care follow up (at least 1 visit)	No-----0 Yes-----1
134	Prior history of preterm	No-----0 Yes-----1
135	Prior history of still birth	No-----0 Yes-----1
136	Maternal Middle Upper Arm Circumference (MUAC)	_____ in cm

Part II: Emotional abuse by an intimate partner

No	Questions	Responses
201 _a	Were you insulted by your partner or made to feel bad about yourself during the current pregnancy?	Yes-----1 No-----0
201 _b	Did you experience this type of violence at any time in the year before this pregnancy by your current partner?	Yes-----1 No-----0
202 _a	Were you belittled by your partner or humiliated in front of other people during the current pregnancy?	Yes-----1 No-----0
202 _b	Did you experience this type of violence at any time in the year before this pregnancy by your current partner?	Yes-----1 No-----0
203 _a	Are things done by your partner to scare or intimidate you on purpose, e.g. by the way he looked at you, by yelling or smashing things during the current pregnancy?	Yes-----1 No-----0
203 _b	Did you experience this type of violence at any time in the year before this pregnancy by your current partner?	Yes-----1 No-----0
204 _a	Has your partner threatened to hurt someone you cared about during the current pregnancy?	Yes-----1 No-----0
204 _b	Did you experience this type of violence at any time in the year before this pregnancy by your current partner?	Yes-----1 No-----0

Part III Physical violence by an intimate partner

No	Questions	Responses
301 _a	Did your partner slap or had something thrown at you that could hurt you during the current pregnancy?	Yes-----1 No-----0
301 _b	Did you experience this type of violence at any time in the year before this pregnancy by your current	Yes-----1 No-----0

	partner?	
302 _a	Did your partner pushed or shoved you during the current pregnancy?	Yes-----1 No-----0
302 _b	Did you experience this type of violence at any time in the year before this pregnancy by your current partner?	Yes-----1 No-----0
303 _a	Did your partner hit with fist or something else that could hurt you during the current pregnancy?	Yes-----1 No-----0
303 _b	Did you experience this type of violence at any time in the year before this pregnancy by your current partner?	Yes-----1 No-----0
304 _a	Did your partner kick, drag or beat you during the current pregnancy?	Yes-----1 No-----0
304 _b	Did you experience this type of violence at any time in the year before this pregnancy by your current partner?	Yes-----1 No-----0
305 _a	Did your partner choke or burn you on purpose during the current pregnancy?	Yes-----1 No-----0
305 _b	Did you experience this type of violence at any time in the year before this pregnancy by your current partner?	Yes-----1 No-----0
306 _a	Did your partner threaten to use (or actually use) a gun, knife, spear or other weapon against you during the current pregnancy?	Yes-----1 No-----0
306 _b	Did you experience this type of violence at any time in the year before this pregnancy by your current partner?	Yes-----1 No-----0
307	Were you ever punched or kicked in the abdomen during the current pregnancy?	Yes-----1 No-----0

Part IV: Sexual violence by an intimate partner

No	Questions	Responses
401 _a	Were you physically forced to have sexual intercourse with your partner when you did not want to during the current pregnancy?	Yes-----1 No-----0
401 _b	Did you experience this type of violence at any time in the year before this pregnancy by your current partner?	Yes-----1 No-----0
402 _a	Did you have sexual intercourse with your partner when you did not want to because you were afraid of what your partner might do during the current pregnancy?	Yes-----1 No-----0
402 _b	Did you experience this type of violence at any time in the year before this pregnancy by your current partner?	Yes-----1 No-----0
403 _a	Were you forced by your partner to do something sexual that you found degrading or humiliating during the current pregnancy?	Yes-----1 No-----0
403 _b	Did you experience this type of violence at any time in the year before this pregnancy by your current partner?	Yes-----1 No-----0
404	If the woman answered yes to any of the violence questions (part II or part III or Part IV) then ask Compared to before you were pregnant, did the violence get less, stay about the same, or get worse while you were pregnant?	Got less-----1 Stayed about the same-----2 Got worse-----3 I don't know-----4

Part V: Feelings of depression.

Tell us the way you have been feeling in the past seven days including today.

S.No	Questions	Responses
501	In the past seven days, have you been able to laugh and see the funny side of things?	Yes As much as I always could-----0 Not quite so much now-----1 No Definitely not so much now-----2 Not (hardly) at all-----3
502	In the past seven days, have you looked forward with enjoyment to things?	Yes As much as I ever did-----0 Rather less than I used to-----1 No Definitely less than I used to-----2 Hardly at all-----3
503	In the past seven days, have you blamed yourself unnecessarily when things went wrong?	No Not very often-----0 Never-----1 yes Most of the time-----2 Some of the time-----3
504	In the past seven days, have you been anxious or worried for no good reason?	No Not at all-----0 Hardly ever-----1 Yes Some times-----2 Very often-----3
505	In the past seven days, have you felt scared or panicky for no very good reason?	No Not at all-----0 Not much-----1 Yes Some times-----2 Quite a lot-----3

506	In the past seven days, have things been getting on top of you?	No	Coping as usual-----0 Mostly able -----1
		Yes	Sometimes unable-----2 Most of the time unable to cope -----3
507	In the past seven days, have you been so unhappy that you have had difficulty sleeping?	No	Not at all -----0 Not very often -----1
		Yes	Sometimes-----2 Most of the time -----3
508	In the past seven days, have you felt sad or miserable?	No	Not at all-----0 Not very often-----1
		Yes	Sometimes-----2 Most of the time-----3
509	In the past seven days, have you been so unhappy that you have been crying?	No	Never-----0 Only occasionally-----1
		Yes	Quite often-----2 Most of the time-----3
510	In the past seven days, has the thought of harming yourself occurred to you?	No	Never-----0 Hardly ever-----1
		Yes	Sometimes-----2 Quite often-----3

Part VI: Social support received from different people

Tell us about the support you received from different people

		Always	Most of the time	Some of the time	Rarely	Never
601	I have good friends who support me.	5	4	3	2	1
602	My family is always there for me.	5	4	3	2	1
603	My husband/partner helps me a lot.	5	4	3	2	1
604	There is conflict with my husband/partner.	1	2	3	4	5
605	I feel controlled by my husband/partner.	1	2	3	4	5
606	I feel loved by my husband/partner.	5	4	3	2	1

Thank you for your time and effort in responding to these questions

End

Appendix 2: Parental Permission

Read this information sheet and informed consent form to the parent.

Good morning/good afternoon.

My name is _____ I am a data collector for the study conducted in Wondo Genet Woreda to assess the health and social welfare of pregnant women and their newborns. We are based at Hawassa University. Your child has been selected by chance to participate in this study. Since the age of your child is below 18 years we request your permission for your child to participate in this study.

If she agree to participate in the study, there will be an interview at enrollment (I will ask her some questions about her health and use of health services), and a visit as soon as possible after birth to measure the baby's birth weights. Her participation in this study is completely voluntary. All the information she give us will be kept private. She do not have to answer any of the questions if she do not want to, and may withdraw at any time she want to. If she refuses to participate in this study it has no consequences for her. However, her honest answers to these questions we hope will help us improve women's health and the services provided. She will not get any monetary/material benefit for her participation in this study.

Some of the topics are sensitive in nature and difficult to discuss, but many women have found it useful to have the opportunity to talk. Memorizing painful events may cause distress. If she needs psychological support, she will be referred to Kela health center and Hawassa University Referral Hospital.

Do you have any questions? If you have any questions to be clarified further you can talk to the principal investigator Sewhareg Belay via +251 916 874105.

Do you allow your child to be interviewed and followed up?

Agree [] Disagree []

Appendix 3: Questionnaire for follow up visit

Name of the interviewer _____ Signature of the interviewer ____ Date _____

Name of the kebele _____ ID number of the woman _____

1. Does the baby breast feed? Yes-----No-----

2. What food has the baby got these first days?-----

3. Is the baby active? Yes-----No-----

4. Is there anything wrong with the baby that you want to mention? Yes-----No-----

If yes, specify-----

5. How is your own general health now? Well-----Not well-----

If not well, specify -----

6. Place of delivery Home-----Health institution-----

7. Outcome of pregnancy Live birth-----Still birth-----

8. Sex of baby Female-----Male----- Birth order-----

9. Date of birth _____ time of birth _____

10. Birth weight _____ gm

11. Date of birth weight measurement _____

12. Time of birth weight measurement _____

13. If birth weight was not taken, why? _____

Appendix 4: Questionnaire for health workers

Questionnaire to assess knowledge and attitude of health workers

Informed Consent Form

Good morning/good afternoon.

Please read this consent form before you decide to participate in this study.

The is a study conducted with the objective of assessing knowledge and attitude of health care professionals working in primary health care units about intimate partner violence in Sidama Zone, South Ethiopia. The results we get from this study will provide evidence valuable for the design of interventions aimed at improving the health status of women in our country.

The research forms part of a study conducted in selected districts of Sidama Zone by team of researchers at Hawassa University. You have been approached because you are working in maternal health care unit and involved with giving care and treatment.

The questionnaire includes some short questions about your background, knowledge and attitude about intimate partner violence. No personal identifiers will be attached to the questionnaire. Individual respondents will not be identified by their institution in the final report. All the data obtained will be kept strictly confidential, to be accessed only by the principal investigator and destroyed immediately when the study is finalized.

Your participation in this study is completely voluntary. It may take 20-30 minutes to fill the questionnaire. If you feel inconvenient, you can interrupt and clarify inconvenience, appoint to other time or even withdraw any time after you get involved in the study. Your honest and genuine participation in this study is very important & highly appreciated.

If you have any questions to be clarified you can talk to the principal investigator Sewhareg Belay via +251 916 874105.

Do you agree to participate? Yes----- No-----

If yes, proceed to the next page.

If no, stop here.

Date ----/----/----Name and type of health facility _____

Part I- Socio-demographic and economic characteristics of respondent.

No	Questions	Response
101	Residence	Rural-----1 Urban-----2
102	Age	_____ Years
103	The highest educational status you have attained	Certificate-----1 Diploma-----2 Degree-----3 Others (specify)-----4
104	Ethnicity	Sidama-----1 Oromo-----2 Amhara-----3 Wolayta -----4 Gurage -----5 Others -----6 specify _____
105	Religion	Protestant -----1 Muslim-----2 Orthodox-----3 Catholic-----4 Traditional belief -----5 Others-----6 specify) _____
106	Occupation (Job)	Health extension worker-----1 Midwifer-----2 Nurse-----3 Health officer-----4 Others-----5 specify _____
107	Marital status	Never married-----1 Married-----2 Divorced-----3 Widowed-----4 Unmarried but in stable union----5 Separated-----6 Other-----7
108	Years of experience	_____ years

Knowledge questions

1. Violence by an intimate partner can occur in all settings, among all socioeconomic, religious and cultural groups.

False	0
True	1
Don't know	2

2. Being slapped, pushed, shoved or pulled, hit with fist or with something else, choked or burnt on purpose by an intimate partner is violence.

False	0
True	1
Don't know	2

3. Being physically forced to have sexual intercourse when a woman didn't want to can be considered as violence by an intimate partner.

False	0
True	1
Don't know	2

4. Having sexual intercourse when a woman did not want to because of fear of a partner can be considered as violence.

False	0
True	1
Don't know	2

5. Being forced to do something sexual that is degrading or humiliating can be considered as violence by an intimate partner.

False	0
True	1
Don't know	2

6. Insulting or making a woman to feel bad, humiliating woman in front of other people, perpetrator had done things to scare or intimidate her on purpose, e.g. by yelling or smashing things had threatened to hurt someone she cared about can be considered as violence by an intimate partner.

False	0
True	1
Don't know	2

7. Violence by an intimate partner can be caused by alcohol drinking.

False	0
True	1
Don't know	2

8. Violence by an intimate partner never happens during pregnancy.

False	0
True	1
Don't know	2

9. Violence by an intimate partner during pregnancy cannot cause adverse health outcome for the pregnant woman or her baby.

False	0
True	1
Don't know	2

10. We cannot suspect violence unless we see physical signs/injuries and bruises

False	0
True	1
Don't know	2

Attitude questions

1. An intimate partner can beat his wife during pregnancy unless he directly focused the abdomen.

1	Strongly disagree
2	Disagree
3	Don't know
4	Agree
5	Strongly agree

2. An intimate partner is not justified to beat or insult his wife even if the pregnancy is mistimed or unwanted.

1	Strongly disagree
2	Disagree
3	Don't know
4	Agree
5	Strongly agree

3. Physical violence is not an acceptable way to resolve conflict in a relationship.

1	Strongly disagree
2	Disagree
3	Don't know
4	Agree
5	Strongly agree

4. A woman should tolerate violence in order to keep her family together.

1	Strongly disagree
2	Disagree
3	Don't know
4	Agree
5	Strongly agree

5. Violence will not happen unless the woman has done something that would trigger the perpetrator to abuse her.

1	Strongly disagree
2	Disagree
3	Don't know
4	Agree
5	Strongly agree

6. Health care professionals shouldn't screen for violence in order not to offend the woman.

1	Strongly disagree
2	Disagree
3	Don't know
4	Agree
5	Strongly agree

7. Dealing with violence is pertinent not only to the fields of police and justice, but also to health.

1	Strongly disagree
2	Disagree
3	Don't know
4	Agree
5	Strongly agree

8. Dealing with violence means interfering with privacy of the family.

1	Strongly disagree
2	Disagree
3	Don't know
4	Agree
5	Strongly agree

9. Health care professionals should suggest abused women to leave their home.

1	Strongly disagree
2	Disagree
3	Don't know
4	Agree
5	Strongly agree

10. Health care professionals do not have any role except treating physical injuries caused by IPV.

1	Strongly disagree
2	Disagree
3	Don't know
4	Agree
5	Strongly agree

General Questions

1. Did you get any pre service training on IPV management?
 1. Yes
 2. No

2. Did you get any in service training on IPV management in the last 6 months?
 1. Yes
 2. No

3. Did you ever meet a pregnant women facing violence by her intimate partner asking for help?
 1. Yes
 2. No

4. How often do you detect IPV?
 1. Never
 2. Once a year
 3. 2-4 times /year
 4. Over 4 times/year

5. Do you feel confident to offer help to women facing violence by an intimate partner?
 1. Yes
 2. No
 3. Don't know

6. Would you welcome training on IPV?
 1. Yes
 2. No
 3. Don't know

Thank you for your time and effort in completing this survey
End

Appendix 5: Ethical approvals and support letters

Region:
REK vest

our date:
19.01.2017
your date:
09.01.2017

reference:
2016/1908/REK vest

Sven Gudmund Hinderaker
University of Bergen

2016/1908 Intimate partner violence during pregnancy: Its effect on gestational depression and neonatal outcomes. and assessment of knowledge and attitudes of Health care professionals towards intimate partner violence in Sidama zone, south Ethiopia

Institution responsible for the research: Hawassa University, University of Bergen
Project manager: Sven Gudmund Hinderaker

With reference to your response 09.01.2017 and email 11.01.2017 with updated version of the protocol, The Chairman of Regional Committee for Medical and Health Research Ethics (REC Western Norway) reviewed the response, pursuant to The Health Research Act § 10.

Project summary

The Project will study partner violence in pregnancy, prevalence and risk factors, in rural Hawassa, Ethiopia. The purpose is to explore the impact of violence on neonate from pregnancy and the impact of violence on maternal depression during pregnancy. The researcher will do systematic household visits in the study area, identify pregnant women and interview them. Consent will be obtained from 606 pregnant women

The Committee asked for a response (Letter 14.12.2016)

REC decides to postpone the decision. The Committee requests a response in order to make a decision.

The Project manager's response:

- How may the study ensure that participation do not trigger more violence? Explain special measures to care for and protect the women to limit the potential risks of reprisals. *Response:* See the ethics section (page 17, section 8) and Annex 1 (page 27). On arrival at the household we present the research topic as "women's health". If the woman accepts to participate, the interview will be done in a private room with no other person (aged more than 2 years) present. Before the interview she will be informed about the sensitive nature of some topics and potential support if she wants it, and also be reminded she may decline any question if she so decides.
- The information sheet and consent form must be audited according to the remark and sent to REC. *Response:* See modified information sheet and consent form (Appendix, page 27). Sensitive information for the woman alone is written on the first page of the questionnaire (Appendix, page 28), not in the consent form.
- The project manager must confirm that data will be anonymized at the project end date. *Response:* The data will be anonymized at the project end date (page 18).

Review

Protocol and information sheets have been audited. REC presumes that the participant will be informed about

the sensitive nature of some of the interview topics and potential support before the interview is initiated. The Committee has no further comments.

Decision

REC Western Norway approves the project in accordance with the submitted application and response.

The approval is valid until 31.12.2019. A final report must be send 31.06.2020.

The approval is based on the grounds that the project is implemented as described in the application and the protocol, as well as the guidelines stated in the Health Research Act. If amendments need to be made to the study, the project manager is required to submit these amendments for approval by REC via the amendment form. The decision of the committee may be appealed to the National Committee for Research Ethics in Norway. The appeal should be sent to the Regional Committee for Research Ethics in Norway, West. The deadline for appeals is three weeks from the date on which you receive this letter.

Sincerely,

Marit Grønning
Prof. Dr.med
Committee Chairman

Camilla Gjerstad
Committee Secretary

copy: ayalewastatkie@gmail.com, postmottak@uib.no



Ref. No: IRB/006/09

Date: 30/09/2016

Name of Researcher(s): *Sewhareg Belay, Sven Gudmund Hideraker, Maria Emmelin, Ayalew Astatkie*

Topic of Proposal: *Intimate partner violence during pregnancy: Its effect on neonatal outcomes and assessment of knowledge and attitude of health care professional towards intimate partner violence in Sidama zone, south Ethiopia.*

Dear researcher(s),

The Institutional Review Board (IRB) at the College of Medicine and Health Sciences of Hawassa University has reviewed the aforementioned research protocol with special emphasis on the following points:

- 1. Are all principles considered?
 - 1.1. Respect for persons: Yes No
 - 1.2. Beneficence: Yes No
 - 1.3. Justice: Yes No
- 2. Are the objectives of the study ethically achievable? Yes No
- 3. Are the proposed research methods ethically sound? Yes No

Based on the aforementioned ethical assessment, the IRB has:

- A. Approved the proposal for implementation
- B. Conditionally Approved
- C. Not Approved

Yours faithfully,

Mengistu Hailemariam (MSc),
Acting Chairperson, Institutional Review Board



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Hawassa University

College of Medicine and Health Sciences

Chief Academic and Research Director

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Ref. No
ቀን 27/01/09
Date

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ጉዳይ: ትብብር ስለመጠየቅ

የህብ/አካ/ጤ/አ ት/ቤት መምህር የሆኑት ወ/ሮ ሰውሀረግ በላይ ወደ ጽ/ቤታችሁ መጥተው "Intimate partner violence during pregnancy: Its effect on neonatal outcomes and assessment of knowledge and attitude of health care professional towards intimate partner violence in sidama zone, south Ethiopia." ላይ ምርምር ለመስራት ስለሚመጡ አስፈላጊውን ትብብር እንድታደርጉላቸው በአክብሮት እንጠይቃለን።

ከሰላምታ ጋር



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ቁጥር 108/2/923/1
ቀን 04/02/09

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- ለጤና ስ/ሰ/ዘ/ክ/ግ/ግ/ የሥራ ሂደት ሀዋሳ



የጥርጣሬ ቀን 04/02/09
የጥርጣሬ ቀን 04/02/09

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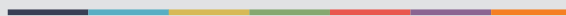
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Ababa Bakkaayo Waaqayo
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