

# Intimate partner violence and depression among women in rural Ethiopia

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## Akademisk avhandling

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**Abstract**

**Background:** Several studies have reported socioeconomic, socio-demographic factors, including violence against women to be associated with depression among women, but knowledge in the area among women living under extreme poverty in developing countries remains scarce. Relationship between intimate partner violence and women's literacy in societies where violence is normative is complex, there are only limited data describing this difference in the distribution of violence exposure by residency and literacy. Few studies have addressed consequences of maternal depression and experiencing violence among women on children's survival.

**Objective:** The aim of this thesis is to determine prevalence of depressive episode and examine its association with violence by intimate partner and socioeconomic status. It also assesses contribution of residency and literacy of women on vulnerability to physical violence by intimate partner, and independent effect of intimate partner violence and maternal depression on the risk of child death in rural Ethiopia.

**Methods:** A community-based cross-sectional study was undertaken among 3016 randomly selected women in the age group between 15-49 years conducted from January to December 2002. A cohort study was done through following up women who gave birth to a live child within a year of the survey, in rural Ethiopia. Analysis was made using all the 3016 women, 1994 of the married women and 561 of women who gave birth within a year of the data collection time. Cases of depression were identified using the Amharic version of the Composite International Diagnostic Interview, experience of physical, sexual and emotional violence by intimate partner was made using the WHO multi-country study on women's life events, and child death was measured by continuous demographic surveillance data from the Butajira Rural Health Program.

**Result:** The twelve-month prevalence of depression was estimated to be 4.4%. In the analyses being currently married, divorced and widowed women, living in rural villages, having frequent khat chewing habit, having seasonal job and living in extreme poverty were factors independently associated with depression. Similarly, among the married women, experiencing physical violence, childhood sexual abuse, emotional violence and spousal control were factors independently associated with depressive episode. Women in the overall study area had beliefs and norms permissive towards violence against women. Violence against women was more prevalent in rural communities, in particular, among rural literate women and rural women who married a literate spouse. In this study, maternal depression was associated with under five child death. Although no association was seen between experiencing violence and child death, the risk of child death increases when maternal depression is combined with physical and emotional violence.

**Conclusion:** Prevalence of depression among women was still in the lower range as compared to studies from high-income countries. Though depression is associated with socio-demographic factors and extreme poverty, the association is complex. The high prevalence of violence against women could be a contributing factor for preponderance of depression among women than in men. Urbanization and literacy are thought to promote changes in attitudes and norms against intimate partner violence. However, literacy within rural community might expose women to the higher risk of violence. Improving awareness of clinicians and public health workers on the devastating consequences of violence against women and depression is essential in order to identify and take measure when violence and maternal depression co-occurred.

**Keywords**

depression, extreme poverty, intimate partner violence, spousal-control, child death, rural Ethiopia

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*This dissertation is dedicated to my late father,  
Deyessa Kabeta who used to teach me through  
counting right marks and encouragement for  
never having wrong marks*



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## Abstract

**Background:** Several studies have reported socioeconomic, socio-demographic factors, including violence against women to be associated with depression among women, but knowledge in the area among women living under extreme poverty in developing countries remains scarce. Relationship between intimate partner violence and women's literacy in societies where violence is normative is complex, there are only limited data describing this difference in the distribution of violence exposure by residency and literacy. Few studies have addressed consequences of maternal depression and experiencing violence among women on children's survival.

**Objective:** The aim of this thesis is to determine prevalence of depressive episode and examine its association with violence by intimate partner and socioeconomic status. It also assesses contribution of residency and literacy of women on vulnerability to physical violence by intimate partner, and independent effect of intimate partner violence and maternal depression on the risk of child death in rural Ethiopia.

**Methods:** A community-based cross-sectional study was undertaken among 3016 randomly selected women in the age group between 15-49 years conducted from January to December 2002. A cohort study was done through following up women who gave birth to a live child within a year of the survey, in rural Ethiopia. Analysis was made using all the 3016 women, 1994 of the married women and 561 of women who gave birth within a year of the data collection time. Cases of depression were identified using the Amharic version of the Composite International Diagnostic Interview, experience of physical, sexual and emotional violence by intimate partner was made using the WHO multi-country study on women's life events, and child death was measured by continuous demographic surveillance data from the Butajira Rural Health Program.

**Result:** The twelve-month prevalence of depression was estimated to be 4.4%. In the analyses being currently married, divorced and widowed women, living in rural villages, having frequent khat chewing habit, having seasonal job and living in extreme poverty were factors independently associated with depression. Similarly, among the married women, experiencing physical violence, childhood sexual abuse, emotional violence and spousal control were factors independently associated with depressive episode. Women in the overall study area had beliefs and norms permissive towards violence against women. Violence against women was more prevalent in rural communities, in particular, among rural literate women and rural women who married a literate spouse. In this study, maternal depression was associated with under five child death. Although no association was seen between experiencing violence and child death, the risk of child death increases when maternal depression is combined with physical and emotional violence.

**Conclusion:** Prevalence of depression among women was still in the lower range as compared to studies from high-income countries. Though depression is associated with socio-demographic factors and extreme poverty, the association is complex. The high prevalence of violence against women could be a contributing factor for preponderance of depression among women than in men. Urbanization and literacy are thought to promote changes in attitudes and norms against intimate partner violence. However, literacy within rural community might expose women to the higher risk of violence. Improving awareness of clinicians and public health workers on the devastating consequences of violence against women and depression is essential in order to identify and take measure when violence and maternal depression co-occurred.

**Key words:** depression, extreme poverty, intimate partner violence, spousal-control, child death, rural Ethiopia

## List of original papers

This thesis is based on the following four papers, which will be referred to in the text by their Roman numerals.

- I. Deyessa N, Berhane Y, Alem A, Hogberg U, Kullgren G. Depression among women in rural Ethiopia as related to socioeconomic factors: A community-based study on women in reproductive age groups. *Scand J Public Health*. 2008;36:589-97.
- II. Deyessa N, Berhane Y, Alem A, Ellsberg M, Emmelin M, Hogberg U, et al. Intimate partner violence and depression among women in rural Ethiopia: a cross-sectional study. *Clin Pract Epidemiol Ment Health*. 2009;5:8.
- III. Deyessa N, Berhane Y, Ellsberg M, Emmelin M, Kullgren G, Högberg U. Violence against women in relation to literacy and area of residence. *Global Health Action* 2010, 3:2070 - DOI: 10.3402/gha.v3i0.2070
- IV. Deyessa N, Berhane Y, Emmelin M, Ellsberg M, Kullgren G, Högberg U. Joint effect of maternal depression and intimate partner violence on increased risk of child death in rural Ethiopia. *Arch Dis Child* 2010. In press.

## **Acronyms**

<b>BDI</b>	<b>Beck Depression Inventory</b>
<b>BRHP</b>	<b>Butajira Rural Health Program</b>
<b>CIDI</b>	<b>Composite International Diagnostic Interview</b>
<b>CSA</b>	<b>Central Statistical Agency</b>
<b>DHS</b>	<b>Demography and Health Survey</b>
<b>DIS</b>	<b>Diagnostic Interview Schedule</b>
<b>DSS</b>	<b>Demography and Surveillance Site</b>
<b>EPDS</b>	<b>Edinburgh Postnatal Depression Scale</b>
<b>FGC</b>	<b>Female Genital Cutting</b>
<b>FGM</b>	<b>Female Genital Mutilation</b>
<b>GHQ<sub>12</sub></b>	<b>General Health Questionnaire</b>
<b>INDEPTH</b>	<b>International Network of field sites with continuous Demographic Evaluation of Population and Their Health in developing countries</b>
<b>IPV</b>	<b>Intimate Partner Violence</b>
<b>SRQ<sub>20</sub></b>	<b>Self Response Questionnaire</b>
<b>UNICEF</b>	<b>United Nations Children's Fund</b>
<b>WHO-DAS</b>	<b>World Health Organization, Disability Assessment Schedule</b>

# Introduction

## Women in developing world

Traditional and cultural practices spirituality and religion may have a great influence on health outcome as reported from sub-Saharan Africa, (Thoresen and Harris 2002). In the current period of societal transitions, little is known about how changes in traditional norms, gender roles influence morbidity. Societal transition in sub-Saharan Africa including Ethiopia is related to higher fertility with intertwined challenges of high population growth, environmental degradation, slow rural development and technological adaptation that inflates the rural poverty and vulnerability (Patterson 2007). The stagnation of the agricultural economy and its failure to feed rural population is a tangible phenomena in the country (Patterson 2007). This economic decline is making people to produce cash crops that may enhance rural to urban movement resulting in rapid change in norms of people (Raikes 1989).

Structural adjustments undertaken due to such complex problems may result in failure to distribute social service including education and health care services in an equitable manner. Such inequity of distribution of social resources are geared more to women population (Berhane et al. 2001). Although women are the backbone of a society and vanguard of the family welfare, due to their compromised and marginalized status, they receive the least benefits from societal, communal and family resources. Women in rural community are in a very underprivileged position due to lower literacy levels and decision making power resulting in lower access to modern facilities with high workloads including during time of pregnancy as well as following childbirth (Berhane et al. 2001).

Despite the ratification by African states on several human rights protocols protecting the rights of women to eliminate all forms of discrimination and harmful practices against them, women in Africa still continue to experience human rights violations (Ssenyonjo 2007). Despite the emphasis placed by various policies and agencies on specific needs of women including gender equity in the provision of services and women's participation in the community, the efforts have still failed to much improve the situation (Patterson 2007).

The overall and worldwide disadvantaged situation for women has bearing on their mental health. In recent decades the public health significance of

mental disorders, and particularly depressive disorders, has received increasing attention. Studies from developed world describe that prevalence rates of major depressive disorder are twice as high in females as in males (Angst et al. 2002; Weissman et al. 1996). Major depression is often associated with a disturbed family environment (Duggan et al. 1998) or exposure to traumatic events or major adversities (Keane and Wolfe 1990; Wolf et al. 2002). It is also associated with marital difficulties (Whisman et al. 2000), recent stressful life events and problems which in most cases women from developing countries are exposed to (Kendler et al. 2003; Kessler 1997).

Violence against women is a major public health problem and human rights concern worldwide imbedded in the imbalance in power between men and women. Violence against women in particular hinders progress in achieving the Millennium Development Goals (WHO 2005). Gender-based violence is multifaceted phenomenon grounded in interplay between personal, situational and socio-cultural factors. The public health perspective comprises an ecological framework (structural, community, relationship, individual) for understanding and prevention of violence against women. Factors as norms and laws granting men control over female behaviour, violence accepted for resolving conflicts, masculinity linked to dominance are acting on structural level (Ellsberg 2000, WHO 2005). Although reliable prevalence data are scarce, it is estimated that between 20% and 75% of women in most countries have experienced physical violence from an intimate partner (Garcia-Moreno et al. 2006; Hassan et al. 2004; Owoaje and Olaolorun 2005; WHO 2002). Therefore, studying risk factors associated with violence against women from perspective of an ecological model including interaction of societal, community, relationship and individual in a complex manner is important (Bott 2005). Although the magnitude of physical violence between low and high income settings is not clear, there are some indications of a higher prevalence of physical violence in low income countries (Nasir and Hyder 2003) (WHO 2005).

Although child death declined in many low-income countries, in Sub-Saharan Africa like Ethiopia, death during childhood is a major public health problem (Black et al. 2003; Jones et al. 2003). In the Ethiopian demographic and health survey of 2005, child mortality rate was 123/1000 live birth, one of the highest in developing countries (Central Statistical Agency and ORC Macro 2006). As further explored below, maternal depression and IPV seem both of them to be associated with increased child mortality. Co-occurrence of such high under-five year child death and intimate partner violence in Ethiopia warrants further research to study possible association and interactions.

This thesis examines domestic violence in rural Ethiopia and the most common mental health problems of women, depression. It also reports on factors associated with these problems, and the effect of domestic violence and depression on child survival.

## **Definitions of depression and violence by intimate partner**

### ***Depression definition***

Depression is a common mental disorder that presents with lower mood, loss of interest or pleasure, feelings of guilt or low self-worth, disturbed sleep or appetite, low energy, and poor concentration. These problems can become chronic or recurrent and lead to substantial impairments in an individual's ability to take care of her or his everyday responsibilities (WHO 2008). The general term depression is often used to describe the disorder, but since it is also used to describe a temporary depressed or sad mood, more precise terminology is preferred in clinical use and research (WHO 2008).

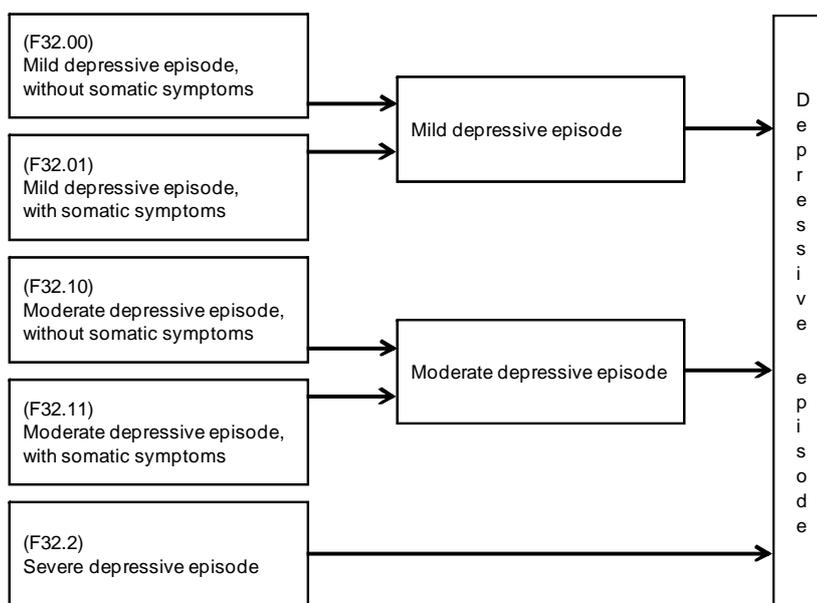
Diagnosis of depression is made through diagnostic criteria from either the International Classification of Diseases version 10 (ICD-10) (WHO 2007) or the Diagnostic and Statistical Manual, fourth edition (DSM-IV) (American Psychiatric Association 1994). Depressive episode (F32) is a diagnosis of the disorder according to ICD-10 and is equivalent to major depressive disorder diagnosed on Diagnostic and Statistical Manual of Mental Disorders, fourth edition (DSM-IV) (American Psychiatric Association 1994). Depressive episode (F32) is a diagnosis of combination of depressive disorders of different severity including 1) mild depressive episode (disorder with and without somatic symptoms, (F32.01/F32.00)), 2) moderate depressive episode (disorder with and without somatic symptoms (F32.11/F32.10), and 3) severe depressive episodes (F32.2) (WHO 2007).

### ***Burden of depression***

In recent decades, the public health significance of mental disorders, particularly depressive disorders has received increasing attention. Depression is a major public health issue, and it imposes a considerable burden upon the community (WHO 2001a). In 1990, unipolar depression was estimated to be the fourth leading contributor to the overall burden of disease; and by 2020, it is projected to be the second overall leading contributor of global disease burden and the leading cause of disability worldwide (Murry and Lopez 1996). While it is not a significant direct cause of mortality, depression seriously reduces the quality of life of individuals, it

is a risk factor for suicide, and often worsens the outcome of other physical health problems. Individuals with depression experience impaired physical role functioning and loss of working time (Broadhead et al. 1990). In a study made in Butajira using WHO Disability Assessment Schedule (WHO-DAS), 15 or more disability days were reported by 48.1% of those with partly recovered depression and 44.4% of those with persistent depression (Mogga et al. 2006).

**Fig 1.** Scheme depicting depressive episode (F32) according to ICD-10.



### ***Challenges of measurement***

In less-income countries due consideration is essential in ascertaining depressive episode using non-clinical methods. The Composite International Diagnostic Interview (CIDI) (Wittchen 1994) is an internationally accepted instrument to measure common mental illnesses using interview by lay persons. The instrument has been used more in western countries using terminologies related with culture that is relatively different from low income countries. Obviously, a different cultural context represents a challenge when using this instrument with difficulties to integrate “emic” and “etic” perspectives (Ragram et al. 2001b).

### ***Violence against women***

Violence towards women represents a major public health and human rights concern everywhere globally (Heise et al. 2002). Violence against women refers to violent acts that are primarily or exclusively committed against women. The United Nations General Assembly, as of 1993 defines "violence against women" 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" (United Nations General Assembly 1993). Potential perpetrators of violence against women include spouses and partners, parents, other family members, neighbors, and men in position of power or influence (Watts and Zimmerman 2002).

The most common form of violence against women is violence by intimate partner, also known as 'domestic violence'. Studies are increasingly highlighting the worldwide scope of intimate partner violence (IPV), which may affect a woman physically, emotionally, and socially (Heise et al. 2002). Women can experience physical, sexual or emotional abuse throughout their lifecycle, starting during their fetal life and continuing through infancy, childhood, adolescence, during adulthood or older age (Watts and Zimmerman 2002). Still there are communities that do not perceive intimate partner violence as a problem (Moracco et al. 2005).

Measurement of violence by intimate partner is likely to underestimate the problem. Possible reason for such underestimation may be due to the sensitive nature of this usually hidden issue. Women may be unwilling to disclose their experience in fear that they might be themselves blamed. It may also be underestimated because of women's loyalty to their spouses. People who do not get immediate benefit when interviewed about a sensitive issue are also less likely to disclose the issue. In the WHO multi-country study, women were reluctant to talk about sexual violence that occurred to them before the age of 15 years. When an anonymous method using picture to describe their sad memory, significantly higher numbers of women were willing to report being victims of IPV (Gossaye et al. 2003a).

### **Magnitude of depression and intimate partner violence**

#### ***Magnitude of depression***

Depression is one of the most widely recognized major mental illnesses worldwide (Lubetkin et al. 2003; Patton et al. 2000; WHO 2001a). Absence of a common diagnostic instrument has hampered synthesis of prevalence of

depressive episode. Since cross-sectional studies are more prevalent than longitudinal cohort design, prevalence of the disorder is more studied than incidence measures. In community studies, despite varying total prevalence rates, the point and lifetime prevalence rates of major depressive disorder across cultures were approximately twice as high in females as in males (Awas et al. 1999; Ovuga et al. 2005; Szadoczky et al. 1998; Weissman et al. 2005; Vorcaro et al. 2001). Despite this consistency, there is substantial variation in the estimated total population prevalence of major depression, with a life time prevalence estimates ranging from as low as 1.5% in Taiwan (Weissman et al. 1996) to as high as 17% (Blazer et al. 1994; Kessler et al. 1994) in united state and 19% (Weissman et al. 1996) in Lebanon (Table 1, 2).

**Table 1.** Prevalence of depression from selected population surveys from Multi country studies.

Authors	Instrument	Country	Sample	Prevalence (rate per 100)	
Weissman et al. 1996	DIS	United States	18,571 (Female 59%)	Male 2.8 $\mu$	Females 7.4 $\mu$
		Canada	3,258 (Female 59%)	Male 6.6 $\mu$	Females 12.3 $\mu$
		Brazil	1,513 (Female 57%)	Male 3.1 $\mu$	Females 5.5 $\mu$
		France	1,746 (Female 62%)	Male 10.5 $\mu$	Females 21.9 $\mu$
		West Germany	481 (Female 52%)	Male 4.4 $\mu$	Females 13.5 $\mu$
		Italy	1000 (Female 53%)	Male 6.1 $\mu$	Females 18.1 $\mu$
		Lebanon	526 (Female 57%)	Male 14.7 $\mu$	Females 23.1 $\mu$
		Taiwan	11004 (Female 48%)	Male 1.1 $\mu$	Females 1.8 $\mu$
		Korea	5100 (Female 52%)	Male 1.9 $\mu$	Females 3.8 $\mu$
		New Zealand	1,498 (Female 66%)	Male 7.5 $\mu$	Females 15.5 $\mu$
Andrade et al. 2003	CIDI	Brazil (Sao Paulo)	1,464 (age 18+)	12.6 $\mu$ , 5.8 $\Omega$	
		Canada	6,902 (age 18+)	8.3 $\mu$ , 4.3 $\Omega$	
		Chile	2,978 (age 15+)	9.0 $\mu$ , 5.6 $\Omega$	
		Czech Republic	1,534 (age 18-79)	7.8 $\mu$ , 2.0 $\Omega$	
		Germany	3,021 (age 14-24)	11.5 $\mu$ , 5.2 $\Omega$	
		Japan	1,029 (age 20+)	3.0 $\mu$ , 1.2 $\Omega$	
		Mexico	1,734 (age 18-54)	8.1 $\mu$ , 4.5 $\Omega$	
		Netherlands	7,076 (age 18-64)	15.7 $\mu$ , 5.9 $\Omega$	
		Turkey	6,095 (age 18-54)	6.3 $\mu$ , 3.5 $\Omega$	
		United States	5,877 (age 15-54)	16.9 $\mu$ , 10.0 $\Omega$	

$\mu$  life time prevalence;  $\Omega$  12 months prevalence

**Table 2.** Prevalence of depression from selected population surveys using more standard measurements.

Country	Authors	Instrument	Study subjects	Prevalence (rate/100)
United States	(Blazer et al. 1994)	CIDI	8098 (age 15-54 years) National representative	17.1 $\mu$ , 4.9 $\text{¥}$
United States	(Kessler et al. 2003)	CIDI	9090 National representative	16.2 $\mu$ , 6.6 $\Omega$
Australia	(Wilhelm et al. 2003)	CIDI	10,641 (age 18-75 years) National representative	Male 3.2 $\text{¥}$ Females 3.9 $\text{¥}$
South Korea	(Cho et al. 2007)	CIDI (K-version)	7,867 National representative	4.3 $\mu$ , 1.7 $\text{¥}$
Hungary	(Szadoczky et al. 1998)	DIS	2953(Age 18-64 years) National representative	Male 9.2 $\mu$ , 7.1 $\Omega$ Females 19.7 $\mu$ , 9.0 $\Omega$
China (Beijing)	(Ma et al. 2008)	CIDI	4767 (age 15-64 years) Representative of Beijing	Male 4.6 $\mu$ Females 5.7 $\mu$
China (Kunming)	(Lu et al. 2008)	CIDI	5,033 Age 15 years and above	Weighted prevalence 1.96 $\mu$ , 1.09 $\Omega$
Brazil (Bambui')	(Vorcaro et al. 2001)	CIDI	1041 Age 18 years and above	Male 8.6 $\mu$ , 5.1 $\Omega$ Females 20.9 $\mu$ , 13.8 $\Omega$
Uganda (Madi and Lusoga)	(Ovuga et al. 2005)	BDI	571 Age 18 years and above	Male 13.9 $\text{¥}$ Females 24.5 $\text{¥}$
Nigeria (Oya-State)	(Amaran et al. 2007)	GHQ12	1105 (female 62%) Age15 years and above	Male 4.8 $\text{¥}$ Females 5.7 $\text{¥}$
Nigeria	(Adewuya et al. 2007b)	EPDS	180 women in Late pregnancy	8.3 $\text{¥}$
Ethiopia (Butajira)	(Awass et al. 1999)	CIDI	300 High SRQ scorers & 300 low SRQ scorers	Male 0.2 $\mu$ Females 3.8 $\mu$

Key:  $\mu$  life time prevalence;  $\Omega$  12 months prevalence and  $\text{¥}$  one month prevalence

### ***Depression in women***

The higher prevalence of depression among women than men is a consistent finding in psychiatric epidemiology. This difference has been found throughout the world using a variety of diagnostic schemes and interview methods (Cho et al. 1998; Kessler 2003; Lee et al. 2007; Piccinelli and Wilkinson 2000; WHO 2001a; Wilhelm et al. 2003). The reasons for such discrepancy are many and complex and might be explained by both biological and psychosocial factors.

A dramatic shift in depression prevalence is apparent during adolescence age in girls sometime between ages 10-15 years (Gutierrez-Lobos et al. 2002). One hypothetical explanation for such difference in depressive episode between women and men is the hormonal effect (Freeman et al. 2006; Freeman et al. 2004). Another hypothesis for sex difference in prevalence of

depression is the type of adverse life event women experience (Keita 2007). Women experience life events related to housing problems (daily hassles), proximal relation problems that may include sexual abuse in childhood, intimate partner violence, life events due to poverty, non-education, and unemployment (Keita 2007; Piccinelli and Wilkinson 2000). Depressive episode with an onset before 22 years among women, which is also called 'Early-onset depression', is expected to affect women on their future educational attainment and future earning power (Berndt et al. 2000). History of presence of past major depression and anxiety disorder (which usually are more prevalent in women population) are other risk factors for recurrent depression status among women compared to men; resulting in higher current prevalence among women (Kessler et al. 1993). Parental genetic markers are known to influence for depression on the child, however, there is doubt whether this genetic vulnerability is different between men and women (Sullivan et al. 2000; Weissman et al. 2005).

### ***Prevalence of intimate partner violence***

It is a serious challenge in developing countries, to study domestic violence because it occurs primarily within the private sphere of the family. Many women are reluctant to report being abused because of the stigma, shame and self-blame surrounding the experience, fear of possible repercussions from perceived disloyalty to their spouse and family (Browman 2003; Heise 1998). However, researchers are able to reduce under-reporting by providing special training to interviewers, placing greater emphasis on respondents' privacy and safety (WHO 2005).

Although reliable prevalence data are scarce, it is estimated that between 20% and 75% of women in most countries have experienced physical violence from an intimate partner (Garcia-Moreno et al. 2006; Hassan et al. 2004; Owoaje and Olaolorun 2005; WHO 2002).

Despite increasing recognition that domestic violence is a global public health concern, population-based studies of violence against women, remain scarce in developing countries (Koenig et al. 2003b). Different rates of domestic violence have been reported from developing countries, with lifetime prevalence of physical violence ranging from 10% in nationwide study in Philippines to about 78.8% in Igbo communities, Nigeria (Okemgbo et al. 2002; Population Information Program and Center for Health and Gender Equity 1999). Reviews of the literature on violence against women have estimated that around 30% of women in developed countries and 18% and 67% of those in developing countries have experienced at least one incident of physical abuse (Coker and Richter 1998; Nasir and Hyder 2003).

A recent study among pregnant women in rural community with lower socio-economic status indicated the prevalence to be 81% (Bailey and Daugherty 2007). As reviewed by Leung, the prevalence of violence against pregnant women in developed countries ranges from 1% to 20% (Leung et al. 1999), and this figure is very high in developing countries especially in African pregnant women that reaches as high as 59% (Okemgbo et al. 2002).

## **Risk factors for depression and violence by intimate partner**

### ***Psychosocial risk factors for depression***

Depressive episode is a complex and multi-factorial disorder, which can be associated with different socio-economic factors. Several studies found that depression is significantly associated with lower education (Cho et al. 1998; Cuijpers and Smit 2002; Kessler et al. 2003; Ma et al. 2008; Vorcaro et al. 2001), and possible explanation given include difficulty of adjusting and coping to changes in the social environment and work related distress among less educated persons (Cho et al. 1998). In contrast, Lu et al 2008, showed that depression is associated with attainment of higher education, and the explanation given includes that the rapid economic growth and industrialization of cities is more likely to have a harder effect on the population with higher education (Lu et al. 2008).

Studies also illustrate that being never married or being divorced, widowed or separated is associated with depressive episode (Cho et al. 1998; Cuijpers and Smit 2002; Li et al. 2008; Wilhelm et al. 2003; Vorcaro et al. 2001). It is suggested that lack of emotional support by a spouse in people living unmarried may lead to increased likelihood of experiencing depression (Cho et al. 1998). Marital disruption and living alone could also create lifelong structural vulnerability to adverse life events which may be a risk factor for depression (Andrade et al. 2003).

Studies demonstrate that depressive episode is associated with these risk factors in the age group between 24-54 years, (Ma et al. 2008; Wilhelm et al. 2003). Possible factors that might explain the low rates of depression in the elderly include decreased emotional responsiveness, increased emotional control and psychological immunization to stressful experiences of the group (Wilhelm et al. 2003).

Depression is also associated with poverty (Boris et al. 2008; Kessler et al. 2003), and being unemployed (Cho et al. 1998; Cuijpers and Smit 2002; Lee et al. 2007; Li et al. 2008; Wilhelm et al. 2003). Studies described that depressive episode is associated with excess alcohol drinking pattern

(Cuijpers and Smit 2002; Wilhelm et al. 2003), being cigarette smoker (Cuijpers and Smit 2002; Ohayon 2007; Wilhelm et al. 2003), and impaired physical health (Li et al. 2008).

Depression is also known to be associated with modernization (Sundquist et al. 2004) and urbanization (Li et al. 2008) in which its effect on depression is accounted through increased migration, breakdown of traditional roles and values, changes in child rearing patterns, among others.

For depression, recent cross-national studies suggest that the cumulative lifetime rates are increasing by time, with each successive young cohort (Colla et al. 2006). Possible suggestions for such association are as follows. Depression is associated with history of past episode of depression (Kessler et al. 1993), and could be found co-morbid with anxiety/somatoform disorders (Li et al. 2008). Depression is associated with adverse life events both in men and women, although adverse life-events are more in women than in men (Kendler et al. 2004).

### ***Risk factors for violence by intimate partner***

The most common form of violence against women, the intimate partner violence is a sensitive issue that usually is underestimated and is a complex and multi-factorial problem, which can be associated with different individual level behaviors, socio-economic factors of the woman herself, her spouse and community pattern where the victim lives. Intimate partner violence is consistently associated with women having no or lower education (Ackerson et al. 2008; Antai and Antai 2008; Bangdiwala et al. 2004; Boy and Kulczycki 2008; Boyle et al. 2009; Dibaba 2008; Karamagi et al. 2006; McCloskey et al. 2005; Nguyen et al. 2008). However, effect of non-education of the woman on intimate partner violence is refuted by lower community level violence (Boyle et al. 2009; Lawoko et al. 2007). Exposure to IPV might be higher among wives whose spouses' are uneducated (Ackerson et al. 2008; Nguyen et al. 2008), and when women are more educated than their husbands (Ackerson et al. 2008).

Studies also illustrated that women at lower wealth index (Antai and Antai 2008; Bangdiwala et al. 2004; Nguyen et al. 2008) and women who were unemployed were more likely to have higher chance of intimate partner violence (Bangdiwala et al. 2004). Women living in rural community are more vulnerable with IVP than their urban counterparts (Boy and Kulczycki 2008; Breiding et al. 2009). Witnessing family violence as a child is associated with intimate partner violence in both spouses. (Deyessa et al. 1998; Dibaba 2008).

Women having higher number of children are more likely to experience violence by their spouses (Dibaba 2008; McCloskey et al. 2005). Women of spouses having extramarital affairs are more exposed to intimate partner violence (McCloskey et al. 2005; Nguyen et al. 2008; Xu et al. 2005). Women having a partner that contributes little to his children are more likely to experience violence (McCloskey et al. 2005; Xu et al. 2005). Women having spouses with excess alcohol drinking habit, (Dibaba 2008; Koenig et al. 2003b; Parish et al. 2004; Varma et al. 2007; Zablotska et al. 2009), having dissatisfying marital relation (Karamagi et al. 2006), living in polygamous marriage (Lawoko et al. 2007), and having higher age difference with their spouse (Lawoko et al. 2007) were more likely to experience intimate partner violence.

Women having a partner with high level of controlling behavior and having a partner giving them lesser autonomy are at higher risk of experiencing IPV (Krantz and Nguyen 2009; Lawoko et al. 2007). Sexual jealousy, patriarchal beliefs, low female contribution to household income, low male socio-economic status are other factors related with higher experience of women by their intimate partners (Parish et al. 2004).

Physical violence during pregnancy has been shown to be associated with lower tendency to cease smoking, increased level of alcohol use, marijuana etc (Bailey and Daugherty 2007). Intimate partner violence during pregnancy is associated with increase of pregnancy complications and symptoms of distress (Small et al. 2008). (Valladares 2005, Edin 2006) Intimate partner violence is also related with women or/and men's belief of its justifiability. Men having positive attitude towards women autonomy, educated men and men who have higher access to information are less likely to justify IPV (Lawoko 2008). In general, women are more likely to justify IPV than men (Uthman et al. 2009). Non educated women (Uthman et al. 2009) and women not living with a male partner have also been shown to have an accepting attitude towards IPV (Owoaje and Olaolorun 2005). Unemployed men are also more likely to justify IPV (Uthman et al. 2009).

### **Consequences of intimate partner violence**

Intimate partner violence is associated with post traumatic stress disorder (PTSD) and depression (Chandra et al. 2009; Varma et al. 2007) and somatic symptoms and other psychiatric morbidity (Varma et al. 2007). There are also studies illustrating that intimate partner violence to be associated with elevated risk of memory loss, pain or discomfort, suicidal thoughts and injuries (Vung et al. 2009).

Intimate partner violence is associated with self reported adverse general health and sexual health (Parish et al. 2004), with negative reproductive health outcome (Emenike et al. 2008) and with HIV (Jewkes et al. 2006; Zablotska et al. 2009). Women in abusive environment are found to visit health care at higher level (Krishnan et al. 2001), and their level of satisfaction of the marriage is lower (Varma et al. 2007). Intimate partner violence is associated with child morbidity (Karamagi et al. 2007) and infant mortality (Emenike et al. 2008). Women experiencing intimate partner violence are more likely to counsel health care facilities for their infants (Ellis et al. 2008).

### **Effect of maternal depression and intimate partner on child survival**

Depression is a major public health problem in women during pregnancy with a prevalence ranging between 3% and 27% (Adewuya et al. 2007a; Felice et al. 2004; Jesse et al. 2005; Lee et al. 2004; Rubertsson et al. 2005). Maternal depression during pregnancy is related with spontaneous abortion (Sugiura-Ogasawara et al. 2002), intrauterine growth retardation (Rondo et al. 2003) and with giving birth for a pre-mature baby or low birth weight for gestational age (Diego et al. 2008; Field et al. 2008; Rondo et al. 2003). Maternal depression during pregnancy is also associated with child developmental delay (Deave et al. 2008; DiPietro et al. 2006; Petersen et al. 1997), and child-rearing problem and neglect (Bair-Merritt et al. 2008; Eagle et al. 1999; Moehler et al. 2006).

Studies indicate that violence against women is associated with depressive status of women (Deyessa et al. 2009; Hegarty et al. 2004; Leung et al. 2002), and is believed to cause serious physical and mental consequence that could be detrimental for family functioning and health. The effect of intimate partner violence during pregnancy on child death might be a result of direct impact to the fetus during pregnancy (Silverman et al. 2007), or due to behavioral mechanisms within the mother affecting the fetus during pregnancy (Diego et al. 2008; Rondo et al. 2003). Women exposed to intimate partner violence during pregnancy are mentally distressed and could have higher levels of cortisol than those not exposed (Inslicht et al. 2006; Valladares et al. 2005). (Valladares 2009). Fetal growth and risk of pre-term labor is higher among women having higher level of cortisol (Inslicht et al. 2006). It may also affect child survival through difficulty in child-rearing and neglect behavior after the birth of the child (Bair-Merritt et al. 2008; Eagle et al. 1999). A retrospective study from 209 at-risk families showed that children of mothers who disclosed intimate partner violence

tended to be less likely to have a recommended child care and less likely to be fully immunized (Bair-Merritt et al. 2008), although, there is a study that failed to prove this adverse neonatal impact of depression during pregnancy (Andersson et al. 2004).

Knowledge about the combined consequences of depression and violence against women on children's physical health is limited (Bair-Merritt et al. 2008). Findings from Uganda showed an association between intimate partner violence and infant morbidity (Karamagi et al. 2007). Another case-referent study from Nicaragua reported a six-fold increase in risk of death during infancy or childhood, among women who ever experienced physical or sexual violence by intimate partner (Asling-Monemi et al. 2003). Although the multi-country study has addressed measurement of adverse outcome on children, not much is yet reported.

### **Women's situation in Ethiopia**

Ethiopia is situated in the Horn of Africa. It has a federal government composed of 9 ethnic-based national regional states and two administrative councils. According to the 2007 Census, the country has a total of 73.9 million people of whom 45% are people below 15 years of old, and 26.8% are females in the reproductive age group (Federal Democratic Republic of Ethiopia and Population Census Commission 2008). The life expectancy at birth is 53.5 years for females and 50.9 years for males (UNCEF 2009). Majority of Ethiopian population (86%) is known to live in rural community, and the main religions in Ethiopia are Christian and Muslims. The majority of Christians belong to the Ethiopian Orthodox Tewahedo Church.

In terms of health and welfare, Ethiopia ranks among Africa's or the world's poorest nations. The World Bank classifies Ethiopia as a highly underdeveloped (low-income) country with an estimated annual per capita income of about US\$100. Poverty is widespread, with slightly less than half the population living below the basic needs of poverty line. Agriculture is the backbone economy of the country accounting for about 54% of the Gross Domestic Product (GDP). Health indicators are generally poor. The health care system is wholly inadequate.

Ethiopia has a diverse mix of ethnic and linguistic backgrounds. It is a country with more than 80 different ethnic groups each with its own language, culture, custom and tradition. Traditionally men are responsible for providing for the family and for dealing with family contact outside the home whereas women are responsible for domestic work and looking after the children. Parents are stricter with their daughters than their sons; often

parents give more freedom to males than females. The traditional view was men neither cook nor do shopping because housework tends to be women's job. This view continues to be held in many areas of the country. Although many people continue to follow these traditional roles, life is constantly evolving resulting in alteration of the role of men and women, particularly in urban areas where women are beginning to take a major role in all areas of employment and men are beginning to take a greater role in domestic life.

Marriages, mainly in many areas of the country are often arranged by the parents of the bride and groom with a great deal of negotiation. According to tradition and culture the bride must be virgin when the marriage takes place. Because the bride virginity is highly valued, the whole family being shamed if the bride is not virgin at marriage. Usually the bride and groom first see each other on their wedding day. Rural women in particular tend to marry at a very young age than their husbands. Mean age at first marriage for women is at about 16.1 years (CSA 2006). Having large numbers of children are traditionally considered to be a sign of status among such communities. To have large numbers of children, in some areas of the country there is marriage through polygamous union in which husbands may have up to four wives. The proportion of women living in a polygamous union in Ethiopia account for about 12.0% (CSA 2006). Marriage by abduction is another traditional practice that is known to exist in Ethiopia. In general, the abductor forms a group of intimate friends and relatives to carry out the abduction. An unmarried young girl is forcefully dragged by the abductor who may beat her to subdue her and is usually followed by rape. In the 2005 Ethiopian DHS, about 8% of married women reported to marry through abduction (CSA 2006). In some tribes, if the husband of a woman dies, it is the husband's brother responsibility to look after the wife and the children, and the husband's brother may marry her. Nowadays, many men and women who live in urban areas as opposed to rural communities do not follow these traditionally arranged marriages.

Female circumcision, also known as female genital cutting (FGC) or female genital mutilation (FGM), is a common practice in many societies in sub-Saharan Africa. In Ethiopia, the age at which FGC is performed varies among the different ethnic groups. In northern Ethiopia, female genital cutting is performed at infancy and usually on the eighth day after birth; however, there are tribes that perform the circumincision starting 7th year of age to immediately before time marriage. Female circumincision is performed in three quarters of Ethiopian women, and 6% of the circumcised women reported that their vagina was sewn closed (CSA 2006).

### ***The legal perspective in Ethiopia***

In the Ethiopian legal context, there was no consolidated law on violence against women until 2004. The 1957 Penal Code outlawing rape, abduction, early marriage, trafficking in women and other forms of crimes linked to sexuality were provisions that were found scattered in different sections of the code. Regarding wife battering, the 1957 Penal code does not have a specific provision on domestic violence, and wife battery was simply treated as one of the offenses committed by a person against another under the general provisions stated for "bodily injury". As a result the law did not provide women with the required degree of protection from violence occurred in private spheres. Similarly, abduction, which was considered as one form of marriage in rural parts of Ethiopia was a punishable act under Article 558 of the 1957 Penal law; however, Article 558(2) of the penal code provides that no prosecution shall follow where a valid marriage is subsequently concluded between the victim and the abductor.

The 1957 Penal Code punishes perpetrators of rape on strange girls and child under 15. As it is in case of abduction, the rapist would not be charged if he concludes a valid marriage with the victim as clearly stipulated under article 599 of the penal law. On the other hand, the penal code did not recognize marital rape as crime by ignoring the act of compelling a woman to submit to sexual intercourse within wedlock. The Penal Code did not have a specific provision on Female Genital Mutilation (FGM) except those provisions, which apply to bodily injury, as the constitution in Article 35(4) that protects women from any harmful traditional practices. Regarding early marriage, the minimum age of marriage for girls and boys was set under the 1960 Civil Code as 15 and 18, respectively. However, despite a clear provision in the Civil Code and Penal Code, girls were given for marriage before they attain the minimum age of marriage when their bodies are immature. The revised law in 2004, 18 and 21 years is set to be the minimum age of marriage for females and males, respectively.

The penal code of 2004 is a modified form of the law which incorporates sex equality and spells out explicitly fundamental women human rights, and accepts all international human rights instruments ratified by Ethiopia. However, although the penal codes touch all fundamental human rights against women, the law had never been enforced especially in rural communities. This difficulty of enforcing the law may be due to lower awareness of the law by community members, it may also be due to the traditional culture and gender role influence, it may also be due to a men dominated policy making agency both at higher and lower level within communities. It could also be due to underprivileged position of women.

## **Rationale of the studies**

Unipolar depression is estimated to be the fourth leading contributor to the overall burden of disease (Murry and Lopez 1997). The inadequacy of literature on the magnitude and lack of data on risk factors to depression have hampered knowledge of how much socio-economic status of women in low income countries contributes to one of the leading global health burden, depression. In low-income countries, many studies use basic scoring instruments for diagnosis, such as Beck's depression scale and clinical samples. Therefore, estimating the magnitude and assessing socio-economic correlates of depression using relatively valid diagnostic instrument in the general population is able to contribute to increase knowledge to facilitate interventions that aim at prevention of depression.

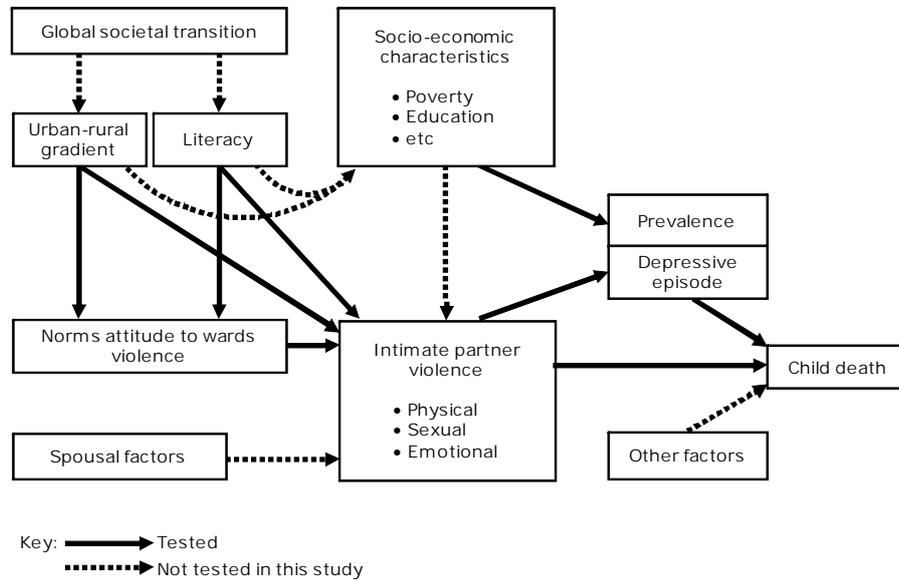
Community based research on intimate partner violence against women using valid epidemiological methods both for descriptive and analytical studies has an important role in the planning for intervention against domestic violence. One of the weaknesses with previous studies is that they have used less specific diagnostic concepts for depressions and methodologies that is likely to underestimate intimate partner violence. A confirmation of the hypothesis of an association between exposure to violence against women by intimate partner and depression could provide a new knowledge and better understanding of the impact of violence against women on women's mental health in low income country.

Current research results on the magnitude of intimate partner violence, as reported by WHO Multi-Country study, show that Ethiopia has the highest prevalence of the problem compared to studies made in 10 countries and 15 sites. Hence, in depth analysis are warranted for understanding the high prevalence in respect of norms and gender roles in Ethiopia. This thesis explores the relation between pattern of intimate partner violence, type of residency, educational level of man and wife as well as beliefs and attitudes towards such violence.

Intimate partner violence is well known to be associated with child morbidity and mortality. This thesis studies mechanisms through which violence by intimate partner and depression might interact to have an effect on under five child death.

## Conceptual framework

**Fig 2.** Conceptual framework describing study questions, arrows with no interrupted space are planned, however with interrupted space are not included in the study.



## Objectives

### *General objective*

- To determine prevalence of depressive episode and examine its association with violence by intimate partner and socioeconomic status of women in reproductive age group.
- To assess contribution of residency and literacy of women on vulnerability to physical violence by intimate partner, and to assess independent effect of intimate partner violence and maternal depression on the risk of child death in rural Butajira, Ethiopia.

***Specific objectives***

- To determine the 12-month prevalence of depressive episode, and assess its socioeconomic correlates of depressive episode among women in child bearing age (Paper I).
- To examine the association between violence against women and depressive episode among currently married women in reproductive age group in Ethiopia (Paper II).
- To examine contribution of residency and literacy of women and their spouses on vulnerability to physical violence by intimate partner of currently married women in rural Ethiopia (Paper III).
- To analyze independent individual and combined effect of experiencing intimate partner violence and maternal depression on child death among women who gave birth to a live child in rural Ethiopia (Paper IV).

## Methods

### Setting

The study was one of the 15 sites in the multi-country study on violence against women undertaken in Butajira district, central Ethiopia. It was conducted among women of childbearing age group from January to December 2002 (Garcia-Moreno et al. 2006; Gossaye et al. 2003b). Butajira is one of the eleven districts in the Gurage Zone, located in the Southern Nations, Nationalities and Peoples Regional State in Ethiopia. It is located 130 km south of Addis Ababa. As estimated by the 1994 census of Ethiopia, it has a total population of 257,500, of which 51.1% are females, 87% live in rural areas, and women between 15 and 49 years of age constitute 24.8% of the population. The district is administratively organized into small units called '*peasant associations*' in rural areas and '*urban dwellers associations*' in urban areas; both units are commonly referred as *kebele*.

The district has a district hospital, two health centers, eleven low-level private clinics and eight community health posts. The hospital was established recently (2002) with a contribution from the district population, and both national and international donations. The hospital and health centers provide both curative and preventive health services. The district was affected by famine in 1974, 1985, 1999 and 2003, and the Disaster Prevention and Preparedness Commission of the Federal Government of Ethiopia have registered the area as one of the drought-stricken areas in the country.

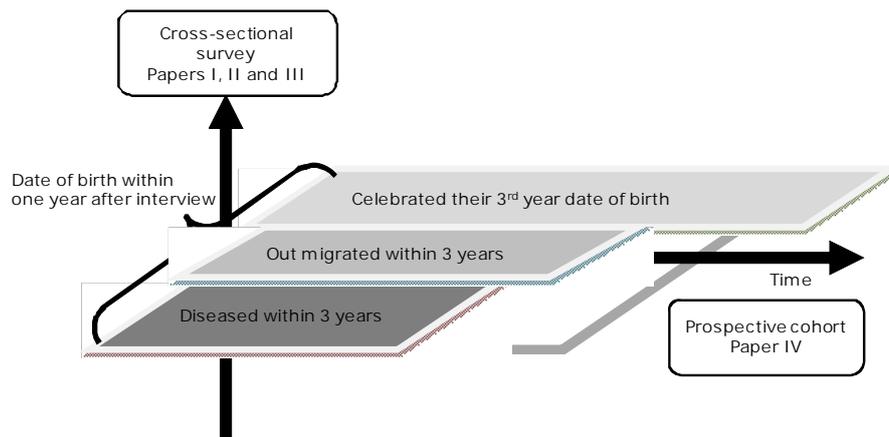
This study was conducted within the framework of the Butajira Rural Health Program (BRHP). The BRHP was introduced in 1986 to develop a continuous demographic and health surveillance system and to provide a base line population and sampling frame. It is a joint collaborative program undertaking between the School of Public Health, Addis Ababa University and Epidemiology, Department of Public Health and Clinical Medicine, Umeå University. The program is a demographic surveillance site that includes one semi-urban dwellers' association and nine peasant associations selected from the Butajira district using the probability proportionate to size technique in 1986 (Berhane et al. 1999a; Shamebo 1993). The program started its surveillance by first census conducted in 1986, its second and third censuses in 1995 and 1999, respectively. Continuous registration of demographic surveillance of vital events was conducted on a monthly bases until 1999, however since 1999 data has been collected on a quarterly basis.

Butajira Rural Health Program is also a member of an international network of collaborating Demographic Surveillance Sites, the INDEPTH, having about 40 member sites within Africa, Asia, and Latin America.

### Study design

The studies are community-based surveys conducted among women of childbearing age. A cross sectional study design was made for Papers I, II and III, and additional data from the demographic surveillance site was used, for the prospective cohort study design (Paper IV).

Fig 3. Summary of the cohort Study design for Paper IV



### Source population

Women residing in the Butajira Rural Health Program (BRHP) area were the overall source population for Papers I, II and III. The criteria supporting inclusion of a woman in the survey were age between 15 and 49 years, resident of the demographic and surveillance sites, found in the list of women in the database and living in the site at least for the last three months (Gossaye et al. 2003b). All women included in the survey were further source population for the prospective cohort design (Paper IV) and women who gave birth within a year after the date of interview were the study subjects.

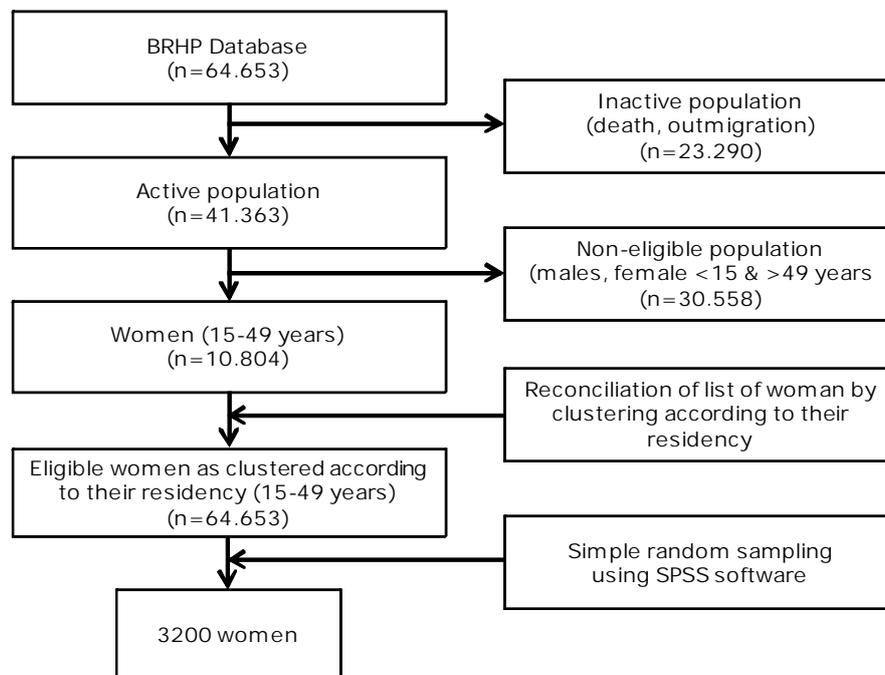
### Sampling method

In a previous study in Addis Ababa, the life time prevalence of a depressive episode among women was 7.7% (Kebede and Alem 1999). Another study made in the study site, found prevalence of physical violence by intimate

partner to be 45% (Deyessa et al. 1998). Our core study, taking the above estimates into account, at 95% confidence interval, 80-90% power and with odds of 1.45 tolerance for depression among women who experience violence compared to non-experienced, a minimum sample of 3044 women were needed. To minimize bias due to non-response, additional 5% was added to find 3200 women.

The database for each *kebele* was obtained from the BRHP database having women's name, unique identity number, including household number as a sampling frame. List of women from the database was refined and reconciled by enumerators of the database to create list of eligible women. Since 85% of the population resides in rural areas, the same proportion of the sample was taken from rural peasant associations. In order to keep the number of women equally distributed in each clustered peasant associations, women were recruited in proportion to population size. After clustering eligible women according to their residence, women were selected by simple random sampling using SPSS for windows software of the 10 clusters separately.

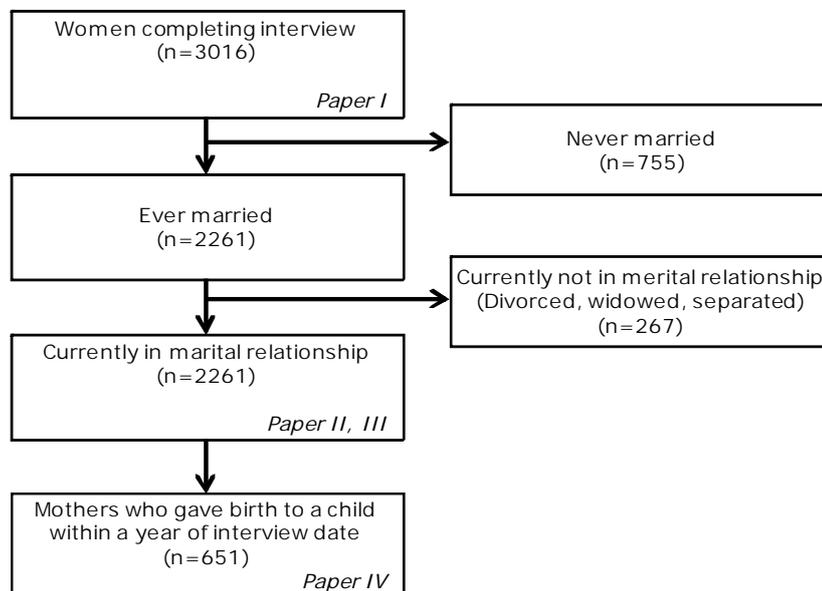
**Fig 4.** Schema of selection of study subjects from the BRHP database



## Study subjects

Of the 3200 study subjects selected for interview, 3016 women had completed the questionnaire, giving a response rate of 94%. Reasons for non-participation include; 32% due to error during randomization, 25% due to incorrect age records of the sampling frame from the DSS. For 24% of non-respondents, it was due to non-availability of the women after three visits, and for 19% it was due to their refusal to participate or to complete an interview. All the 3016 women were included to determine prevalence of depressive episode and its determinants, (Paper I). Since estimation of intimate partner violence needs only women exposed to intimate partner, further stratification of the study subjects was made, and women currently not in marital relationship were excluded. Therefore, Papers II and III were using the 1994 women living in a marital relationship, while the prospective study (Paper IV) all the 651 women who gave birth to a live child within a year of date of interview were included.

**Fig 5.** Sampling procedure of inclusion of study subjects completing the interview



## Data collection and management

Thirty females, (24 enumerators and 6 supervisors) who had completed high school, knowing the community, and having experience of data collection were recruited as field workers. Training was given for three months on data collection, interview techniques and procedures. Training was given on the WHO multi-country standardized questionnaire of life events and health (Garcia-Moreno et al. 2006), and the Composite International Diagnostic Interview (CIDI) version 2.1 (WHO 1997b). During all levels of the training, privacy and confidentiality were given high emphasis. Data was collected after a pre-test was conducted in villages outside the survey area. For the prospective study on follow up of children borne of mothers involved in the survey, we used data collection procedure of the Butajira Rural Health Program. The BRHP has a continuous registration of demographic surveillance of vital events conducted on a quarterly basis. Our project took into account detection of death of a child including date of birth and death of children borne of mothers included in the survey.



**Fig 6.** Transportation of data collecting material to the BRHP field site.

## Measurements

**Depression:** The study used Sections-E of the Amharic version of the Composite International Diagnostic Interview (CIDI) Version 2.1 that was validated in Addis Ababa. The CIDI was tested by lay interviewers against experienced resident psychiatrists using clinical diagnosis, with a percent agreement ranging between 92.5% and 100%, and kappa ranging between 0.78 and 1.00 (Rashid et al. 1996). Using an algorithm software (WHO 2001a), cases of depressive disorders were identified. For this study, occurrence of depressive episode was considered when women got the diagnosis F32 according the International Classification of Diseases of 10th Edition (ICD-10) (WHO 1992).

Using validated algorithm software (WHO 2001b), cases of anxiety disorder with their subtypes and depressive disorders in life time and in the last 12 months were identified. In this study, depressive episode experienced within the last 12 months was considered as having the syndrome. Depressive episode F32, ICD-10 (WHO 1994) is equivalent to major depression of diagnostic and statistical manual (DSM-IV) of mental disorders (American Psychiatric Association 1994), and it includes; 1) mild depressive episode (disorder without and with somatic symptoms, (F32.00/F32.01)), 2) moderate depressive episode (disorder without and with somatic symptoms (F32.10/F32.11), and 3) sever depressive episodes (F32.2).



Fig 7. Transportation of data collectors to the villages.

**Violence against women:** (Paper II, III and IV) A WHO standardized questionnaire (Garcia-Moreno et al. 2006; Gossaye et al. 2003b), which was used in multi-country study of violence against women, was taken to measure life events experienced by women, and it included questions relevant to measure physical, sexual and emotional violence against women by intimate partner. Women were considered to experience physical violence (Paper II, III and IV), if they experienced at least one act of the five violent acts including; being slapped, shoved, hit with fist or something, beaten or kicked, being choked or burnt and threatened using knife or gun. Once women were found to experience physical violence, they were asked for time when it happened, whether it happened before 12-months and within last 12 months whether it happened in the last pregnancy and whether the physical violence resulted on physical injury on body.

Experience of sexual violence (Paper II and IV) was measured by report from experience of at least one act of the following, including; experiencing of a forced sexual intercourse, intercourse that made a woman afraid of what will come next, and experience of degrading or humiliating type of intercourse without the consent of a woman. A woman was considered to experience emotional violence (Paper II and IV) by intimate partner when she got one of the following acts including; if she was belittled/humiliated in front of others, if she was intimidated/scared on purpose and if she was threatened to hurt her or someone she cares about. Since simple insulting by a spouse or others was a common act that was considered as a normative (Gossaye et al. 2003b), in our study, it was not considered as an emotional violence. Experience of emotional violence was further categorized to moderate violence, if only a single act was experienced, and severe violence if two or the three forms of acts were experienced.

Sexual violence during childhood (Paper II) was measured in two ways. First by interviewing the eligible woman, and second, anonymously using a picture showing a happy and a sad woman. Since the anonymously collected data was more reliable, in this study it was given high consideration (Garcia-Moreno et al. 2006). After elaboration by enumerator, that marking on a sad woman in the picture to represent sexually violated as a child, and marking on a happiest woman in the picture to represent no sexual violence as a child. The respondent did the marks on type of experience as a child, and was made to put in envelope without showing the enumerator.

Spousal control (Paper II and III) over the respondent was measured using six questions, and women were categorized into three classes. First, women were categorized as totally-controlled when they totally need permission of their spouse to do anything in the list, second, women were categorized as

moderately controlled when they need permission of their spouses to do some of the activities listed, and lastly, women were categorized as non-controlled when they did not need any permission from their spouses. Socio-demographic characteristics including her age grouped into four, residency categorized into three geographical areas, educational status and ethnicity categorized into three major groups were used.

*Combined depression and Violence by intimate partner (Paper IV):* a variable containing combination of experience of intimate partner violence and maternal depression was created. Women were stratified into four groups including women neither experienced violence nor depression, women who experienced violence but not depressed, women who experienced depression but not violence and women who experienced both intimate partner violence and depression for each form of violence (physical, sexual and emotional violence).

*Gender related attitudes (norms) (Paper III)* were measured using four questions related to the roles and responsibilities of men and women that focused on male dominance. *Attitudes towards domestic violence (Paper III)*, refers to a belief a woman has on the right of refusing sex, and was measured by four items, perceived justifiability for a man to beat his wife was assessed using six questions [3]. By adding the scores separately for each attitudinal sets of measures, women were categorized in three groups 'totally accepting' when they answer yes to all the item questions, 'partly accepting' when answering to only few of the items and "not accepting" if they answer no to all questions. *Spousal control* (Paper II, III) was measured using six items referring to what a woman can do without permission from the spouse (Garcia-Moreno et al. 2006). By adding the scores, women were categorized into three categories: 'no controlled' when they answer 'no' to all questions, '*moderately controlled*' answering 'yes' to some questions, or '*highly controlled*' when they answered 'yes' to all questions.

***Socio-demographic characteristics:*** The WHO multi-country study questionnaire (Garcia-Moreno et al. 2006; Gossaye et al. 2003b), was used to measure socio-demographic and behavioral characteristics of the women include age, residency, education, type of marriage and its initiation, age difference with spouse, poverty status, witnessing their mothers or mothers-in-law being battered, alcohol use and khat chewing habit. The questionnaire also assessed a number of socio-cultural events related to health including migration status of women as in-migrated at any time, and having never moved in, respectively. The spousal characteristics are all based on reports by the women and include age, place of residence, education, alcohol use, khat chewing, hostile behavior (fighting with other men).

*Educational status* was categorized into two ways, the first categorized into three; illiterate (those with no schooling), elementary (those with grades 1-6) and secondary and above (7 or more) (Paper I); the second categorized into two, illiterate as in the above and literate (educated in a formal school) and (Papers II, III and IV). *Place of residence* is categorized into urban or rural based on information about the community included in the Demographic Surveillance Site. A *combined measurement* (Paper III) that could describe education and residency of the respondent having eight levels of discordance was created by combining educational status of the women and her spouse with their place of residence.

A woman's *poverty status* was measured using summation of items of possession (Krieger et al. 1997). In this study, it was measured by giving a score of "1" for each 22 items of questions, when having answers that show their ownership or possession. The questions comprise groups of possession of asset items in household, other questions related to knowledge or education and occupation of the woman and her spouse were included as asset items. The summed items were then classified into three categories, taking quartiles of summed items into consideration. Women having item score below a quartile were categorized as women in "absolute poverty", women having item score between the lower and upper quartile as "relatively moderate" and others having above the upper quartile were categorized as being "relatively better off". Since this poverty scale includes items related to spouse's economic condition, only currently married women were included in analysis of poverty status.

***Child death:*** Death of a child was the dependent variable for Paper IV. For the retrospective design, child death of women included in the survey was computed from interview, and presence of death of a child with an age less than 5 years was measured as an outcome variable. For the prospective design, information of child death was taken from the BRHP database (Berhane et al. 1999a), and child death during the follow up time was considered as the outcome variable, children who out-migrated before they celebrate their 3rd year, date of birth were considered in the analysis.

### **Quality assurance**

Quality assurance was introduced during the design, at fieldwork and during data entry. Quality assurance during the design included a meticulous formative qualitative assessment of the measuring instruments was done to reach its maximal contextual meaning, and pre-test of the instruments was made for amending changes in the instrument. Quality assurance during fieldwork was made by training enumerators to follow the WHO ethical

guide of privacy and checking for consistency and completeness before finishing interview, supported by daily supervisory meetings and debriefings. At the data entry level, collected data were checked for its completeness and consistency by a data quality supervisor, and checked data was entered into two computers having template check of consistency in epi-info statistical software. Data entered by the two computers was validated for its consistency, and corrective measures were performed timely. Additional random counter checking of entered data was performed. At the end of data entry, extensive cleaning and logical cross tabulations were performed to detect additional errors.

### **Data analysis**

The analyses were carried out using SPSS for windows (Paper I, II, III and IV), and Cohort statistical software (Paper IV). In all four studies, the individual women included in the survey were the unit of analysis. The 12 months status of depressive episode (Papers I and II), physical violence by intimate partner (Paper III) and child death of women included in the study (Paper IV) were used as the dependent variables. Chi-square was used to assess for statistical difference between groups, and significance of association was set at  $P < 0.05$ . In (Papers I and II) studies, analysis using simple descriptive and tabulation was followed by multivariate analysis using logistic regression to adjust for possible confounders. Common socio-demographic factors were considered as possible confounders if they were significantly associated with the outcome variable (Papers I, II), and were included in a model of the multivariate analysis.

For the prospective cohort study (Paper IV), the Cohort statistical program developed by Umeå University was used. The program allows the calculation of person-years as a denominator of measuring incidence density of child death with a 95% confidence intervals, and relative risk with its confidence intervals. Cumulative survival plot was made using Cox regression.

## Ethical considerations

Ethical and publication committees of the Medical Faculty, Addis Ababa University, and the Ethiopian Science and Technology Commission, approved the study. The ethical committee at Umeå University (Umeå, Sweden) (01-133) also assessed and approved the study. Informed consent was obtained at different levels; first local formal and informal leaders were well informed on the aim for consent to approach women in their area. Participating women were informed and verbal consent for participation was obtained individually. During the data collection the utmost efforts were made to maintain privacy and confidentiality. To maintain privacy, individual interview was made under a tree, and in case if an individual above 4 years joined, the interview was shifted to a dummy question. Counseling service was instituted in the area, for those who were in need, during data collection time and for one year after data collection was completed.



**Fig 8.** Maintaining privacy through interviewing the interviewee alone.



## Results

### Socio-demographic characteristics

The socio-demographic characteristics of the study subjects are shown in Table 3. Overall, more than two thirds of the respondents were below 35 years of age, and have a mean age of 29.87 (SD + 9.24) years. During the survey time, 1994 (64%) of the women were married. About 80% were illiterate, more than 85% were dwellers of rural communities, and about 77% were Muslims. There was no difference in age, marital status, religion and educational status between our sample and the surveillance population, but difference was observed by residency, in which urban dwellers were more underestimated in our sample (15%) than within the surveillance population (24%), (Paper I).

Study subjects for Papers II and III were all women who were married, and out of the 1994 currently married women within child bearing age, about 44% were in the 25-34 years age group, about 33% were in the 35-44 years age group, and have a mean age of 31.6 (SD + 7.8) years. Eighty five percent of the women were illiterate, 73% were Muslims and 87% were from rural community. About 62.8% were women having no job, 64% have chewing habit of khat regularly or occasionally, and 23% have few items to possess and live in a relatively 'better off'.

The study subjects found in the prospective cohort were 561 mothers who gave birth to a live child. Compared to the source sample (all currently married women of the survey), study subjects in cohort study were not statistically different on the basis of their residency, education, experience of sexual or physical violence and depression. However, study subjects in the prospective cohort were younger to a statistically significant level than the source sample.

**Table 3.** Comparison of study sample with surveillance population of women in the reproductive age group, in Butajira, rural Ethiopia 2010.

Characteristics	Sample (n=3016)	Surveillance (n=8630)	P-value
Age (yr) mean $\pm$ SD	29.87 $\pm$ 9.24	29.96 $\pm$ 9.34	0.16
Religion (%)			
Muslim	77.1	73.2	0.65
Christian	22.8	25.8	
Other	0.1	1.0	
Ethnicity (%)			
Meskan	49.4	50.1	0.84
Silte	21.4	17.7	
Other gurague	23.6	23.4	
Non-gurague	5.7	8.8	
Marital status (%)			
Never married	29.0	29.9	0.84
Married	63.6	64.6	
Separ/divor/widow	7.3	4.5	
Education (%)			
Illiterate	81.5	79.8	0.87
Elementary	14.4	15.6	
High school & above	4.2	4.6	
Residency (%)			
Urban	14.7	24.7	0.01
Rural highland	45.8	43.4	
Rural lowland	39.5	31.9	

### **Magnitude of depressive episode and its socio-demographic correlates**

The overall prevalence of depressive episode was 4.4% in the sample with a 95% CI between 4.2% and 4.5% in the population. This prevalence was 4.8% among all married women, 5.2% among rural women and 3.0% in urban community. Examining for socio-demographic correlates of depressive episode in the whole study subjects resulted that the odds of depressive episode was significantly higher among widowed, separated or divorced and married women than their referents the never-married women. Similarly, prevalence of depressive episode was higher among women who in-migrated to the area than women who permanently live there. Although depressive episode was higher in age groups above 24 years, when it was adjusted for other variables its relation was refuted. However, prevalence of depressive episode was not associated by difference in residency, educational status and alcohol drinking habits of women.

**Table 4.** Sociodemographic characteristics of study subjects included in study categories of women in child bearing age in rural Butajira, Ethiopia, 2010.

Characteristics	All women sample (Paper I) (n=3016)	Currently married (Paper II, III) (n=1994)	Women gave live birth (Paper IV) (n=516)
<b>Age</b>			
15 – 24	37.5	18.6	21.0
25 – 34	32.0	43.9	55.1
35 – 44	26.6	33.5	23.9
45 – 49	3.9	4.1	
Mean ± SD	29.9 ± 9.2	31.8±7.8	29.6± 6.6
<b>Marital status</b>			
Never married	25.0	==	==
Married	66.1	==	==
Separated/Divorced	3.3	==	==
Widowed	5.6	==	==
<b>Residence</b>			
Urban	14.7	12.7	10.5
Rural	85.3	87.3	89.5
<b>Educational status</b>			
No education	77.4	85.2	84.5
Elem. (1 - 6)	19.0	12.4	13.7
High school +	3.6	2.4	1.8
<b>Religion</b>			
Christian	27.6	27.3	14.3
Muslim	72.4	72.7	85.7
<b>In-migrated (n =3014)</b>			
Yes	37.5	49.4	47.1
Never	62.5	50.5	52.9
<b>Khat chewing habit (freq)</b>			
Never	47.5	37.2	34.9
< 1/month	12.7	15.1	15.0
> 1/week	39.8	47.7	50.1
<b>Poverty</b>			
Very poor	==	3.2	3.2
Moderate	==	90.1	89.8
Relat. better off	==	6.8	7.0

Socio-demographic correlate of depressive episode was also computed among currently married women. Depressive episode was higher among women living in rural community, having frequent khat chewing habit and women who have seasonal work than their referents both crudely and after it was adjusted for age group, residency, khat chewing habit, occupation and poverty status. Similarly, women who were relatively in a better off of our poverty scale were having in lesser magnitude of depressive episode both

crudely and after it was adjusted for the variables included in the model. However, there was no statistical difference in magnitude depressive episode by difference in educational status, religion, alcohol drinking habit and migration status of married women.

Further stratifying by their residency, socio-demographic correlates of married women living in rural community are described as follows. Depression status of women was higher among women who live with a seasonal work, and was lower among women living in a relatively 'better off' in the poverty scale, even after it was adjusted for age group, occupation and poverty status. However, there was no significant difference in magnitude of depressive episode for the other variables included in the model.

### **Depressive episode and violence by intimate partner**

In this study, 4.8% (95% CI; 3.9% to 5.8%) had experienced depressive episode in the last 12 months while 72% (95% CI, 70.0%, and 73.9%) experienced any form of intimate partner violence in their life time. Of the overall magnitude of intimate partner violence in life time, physical violence accounted for 49.5%, sexual violence for 59.5% and emotional violence accounted for 27.8%. Assessment of socio-demographic characteristics against depressive episode in the last 12 months was made, and depressive episode was associated with rural residency, women who have khat chewing habit, women working on seasonal work and women in extreme poverty status. Similarly, intimate partner violence was associated with older age groups, lower education, khat chewing habit and occupational status of the women.

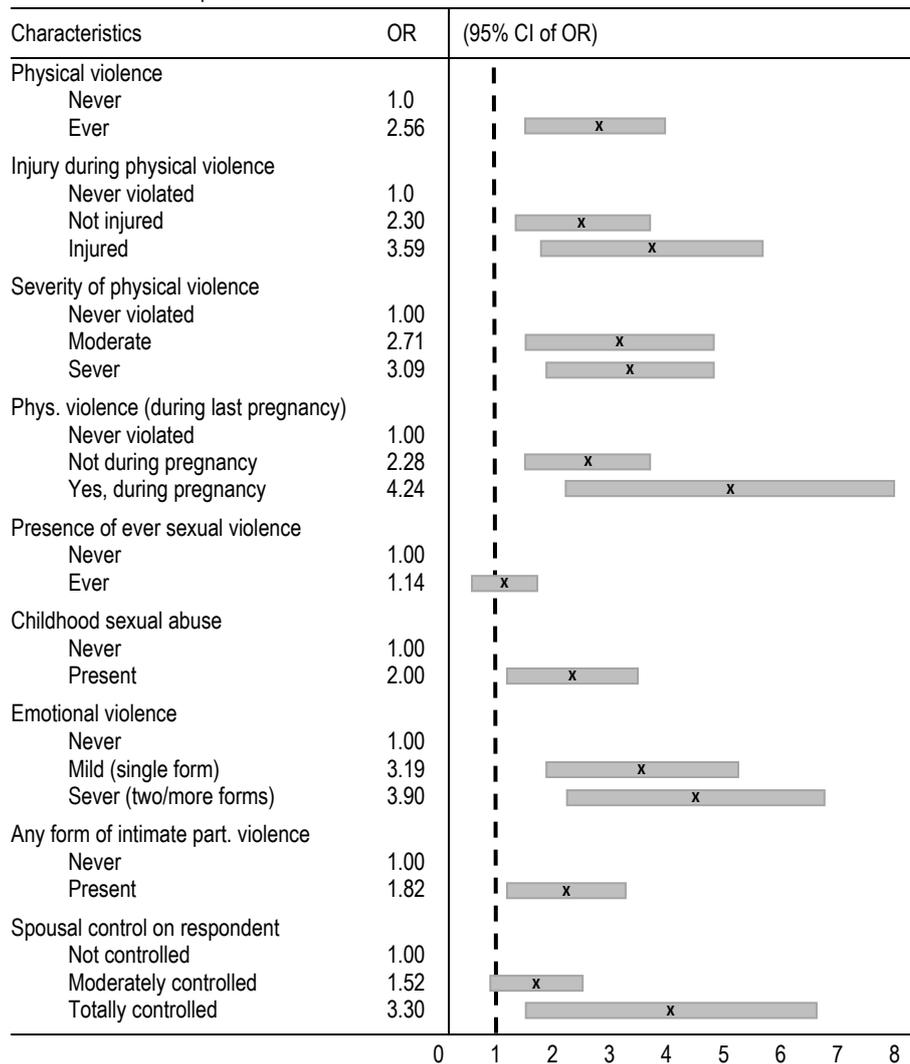
In general, depressive episode in the last 12 months was higher among women who experienced any form of intimate partner violence during their life time, and specifically of women who experienced physical and emotional violence by their intimate partner in life time. Moreover, the odds of depressive episode was higher among women who experienced violence during their pregnancy, women who acquire injury, women who reported to experience sever or moderate form of physical violence, and women who experience physical violence more than a year ago compared to women who never experienced physical violence in crude analysis as well as after it was adjusted for age, residency, occupation, poverty and khat chewing habit. Similarly, the odds of depressive episode among women who experienced sexual violence as a child and women who reported of being controlled by their spouses was higher than the odds of experiencing depressive episode in their respective referents, both crudely and after it was adjusted for possible confounding variables. However, depressive episode was not associated with women who experience sexual violence by intimate partner during their life time.

**Table 5.** Socio-demographic correlates of depressive episode by all women in reproductive age, currently married women and married women residing in rural community, Butajira Ethiopia 2010.

Characteristics	All women in reprod age (n=3016)		Currently married women (n=1994)		Rural married women (n=1740)	
	Prev (%)	Adjusted <sup>1</sup> OR (95% CI)	Prev (%)	Adjusted <sup>2</sup> OR (95% CI)	Prev (%)	Adjusted <sup>3</sup> OR (95% CI)
<b>Age</b>						
15 – 24	2.7	1.00	4.1	1.00	4.1	1.00
25 – 34	4.7	1.04 (0.59, 1.82)	4.6	1.05(0.57, 1.97)	5.2	1.24 (0.65, 2.34)
35 – 44	6.1	1.25 (0.71, 2.20)	5.2	1.21 (0.64, 2.29)	5.6	1.36 (0.71, 2.62)
45 – 49	7.7	1.50 (0.64, 3.51)	7.3	1.91 (0.71, 5.16)	8.2	2.15 (0.79, 5.88)
<b>Marital status</b>						
Never married	1.9	1.00	-	-	-	-
Married	4.8	2.30 (1.14, 4.64)	-	-	-	-
Separated/Divorced	8.2	4.05 (1.53, 10.7)	-	-	-	-
Widowed	9.4	4.24 (1.73, 10.4)	-	-	-	-
<b>Residence</b>						
Urban	3.4	1.00	2.0	1.00	-	-
Rural	4.6	1.49 (0.86, 2.61)	5.2	3.78 (1.48, 9.67)	-	-
<b>Educational status</b>						
No education	4.8	1.00	4.8	1.00	5.1	1.00
Elementary (1 - 6)	3.5	1.14 (0.67, 1.92)	4.8	1.52 (0.78, 2.96)	6.7	1.64 (0.82, 3.25)
High school +	2.7	0.81 (0.25, 2.64)	4.3	1.89 (0.44, 8.85)	7.7	1.85 (0.22, 15.7)
<b>Religion</b>						
Christian	4.2	1.00	3.9	1.00 (0.76, 2.31)	4.4	1.00
Muslim	4.5	1.01 (0.65, 1.57)	5.2	1.33 (0.76, 2.31)	5.5	1.25 (0.75, 2.09)
<b>In-migrated (n =3014)</b>						
Yes	5.8	1.00	5.3	1.00	6.1	1.00
Never	3.7	0.79 (0.55, 1.15)	4.4	0.82 (0.54, 1.24)	4.4	0.72 (0.47, 1.10)
<b>Khat chewing habit</b>						
Never	3.6	1.00	3.8	1.00	4.3	1.00
< 1/month	3.1	0.75 (0.39, 1.44)	3.0	0.68 (0.32, 1.48)	3.2	0.67 (0.31, 1.46)
> 1/week	5.9	1.35 (0.92, 1.99)	6.2	1.61 (1.01, 2.58)	6.6	1.54 (0.95, 2.49)
<b>Occupation</b>						
No job	4.1	1.00	4.2	1.00	4.4	1.00
Selling/trading	4.7	1.04 (0.71, 1.52)	5.6	1.59 (1.00, 2.52)	6.5	1.50 (0.94, 2.40)
Seasonal work	7.6	1.98 (0.96, 4.11)	9.9	2.94 (1.26, 6.86)	10.5	2.53 (1.04, 6.19)
Other	5.4	1.62 (0.57, 4.62)	5.6	2.09 (0.47, 9.30)	8.7	2.12 (0.48, 9.48)
<b>Poverty</b>						
Very poor	-	-	6.2	1.00	8.0	1.00
Moderate	-	-	5.0	0.68 (0.39, 1.19)	5.3	0.60 (0.35, 1.05)
Relat. better off	-	-	3.5	0.48 (0.24, 0.97)	3.5	0.39 (0.19, 0.80)
<b>Prevalence</b>						
<b>Depression (12 months)</b>	<b>4.4</b>	<b>(4.23, 4.53)</b>	<b>4.8</b>	<b>3.9%, 5.8%</b>	<b>5.2</b>	

**Model Adjusting**Adjusted<sup>1</sup>: for marital status, age group, migration status and khat chewing habit of respondentsAdjusted<sup>2</sup>: for age group, residency, occupation, poverty status and Khat chewing habitAdjusted<sup>3</sup>: for age group, occupation, and poverty status

**Fig 9.** Comparison of the 95% CI of the odds of depressive episode by experience of intimate partner violence of women in reproductive health age, Butajira, rural Ethiopia, 2010

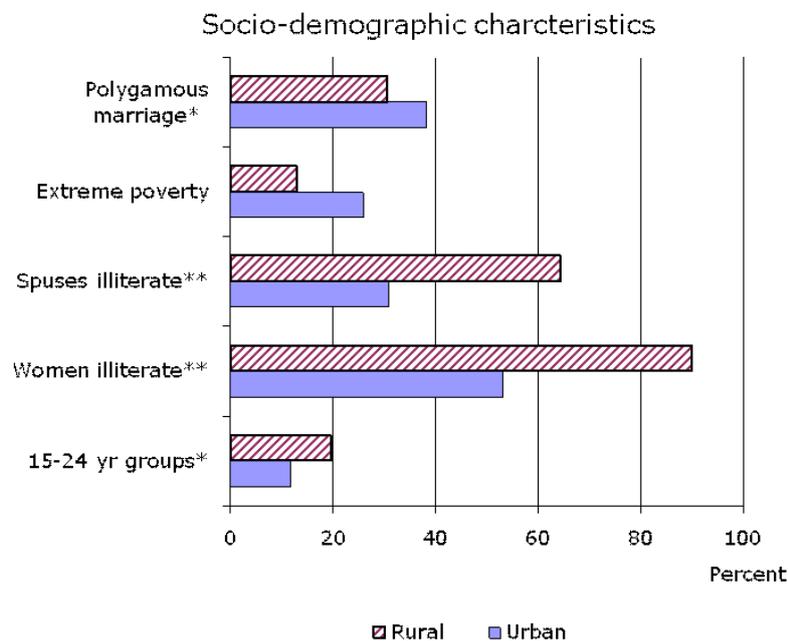


Key: Adjusted for age, residency, occupation, poverty and khat chewing habit X is the OR, and the right and left borders of the boxes are the 95% CI

### Pattern of physical violence by urban-rural gradient

Prevalence of physical violence was statistically different between urban and rural dwellers, and in this study we tried to describe what major difference exists between the dwellers in relation to literacy, norms and beliefs as well as other conditions related to violence by intimate partner. Accordingly, women in rural community were statistically more of younger age, more illiterate, or married to illiterate spouses, but with lesser proportion of women to engage in polygamous marriage than urban dwelling women. Moreover, although there were more women in extreme poverty in urban population such difference was not statistically different.

**Fig 10.** Distribution of socio-demographic characteristics of women by residency of women in reproductive health age, Butajira, rural Ethiopia, 2010



Key: \* =  $P < 0.05$

\*\* =  $P < 0.01$

Similarly, after the study subjects were stratified by their residence into urban and rural community experience of physical violence was examined by age group, poverty status and literacy status of the women and their spouses. Although there was not significance difference in experiencing physical

violence by difference in socio-demographic characteristics; in rural community, the odds of experiencing physical violence was higher among women who were between 24-35 years than the young women who were literate or married to literate spouse than their referents.

Norms and attitudes of women towards gender and intimate partner violence were assessed by residency and literacy status of the women. Rural residing women in this study setting have an opinion that accepts sexual intercourse even when they did not want, and opinion that accept any justification of being beaten by their spouses than urban women. Moreover, illiterate women have an opinion that favors acceptance of sexual intercourse even if they don't like it, and accept justification of being hit by their spouses. However, attitude favoring dominance of a man which was relatively higher in the study setting was neither different by type of residency nor literacy of the women.

To address educational disparity in the household, an analysis was performed by combining women's residency and literacy with that of their spouses. Literate urban women having a literate spouse were least likely to have experienced physical violence. Using this group as a referent, we noted that rural women had significantly higher odds of experiencing physical violence with the highest odds for literate women having an illiterate spouse. Considering literacy status of the women alone, women living in rural communities experienced higher odds of physical violence; moreover, literate women living in rural communities had the highest prevalence of experiencing physical violence. Similarly, considering spousal literacy alone, women having literate spouse in rural communities had experienced physical violence, both crudely and after it was adjusted for poverty, age and polygamous marriage.

### **Effect of maternal depression and intimate partner violence on child survival**

In this study a total of 561 children were followed for a total of 1518.78 person-years, and the incidence rate of child death in the study groups was about 42 cases per 1000 person years. Comparison of child death was computed for experience of intimate partner violence and depressive episode in the last 12 months, and the risk of child death was higher to statistically significant level among children having maternal depression. However, the risk of child death was not different among women who neither experienced physical, sexual nor emotional violence by intimate partner.

Further combination of maternal depression and experience of intimate partner violence against risk of child death was computed, and the risk of child death was much higher among children whose mother experienced combined depressive episode and physical violence or depressive episode and emotional violence than children whose mother experienced neither depressive episode nor violence by intimate partner.

## Discussion

### Prevalence

This study has found the 12-month prevalence of depressive episode among women in rural Ethiopia to be 4.4%, which is relatively lower compared to other studies in high-income countries (Lindeman et al. 2000; Tylee 2000). One explanation might be linked to the instrument CIDI used for diagnosis as further discussed below in the section Limitation. However, the prevalence of depression in the current study is relatively comparable to findings from a survey conducted in a general population using CIDI (Awas et al. 1999; Henderson et al. 2000; Kebede and Alem 1999). It could also be existence of high social capital in the area may have played an important role in prevention of the episode (Ethiopian 2006).

### Socio-demographic correlates

Our finding of preponderance of experiencing depressive episode among women who were divorced or separated and among women who were widowed is consistent to other studies (Almeida-Filho et al. 2004; Carta et al. 1995). Possible explanation for this may be the issue of adverse life events of losing someone they like most, including both economical and social loss that follows (Kendler et al. 2003; Kessler 1997). The association between depression and frequent khat chewing might have contradicting explanations, as a cause-effect relationship or khat may be used as a self-medication for their depressive symptoms. Khat is believed to have a psycho-stimulant effect (Dhaifalah and Santavy 2004). In this study, married women living in rural community were suffering from depressive episode to higher extent than those living in urban residence, which is in contrary to other studies (Wang 2004). This may be due to societal transition of developmental interventions in Ethiopia are done more in urban areas than in the rural areas. Women having seasonal job in this setting are women with a strained economical situation with no other income, who are forced to do whatever they can for survival of their family and its association with depression is as part of the poverty pathway. In our study, the likelihood of suffering from depression was lower among women in a relatively 'better off' economic position which is consistent to findings from almost all previous studies (Gilman et al. 2003; Lewinsohn et al. 1988; Ostler et al. 2001). Contrary to studies in other continents and high-income countries, there was no significant association between depression and educational status of

women in our study. This could be due to lower contextual difference between educated and uneducated women, with an overall low level of education and slight small difference of our study subjects.

### **Intimate partner violence and depression**

Our result of association between physical violence and depressive episode is consistent to other studies (Hegarty et al. 2004; Leung et al. 2002). Possible explanations for the association may be that physical violence could lead to psychological trauma that lead to negative belief about self and others. Physical violence occurs within the household however close to their neighbors, friends and relatives (Deyessa et al. 1998) and this may involve shame to communicate with those social groups ensuing in stigmatization and discrimination resulting in lack of family and community support (Ellsberg et al. 2000). Further strength of association between physical violence during pregnancy and depression should be interpreted in the hazardous prospects of childbearing and childrearing in a violent relationship (Ellsberg et al. 2000).

The study result of association between experiencing of sexual violence as a child and depression, is consistent to previous studies (Wainwright and Surtees 2002). Childhood sexual violence is well documented multifactor for experiencing depression and other mental illnesses. However, failure to show association between experience of sexual violence and depressive episode may be due to its hidden nature when it happens, making the women not to be stigmatized or discriminated. Contextual meaning of sexual violence used in our instrument may not be considered as violence in the community. Its link (Ellsberg et al. 2000) with physical and emotional violence may have been hidden to show its effect.

In this study, report of women of being controlled by their spouse was associated with depressive episode. It is supported by a study giving an explanation for difference in depression between men and women that lack of decisional control among women as a factor that favor preponderance of depression in women than among men (Piccinelli and Wilkinson 2000). Regarding emotional violence, it is one form of violence that directly erodes women's psychology, especially if the intimidation is in front of other people, their neighbors, friends and relatives. Therefore, these findings warrant that violence against women, including emotional violence and spousal control of women are more associated with depressive episode, and could be supportive evidence for preponderance of depression in women than in men.

### **Physical violence by urban-rural gradient**

Rural and urban population have difference in access to social service including access to education, health and information. As in other studies (CSA 2006; Hope and Edge 1999; Sahn and Stifel 2003), rural community women were more likely to be illiterate, to marry illiterate spouse, and to marry at a lower age. Attitudes to traditional gender roles seem to have a complex relationship with residency and literacy. As part of globalization, this societal transition happens more among urban population that could change traditional norms and beliefs favoring women autonomy (Logan et al. 2001; Websdale and Johnson 1997). Rural women far away to such societal changes may be observed to accept norms that justify violence against women, and accept violence by intimate partner as a normal part of life (Berhane et al. 1999b; Garcia-Moreno et al. 2006). Similarly, attitudes towards violence and gender roles were linked to disparities in literacy of women, in which higher educational attainment of women is associated with lower levels of violence (Jewkes 2002; Jewkes et al. 2002; Koenig et al. 2003b). Education might confer social empowerment and greater female autonomy, which in turn could help women change their norms and improve socio-economic conditions (Jewkes 2002; Martin et al. 2007).

Rural literate women and rural women married to literate men had higher odds of experiencing physical violence than urban women married to literate spouses. This describes presence of negative interaction which is observed in rural community, when women or their spouses are literate. This could be due to literate women may be less likely to accept the traditional role, a response that is viewed as a transgression and deserving of chastisement (Berhane et al. 1999b; Hindin 2003; Jewkes 2002; Schuler et al. 1999). Likewise, in a community where violence is considered as normative indicator of masculinity, rural literate men may not like to lose their suppressing muscular thinking norm (Hindin 2003; Jewkes 2002). This indicates that in rural community, intimate partner violence is associated with inequality between couples, especially in situations where husbands have lower status than their wives (Jewkes 2002; Koenig et al. 2003a; Schuler et al. 1999).

### **Effect of maternal depression and intimate partner violence on child survival**

The risk of child death was significantly higher for women who sustained a depressive episode. The incidence of child death was higher among women who experience physical, sexual or emotional violence by intimate partner although there was no association. However, when physical or emotional

violence by intimate violence is combined with maternal depression, the likelihood of child death was higher than their additive and multiplicative independent effects.

Possible explanation for the association of depression for higher child death could be the time of depression during pregnancy could cause intrauterine growth retardation (Rondo et al. 2003) (Valladares 2009) which may result for a premature baby or low birth weight (Diego et al. 2008; Rondo et al. 2003). (Valladares 2002) It may affect child survival through developmental delays (Deave et al. 2008). Depression during pregnancy which usually recurs to post partum time (Skouteris et al. 2008) could affect the mother's child-rearing capacity leading to neglect (Bair-Merritt et al. 2008), and higher risk of childhood morbidity and mortality. Combined effect of intimate partner violence and depressive episode on child death suggests existence of a positive interaction (synergistic) effect. The most likely interpretation is that the main effect of violence on child survival is through maternal depression.

## **Limitation and strength of the study**

### ***Methodological considerations***

There are several potential limitations of our study. First, given the cross-sectional design (Papers I, II and III), neither a causal nor temporal ordering of the associations can be inferred. Use of current (last 12 month) experience of depressive episode (Papers I and II) and physical violence against women (Papers III), against independent explanatory variable like residence and literacy that seem to occur several years in the past could wear away our concern of violating temporal relation due to study design. However, we still suffer for some explanatory variables like soio-economic status that varies with time.

### ***Measurement***

Other potential limitations could be underestimation of concerning, in particular, depressive episode and intimate partner violence. To avoid such limitations, we have used an instrument, CIDI, that has been validated in the country (Rashid et al. 1996). Possible explanation for the relatively low prevalence of depressive episodes in our study may be related to the instrument being developed in the Western culture and possibly working less well in low income cultural settings (Ragram et al. 2001a) (Goldney et al. 2004).

Under-reporting of violence by intimate partner is a potential problem in all research involving intimate partner violence (Ellsberga et al. 2000; Heise 1998). However, this study was part of the WHO multi-country study, and great efforts were made to ensure high disclosure through interviewer training and data management (Garcia-Moreno et al. 2006). In addition formative research was made to ensure that the instrument was culturally appropriate (Gossaye et al. 2003a). Moreover, the high prevalence of physical violence found in this study is in the same range as earlier studies in the same area (Deyessa et al. 1998).

Another potential limitation that we have to mention is measurement of child survival that may underestimate child death. Early neonatal deaths might have been considered as stillborns and they are not registered in Butajira Rural Health Program (Berhane et al. 1999b) The measurement of socio-economic characteristics of women might have had weaknesses. Direct measurement of the socioeconomic status of women, is difficult as it has been shown in other studies in developing countries, because most respondents do not give reliable responses regarding the income of their own families (Kloos H. et al. 1987). Due to these limitations in measuring socioeconomic status, we used a scale with a number of factors, such as possession of commodities, as adopted from Krieger (Krieger N. et al. 1997). Regarding educational status, the definition of literacy 'at least one year modern education' might be difficult to ascertain. However, in the study area (especially in the rural communities) most adults have a low educational attainment because modern education has only been available for the last two decades (Berhane et al. 1999b).

Another possible limitation is historical recall bias when a lifetime experience is asked through a cross sectional design. To minimize such limitation, a 12-month prevalence of the dependent variable was considered. Furthermore, norms regarding gender roles and attitudes towards violence may be situational, so the observed differences might reflect underlying socio-economic conditions that are not fully addressed in this paper. The prospective cohort study that has relatively lower sample size may not give the power needed to detect minute differences. Similarly, the short follow up time may affect the result. This was due to the assumption of possible changes in exposure status of women in their experiencing of intimate partner violence or depressive episode acquired through time would dilute any finding.

***Strength***

Our study group's response rate of 94.6% was one of the highest compared to other countries participated in the multi-country study (Garcia-Moreno 2005). Other strengths of the study include its community-based design using a random sampling technique nested in a demographic surveillance site, attaining only little difference between its sample and the general population of the demographic surveillance site for some socio-demographic characteristics (Gossaye et al. 2003a), and the lack of variance between the interviewers in detecting women exposed to violence also supports validity of the study. Moreover, it has strength in minimizing bias by utilizing randomly selected respondents through use of structured and internationally standardized questionnaires, both the CIDI (WHO 1997a) and the WHO Multi-Country study questionnaire on violence against women (Garcia-Moreno et al. 2006). In addition, the meticulous training (including by WHO experts), regular daily supervision and checking of the completeness and accuracy of data further strengthen the quality of the study. The prospective design (Paper IV) that shows temporal ordering and direct measurement of risk may support a cause-effect relationship between depression and child death.

## Summary of findings

In this high-poverty area, prevalence of depression among women was still in the lower range as compared to studies from high-income countries.

As shown in studies from the Western world, poor socio-economic conditions were associated with depression. Women who are widowed, separated or divorced, women who in-migrated, and women who are in extreme poverty are more likely to suffer from a depressive episode. However, we failed to identify any association between depression and educational level.

This study illustrates that emotional and physical violence by intimate partner and childhood sexual violence of women are associated with depressive episode. Similarly, women under spousal control are more likely to suffer a depressive episode.

Although urban lifestyle and literacy can promote changes in gender norms and attitudes regarding intimate partner violence, in this study, literacy in rural community was observed to expose women to an increased risk of experiencing intimate partner violence.

Our study also shows that maternal depression is associated with an increased risk of child death. Moreover, there is a positive synergistic effect when physical or emotional violence are combined with maternal depression, for risk of child death.

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