UNDERSTANDING THE EFFECTS OF PREGNANCY INTENTIONS ON MATERNAL AND CHILD HEALTH: EVIDENCE FROM THE GILGEL GIBE DEMOGRAPHIC SURVEILLANCE IN SOUTHWEST ETHIOPIA

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DISSERTATION FOR THE DEGREE OF DOCTOR OF PHILOSOPHY (PHD) IN PUBLIC HEALTH

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List of Original Papers

- Yohannes Dibaba, Mesganaw Fantahun & Michelle J. Hindin, Unintended pregnancy and the Use of Maternal Health Services in Southwestern Ethiopia, BMC International Health and Human Rights 2013, 13:36
- Yohannes Dibaba, Mesganaw Fantahun & Michelle J. Hindin, The Association of unwanted pregnancy and social support with depressive symptoms in pregnancy: Evidence from rural Southwestern Ethiopia, *BMC Pregnancy and Childbirth* 2013, 13:135 (24 June 2013)
- Yohannes Dibaba, Mesganaw Fantahun & Michelle J. Hindin, Childhood Vaccination in Rural South Western Ethiopia: The nexus with Demographic Factors and Women's Autonomy, Pan Afr Med J. 2014;17(Supp 1):9
- Yohannes Dibaba, Mesganaw Fantahun & Michelle J. Hindin, Effects of maternal Pregnancy intention, depressive symptoms and social support on risk of low birth Weight: A prospective study from southwestern Ethiopia, PLoS ONE,2014, 9(5): e96304
- Yohannes Dibaba, Mesganaw Fantahun & Michelle J.Hindin, The effects of pregnancy Intention on the use of Antenatal Care Services: Systematic Review and Meta Analysis, BMC, Reproductive Health 2013, 10:50. doi:10.1186/1742-4755-10-50.

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Abstract

Background: Although the prevention of unintended pregnancy has been the major rationale for family planning and reproductive health programs throughout the world, a significant level of unintended pregnancy still exists in almost all countries of the world. The highest rate of unintended pregnancy occurs in Sub-Saharan Africa, where maternal and child mortality rates are also the highest. Unintended pregnancy has a number of costs to women including abortion related maternal deaths, as well as to the unwanted child in terms of health and development. Few studies have examined the effects of unintended pregnancy on maternal and child health and well-being in developing countries including Ethiopia.

Objectives: The aims to examine the effects of unintended pregnancies on maternal and child health and health behavior in Gilgel Gibe Demographic Surveillance area, Jimma zone, southwest Ethiopia.

Methods*:* The study is designed as a mixed method study in which both quantitative and qualitative data collection and analysis were employed. The quantitative study involved a follow up study among pregnant women and a cross-sectional survey among women with a live birth in the two years before the survey respectively. The prospective cohort study was conducted among 622 pregnant women, identified from the 11 Demographic Surveillance Site (DSS) villages, who were followed from pregnancy through to delivery. Baseline survey was conducted in June and July 2012 to collect data on pregnancy intention, depressive symptoms, social support and other variables. Birth weight was measured within 72 hours of birth to examine the effects of pregnancy intention and related maternal health behaviors on birth weight. Moreover, a cross-sectional survey among 1370 women who have had a birth in the two years before the survey was conducted to assess the associations of pregnancy intention and related fertility behaviors on maternal and child health care and child survival. Women with live births in the two years before the survey were randomly selected from the 11 kebeles in the DSS. A qualitative study is included to describe the context and results that emerge from the quantitative study. Eight focus group discussions were conducted with women disaggregated by place of residence and parity. Quantitative data were entered to EPI Data and analysed using STATA version 11. Analysis involved descriptive measures and multivariate regression analysis. Odds ratio, relative risk, incidence rate ratio , 95% CI and P values were used to interpret results. The qualitative data was transcribed verbatim, translated and analysed using a content analysis approach

Results: The level of unintended pregnancy of 35% [95% CI, 32.5-37.5] in the cross-sectional study and 41% [95% CI, 37.1 - 44.9] in the baseline prospective study is high. Older women, rural women, women with no formal education, high parity women and women with low decision making autonomy were more likely to report unintended pregnancy. The major causes of unintended pregnancy were non-use of contraception,

inconsistent use and method failure. In the qualitative study, participants mentioned that unintended pregnancy most often occurs because women hesitate to use contraceptives due to fear of side effects or because they discontinue a method.

Use of maternal health services is very low in the study area. Only 42% of women used any antenatal care (ANC) for the index pregnancy and 12% delivered at a health facility. Only 13% of women started ANC in the first trimester and 17% made the recommended four or more ANC visits**.** A higher proportion of women with intended pregnancies reported use of maternal health care than women with unintended pregnancies. At the multivariate level, the odds of using ANC was significantly lower among women with unintended pregnancies (OR, 0.76, 95% CI; 0.58-0.98) compared to women with intended pregnancies. Moreover, compared to women with intended pregnancies, the odds of receiving adequate ANC was significantly lower (RR, 0.67, 95%CI; 0.46-.96) among women with unintended pregnancies. The association with institutional delivery was attenuated after adjusting for other socio-demographic factors.

Using the Edinburgh Postpartum Depression Scale (EPDS) and a cut of point of 13 and above, it was found that 19.9% (95% CI, 16.8-23.1) of pregnant women who participated in the follow up study had high symptoms of depression. Substantial variation was observed in the magnitude of EPDS with pregnancy intention, food security status, intimate partner violence, social support and history of pregnancy loss. At the multivariate level, the odds of being depressed were nearly twice higher (OR, 1.96, 95% CI; 1.09-3.54) among women with unwanted pregnancy compared to women with a wanted pregnancy. Similarly, the odds of having depressive symptoms were higher among women from food insecure households, women who experienced intimate partner physical violence during pregnancy, and women with low social support compared with their counter parts.

Of the 622 women included in the follow up study, birth outcomes of 612 women were identified and birth weights of 537 births were measured within 72 hours after birth. Ninety six percent of the pregnancies ended in a live birth. The mean birth weight was 2989 grams (SD± 504 grams). Among the 537 neonates whose birth weight was taken, the incidence of LBW was 17.9%, (95% CI; 14.6, 21.1). A higher proportion of low birth weight neonates were born to women aged 35 and above (26%), women in lowest wealth tertile (25.4%) and to women with unwanted pregnancy (28.4%). The multivariate log binomial regression also showed that the risk of low birth weight was two times higher (RR, 2.08; 95% CI, 1.02-4.23) among births after unwanted pregnancy compared to births from wanted pregnancy. The other factors that were significantly associated with LBW in the final model were wealth status, ANC use and maternal mid upper arm circumference (MUAC) size.

There were 1382 births among 1370 women who participated in the cross-sectional survey. Although 74.3% of children alive at the time of the survey had received at least one type of vaccinations, only 37% (95% CI, 33.5-39.9) of children age 12-24 months received all basic childhood vaccinations. About one quarter, 24% [95% CI; 21.8-26.4], of children had experienced illness during the two weeks before the survey. Among the children with any illness, 59.2% (95% CI, 53.8-64.7) had received treatment and advice from health facilities. Among the 1382 children born in the two years before the survey, there were 78 deaths showing a mortality rate of 51 per 1000 person years [95% CI, 40.4-63.1].There were no significant differences between intended and unintended births in terms of receiving vaccinations or mortality in the first two years but intended births were more likely to receive treatment up on illness than unintended births. At the multivariate level, there was a significant effect of unintended pregnancy on treatment seeking (RR, 1.56 95%, CI: 1.09-2.33) but corresponding effects on vaccination and mortality were not observed.

Conclusion: There is a high level of unintended pregnancy in the study area particularly among rural, older, the poor and uneducated women. Unintended pregnancy is linked to a wide range of maternal and child health issues; including use of antenatal care, maternal depression during pregnancy, child health care and birth weight.

Recommendations: Given the high level of unintended pregnancy, improving access to family planning information and services is essential to improve the health of women, children and families. It is important to build on the current momentum of expanding access to family planning in Ethiopia to help women and families achieve their desired family size. Efforts should be made to increase access to more effective and long acting family planning methods. Similarly, improving use of maternal and child health services in rural areas is important. Increasing awareness of the importance of healthy timing, spacing and limiting of pregnancies, and on maternal and child health seeking behavior - early pregnancy symptoms, early initiation of ANC, health facility delivery, completing childhood vaccinations and care seeking for childhood illness – is important. Improving the integration of services - family planning and maternal and child health services, and family planning and maternal and child health issues in to other development programs such as food security is also essential. Further research is required to understand the reasons for under-utilization of maternal and child services in the study area, and on the feasibility and modes of service integration.

Key words: Unintended pregnancy, unwanted pregnancy, birth interval, maternal health, depression, social support, vaccination, low birth weight, Gilgel Gibe, DSS

List of Acronyms and Abbreviations

ANC: Antenatal Care
AOR: Adjusted odds ratio
ARR: Adjusted relative risk
CI: Confidence interval
COR: Crude odds ratio
CSA: Central Statistical Agency
DHS: Demographic and Health Surveys
DSS: Demographic Surveillance System
EPDS: Edinburgh Postnatal Depression Scale
HEWs: Health Extensions Workers
ICPD: International Conference on Population and Development
IMR: Infant Mortality Rate
IRR: Incidence rate ratio
LBW: Low birth weight
MDG: Millennium Development Goals
MOH: Ministry of Health
MMEIG: Maternal Mortality Estimation Inter-Agency Group
MMR: Maternal Mortality Ratio
MSSS: Maternity Social Support Scale
MUAC: Mid-upper arm circumference
NLSY: National longitudinal study of Youth
NMIHS: National Maternal and Infant Health Survey
PMA: Performance, Monitoring and Accountablity
PRAMS: Pregnancy Risk Assessment Monitoring System
PY: Person Years
OR: Odds Ratio
RR: Relative risk
SSA: Sub-Saharan Africa
UNFPA: United Nations Population Fund
UNICEF: United Nations Children's Fund
WHO: World Health Organization

1.0 Introduction

1.1 Background of the Study

Maternal and child mortality continue to be major health problems in the developing world, and especially in Sub-Saharan Africa. According to the recent estimate by the Maternal Mortality Estimation Inter-Agency Group (MMEIG), an estimated 289,000 maternal deaths occurred in 2013 globally, a 45% change from the 1990 level (1). Sub-Saharan Africa (SSA) accounted for 62% (179,000) of the deaths and had the highest Maternal Mortality Ratio (MMR) at 510 maternal deaths per 100,000 live births (1). Ethiopia has one of the highest maternal mortality levels in the world, with an estimated 676 deaths per 100,000 live births in 2011 (2). Overall, the pace of decline in maternal mortality in SSA was slower (2.9%) than the 5.5% required to meeting the Millennium Development Goal (MDG) on maternal mortality (1, 3, 4).

With regards to child mortality; United Nations Children's Fund (UNICEF) estimated that 6.4 million children died before reaching their fifth birthday in 2012, the overwhelming majority (92%) occurred in Africa and Asia. The global under-five mortality rate has been reduced from 90 in 1990 to 48 deaths per 1000 live births in 2012 (5). The highest rates of mortality in children under 5 years old also occurs in sub-Saharan Africa - where 1 in 9 children die before age five (6). Ethiopia has made remarkable progress in reducing under-five mortality (from 166 deaths per 1000 births in 2000 to 88 in 2011), but the magnitude of neonatal mortality is still high (2, 7).

Most maternal and child deaths are preventable. Reducing maternal and neonatal mortality requires better access to maternal and reproductive health care services including antenatal care in pregnancy, skilled care during childbirth, postnatal care and family planning services (8-11). Antenatal care provides an opportunity to deliver interventions for improving maternal nutrition, providing health education, and encouraging skilled attendance at birth. There is evidence that access to skilled assistance and well-equipped health institutions during delivery can reduce maternal mortality and morbidity and improve pregnancy outcomes (9, 10). Delivery assisted by

skilled provider is an important intervention in reducing maternal mortality, and one of the MDG indicators to track efforts towards safe motherhood. Moreover, preventing unintended pregnancies and shorter birth intervals through effective family planning could avert over one third of maternal deaths and more than 10% childhood deaths (11-13). However, use of these interventions in most of the countries with high maternal and neonatal mortality is very low. In Ethiopia, according to the 2011 Ethiopian DHS, only a third of women used antenatal care and nearly nine in ten women delivered at home (2). About 27% of women use modern family planning methods while on the other hand the unmet need for family planning was 28%.

The interventions required to reduce child deaths are also well known. A majority of deaths can be prevented through cost-effective prevention efforts including vaccinations, appropriate nutrition and health care practices. According to the WHO, vaccination alone averts an estimated 2 to 3 million deaths every year from diphtheria, tetanus, pertussis, and measles (14). However, over 22 million children do not receive DPT3 vaccination and countries like Ethiopia have large proportions of children without DPT3 vaccination. In Ethiopia, only one-fourth of children of age 12-23 months receive complete childhood vaccinations, and no more than one-third of children with childhood illness receive treatment for the most common childhood illness such as fever, cough and diarrhea (2).

The links between reproductive health and maternal and child health care is also important in the efforts being made to improve maternal and child health. In addition to the target of increasing the proportion of deliveries with skilled attendance at delivery to 90% by 2015, the international conference on population and development (ICPD's) goal of ensuring universal access to sexual and reproductive health services has been included as an essential strategy for improving the health of women in the MDG goals. The ICPD's program of action affirmed that 'all couples and individuals have the basic right to decide freely and responsibly the number, spacing and timing of their children and to have the information and means to do so' (15). Yet however, despite some notable progress in reproductive health services, a high unmet need for contraception exists in the developing world. It is estimated that about 222 million women would like to

stop child bearing or space their next birth, but are not using a modern family planning method (13). In Sub-Saharan Africa, one out of four couples desires to avoid or delay having another child but is not using contraception. In Ethiopia, the proportion of married women with unmet need was estimated at 26% in 2011 (2).

The high level of unmet need for contraception and of unintended pregnancies in developing countries including Ethiopia can undermine the attainment of MDG goals on maternal and child health. Improved reproductive health care-including increased access to contraceptive services would contribute to attaining MDG goals on maternal and child mortality by helping women and couples plan their families and have healthy babies (11, 13). One of the outcomes of high unmet need for family planning is unintended pregnancies; pregnancies that are not wanted at conception. Worldwide, an estimated 213 million pregnancies occur annually, nearly 85 million are unintended and about 75 million of the unintended pregnancies occur in the developing world(16). The rate of pregnancy and of unintended pregnancy is highest in Africa. In 2012, the unintended pregnancy rate ranged from a low of 43 per 1000 in Europe to 80 per 1000 in Africa (16). In Ethiopia, the 2011 EDHS showed that 28% of births in the five years before the survey and 32% of most recent births were unintended (2). A 2014 report of the Performance, Monitoring and Accountability (PMA 2020) study also showed that the magnitude of unintended pregnancy is even higher at 42% (17).

Although Ethiopia is considered as an ‘emerging family planning success story’ (18) due to the rapid rise in contraceptive use in the last decade, the magnitude of unintended fertility is still high. Use of modern family planning increased from 6% in 2000 to 27% in 2011(2, 7). Similarly, the total fertility rate declined from 5.9 in 2000 to 4.8 during the same period. Apparently, women’s fertility preferences have been changing. While women’s wanted fertility (wanted TFR) declined from 5.0 to 3.0 during the same time, the unwanted TFR increased from 1.0 to 1.8 births per woman between 2000 and 2011.The proportion of women with a desire to stop child bearing also increased during the same period. Moreover, there is a large regional, rural- urban and wealth inequalities in the magnitude of unmet need for family planning and unintended

pregnancies in Ethiopia (2).This widening gap between actual and desired fertility and between population groups suggests a lag between effective contraceptive practice and the changing fertility preference.

1.2 Statement of the Problem

Although the prevention of unintended pregnancy has been the major rationale of family planning and reproductive health programs throughout the world, available evidence shows that a significant level of unintended pregnancy exists in almost all countries of the world (16, 19). About 85 million unintended pregnancies occur in the world annually, resulting in 42 million induced abortions, 32 million unintended births, and 13 million miscarriages (16). On the other hand, about 289,000 maternal deaths occur annually, over 99% of which occurs in the developing world where the magnitude of unintended pregnancy and fertility is higher (1). Half of the 42 million induced abortions that occur annually are unsafe causing about 47,000 maternal deaths annually (13). Unsafe abortion complications also cause several other physical and psychosocial health problems to those affected (20, 21). The Guttmacher Institute and UNFPA estimated that by averting all unintended pregnancies that occur worldwide each year, 22 million induced abortions, 1.4 million infant deaths, and 142,000 maternal deaths could be prevented (13).

A higher proportion of unintended pregnancies in the countries of sub-saharan Africa are carried to term ending in unplanned births, as access to abortion services is limited (16).Little is known about other effects of unintended and unwanted pregnancies carried to term on maternal, child and familial health and wellbeing apart from its effects on maternal death through induced abortion complications. The few studies from developed countries have linked unintended pregnancy with adverse maternal behaviors during pregnancy including late and inadequate prenatal health care(22-25) depression and anxiety during pregnancy and postpartum (26, 27), and smoking and drinking during pregnancy (28, 29). Although the relationship between unintended pregnancies and child health is relatively under-studied, some researchers have argued

that unintended pregnancy incurs several health and social disadvantages by the unwanted child and of damage to the wellbeing of siblings, parents, and communities at large (30-32). In this regard, studies have shown that unintended pregnancies influence birth outcome (33-35), duration of breast feeding (36, 37), infant survival (38, 39), child health care (36, 40), child nutritional status and cognitive development (41, 42). Some research has also found long term mental health effects of unintended pregnancy (43).

Most of the studies documenting the effects of unintended pregnancy are conducted in the developed countries, and little is known about the effects of unintended pregnancy on maternal and child health in developing countries. It is expected that the effects of unintended and unwanted child bearing be larger in low-income settings where 'poor households and communities have less capacity to accommodate additional unwanted births' (32, 39). Even among those studies conducted in developed countries, findings of the effects of unintended pregnancies on some aspects of maternal and child health has not been consistent across or within populations. After a thorough review of the literature on the effects of unintended pregnancy, Gipson and colleagues suggested that 'the evidence on the impact of unintended pregnancy on child and parental health outcomes is mixed and is limited, and so few studies are available from developing country settings' (30). A majority of the studies on this subject depended on cross-sectional data in which women were asked retrospectively about the intention of a pregnancy that happened several years ago, underestimating the magnitude of the problem. Moreover, the influences may vary based on the local contexts of countries and also across social and cultural settings. Thus, gaps remain in our understanding of the mechanisms by which unintended pregnancies influence the health and wellbeing of children and women in developing countries, and Ethiopia in particular. The main research question of the present study is whether unintended pregnancy has effects on maternal health and health behavior, on birth outcomes and child health.

1.3 Rationale and Significance of the study

It is known that improved reproductive health care-including increased access to contraceptive services-would contribute to attaining MDG goals on maternal and child health by helping women and couples plan their families and have healthy babies. However, access to reproductive health, maternal and child health services are low in Ethiopia. Less than one-third of women use family planning and antenatal care services, only one in ten women deliver in a health facility, and a quarter of children age 12-23 months receive complete child-hood vaccinations. Unsafe abortion is also an important health problem in Ethiopia, with an estimated annual abortion rate of 23 abortions per 1000 women as of 2008 (44). There have been several policies and strategies put in place to improve the situation; the population policy, health policy and the resulting Health Sector Development Programs (HSDPs), the national reproductive health strategy (2006-2015), the child survival strategy all envision the attainment of national goals and achieving the Millennium Developmental Goals (MDGs) on maternal and child health. The Population policy aimed at reducing the TFR to 4.0 and increase contraceptive use to 44% by 2015 and the national reproductive health strategy aimed at increasing contraceptive use to 60% by the same year (45).

There has been a remarkable improvement in child health in the last decades in Ethiopia. However, changes in maternal and newborn mortality have been slower to meet the MGD goals. Maternal health care goals and targets were outlined in the Health Sector Development Program (HSDP) and National Reproductive Health Strategy, but achievements were short of the targets (45-47). Use of maternal and child health services is still very low, and the goals of universal access to reproductive health services is far from being achieved. As a result, the unmet need for family planning and the magnitude of unintended pregnancies remain high. This high level of unintended pregnancy contributes to maternal mortality and morbidity in different ways.

There is a renewed commitment by the Ministry of Health and the government to improve access to family planning and reproductive health services as well as maternal

and child health services to meeting MDG targets on maternal and child health. The Ministry has recently developed a 'road map for accelerating the reduction of maternal and newborn morbidity and mortality in Ethiopia'. The major objective of the road map was to reduce maternal mortality ratio to 267 per 100,000 live births and newborn mortality rate to 15 per 1000 live births by 2015 (46). In addition to the goals of improving the use of maternal and newborn health services, the new road map also emphasizes the need to increase access to family planning information and services as a means to improve maternal and newborn health. The national reproductive health strategy which underscored the close interrelationship between reproductive health and maternal and newborn health, has identified priority areas of intervention including the determinants of women's reproductive health; fertility and family planning and maternal and newborn health (48).The strategy sets specific targets for the provision of family planning services in which it has focused on addressing reduction of unwanted pregnancies and enabling individuals to achieve their desired family size. Moreover, the child survival strategy recognizes the complex set of factors that influence child health: including poverty, inadequate maternal education, high fertility and inadequate birth spacing among others (49). Hence, empirical evidence is needed to evaluate the progress, effectiveness of the programs and inform the design of strategies to attain the goals of improving the health of women and children.

This research will have important implications for future research, policy and program design. A better understanding of the magnitude, causes and effects of unintended pregnancy, as well as maternal and child health care needs will enable policy makers to reduce the obstacles that prevent families from having their desired number of children, improve the quality of health care provided, and increase the utilization of reproductive health services. The study provides the evidence base of the implications of unintended pregnancies on maternal and child health and the need to consider the unique needs of women with unintended pregnancy as well as infants and children born as unplanned in health care. It may contribute to the national effort being made to reposition family planning as a priority health issue in Ethiopia. Given that the findings of previous studies were inconclusive; this study will provide additional evidence that

unintended pregnancy influences the health and well being of women and children in the settings of developing countries for the scientific community. Moreover, the study will inform policy makers of the magnitude of unintended pregnancy and its relationship with maternal health care, maternal depression during pregnancy, low birth weight, child health care including vaccination and health care for childhood illness, and child survival. Future researchers can build on the gaps that this study identifies using stronger designs and mixed methods approach.

1.4 Literature Review

1.4.1 The Measurement and Meaning of Unintended Pregnancy

The measurement of pregnancy intentions is important for family planning research, programs and policies. It helps in understanding fertility-related behaviors, estimating unmet need for contraception, for understanding the impact of pregnancy intentions on maternal and child health, and designing family planning programs that prevent unintended pregnancy (30, 50). However, research on pregnancy intention and its health consequences are affected by some methodological challenges; specifically on the conceptualization and measurement of pregnancy intention. There has been a variation in the way pregnancy intention is defined, although the majority of surveys used the DHS questions on pregnancy intention which classifies pregnancies as intended, mistimed and unwanted.The classification of pregnancy as intended or unintended is based on the mother's assessment while thinking back to the time just prior to conception. Accordingly, unintended pregnancies have been defined as pregnancies that, at the time of conception, are either mistimed (the mother wanted the pregnancy to occur at a later time) or unwanted (mother did not want it to occur at that time or any time in the future) (50, 51). But, this notion of unintended pregnancy has received critiques over the past decade in a sense that it does not adequately reflect the complexities of reproductive desires and preferences (52, 53).

Accordingly, studies have focused on the meaning and timing of unintended pregnancy to individual women. For instance, Sable (2000) argued that pregnancy intention is a complex concept, involving emotional and psychological factors that may not be captured by current measures of intention (52). Miller and colleagues (1999) pointed out that motivations to engage in sexual activity may be distinct from motivations to have children, and intentions may emerge only after a pregnancy has occurred (52, 54). Similarly, Stanford and colleagues (2000) suggested that an affective dimension (wanting a baby) is related to community, partner and personal values about child bearing, and that a planning dimension concerns preparation for pregnancy, life goals, and education (55). Accordingly, it is recommended that surveys elicit planning status

by means of multidimensional questions, probing in various combinations intentions, contraceptive use, reactions to pregnancy, timing of pregnancy plans, and family size intentions (56, 57). Barret and collegues recently developed such a multidimensional measure of unintended pregnancy called 'the London Measure of Unintended Pregnancy', but this has not been validated in the setting of developing countries (57).

Another methodological challenge in the study of pregnancy intention and its effects is the timing of measurement of pregnancy intentions. Many of the existing studies used cross-sectional data or retrospective reports of pregnancy intention, asking women to think back to their feelings regarding their most recent live births. One of the main sources of this information is the DHS, often asking pregnancy intention question from women with births in the five years before the survey. Researchers have argued that responses to these questions may be subject to ex- post rationalization, meaning, respondents either adapt to the reality of new offspring or are reluctant to describe existing births as having been mistimed or unwanted, so that births that were initially unintended become subsequently described as having been intended (33, 58, 59). Contrariwise, economic challenges or relationship problems with the child's father, or negative ractions of family and friends to the pregnancy could influence a woman to evaluate the pregnancy as unwanted (41, 58, 60).

Thus, rates of unintended pregnancy fluctuate broadly, depending on whether pregnancy intentions are measured during a pregnancy or after a birth. Most commonly, women tend to become more accustomed to a pregnancy over time and reports of both intention and desire for pregnancy increase with time from conception. For instance, Bankole and Westoff, using a prospective data from Morocco concluded that the reliability of pregnancy intention declines with time as children previously classified as unwanted were latter classified as wanted (58). In this regard, prospective (longitudinal) measurements of pregnancy intentions are believed to give a better understanding of the nature and effects of unintended pregnancies (30, 59, 61) although these are relatively expensive.

Despite these limitations, available evidences show that a significant level of unintended pregnancy exists in all countries of the world. Slegh and colleagues analyzed DHS data of developing countries and national surveys of developed countries to estimate the global level of unintended pregnancies. In 2012, they estimated that about 213 million pregnancies occur annually. About 85 million (40%) of the pregnancies were unintended, of which 38% resulted in unplanned births, 50% in abortions, and the remaining 13 million in miscarriages (16). The highest unintended pregnancy rates were found for Eastern and Middle Africa, and the lowest for southern and western Europe. Even in developed countries such as the United States, it is estimated that about half of all pregnancies are unintended (30, 62). In developing countries, though reliable data on unintended pregnancies are scarce, it is estimated that about 75 million unintended pregnancies occur annually, about 34 million of which results in unplanned births and the remaining are interrupted by abortions and miscarriages (19).

The majority of evidence on levels of unintended pregnancy in less developed countries comes from DHS data. In general, DHS data showed that the magnitude of unintended pregnancy in developing countries ranges from 14 % to 62% (30). In Ethiopia, the percentage of births that were unintended at the time of conception decreased from 36% in 2000 to 35% in 2005 and further declined to 28% in 2011 for births that occurred in the five years before the surveys respectively (2, 7) .However, the magiutude of unintended pregnancy in DHS is higher for the last births. Accordingly, 32% of most recent births in the 2011 EDHS were unintended. Similarily, a 2014 report of the Performance, Monitoring and Accountablity (PMA) 2020 study by the Bill & Melinda Gates Institute for Population and Reproductive Health also showed that the magnitude of unintended pregnancy is even higher at 42%(17). The changes in fertility preferences, accompanied by low utilization of modern family planning, high contraceptive discontinuation rate (2) and the fact that more than 80% of family planning users use short acting family planning methods contribute to the existing high level of unintended pregnancy.

1.4.2 Unintended Pregnancy and Maternal Health Behaviour

Studies on the effects of unintended pregnancy on maternal health documented that unintended pregnancies influence the health and wellbeing of women through unsafe abortions and poor maternity care (30, 36, 63). Apart from abortion related deaths, there are limited studies that examined the effects of unintended pregnancy on maternal deaths. In the only study that tried to examine the effect of unintended pregnancy on maternal mortality in Sichuan (China) based on maternal mortality surveillance data, maternal mortality was found to be twice higher among women with unintended pregnancies as compared to women who planned their pregnancies (64). Most studies focused on the influences of unintended pregnancies on maternal health behavior during pregnancy or postpartum.

1.4.2.1 Unintended Pregnancy and Maternal Health Care

Several studies have examined the effects of individual, household and community level factors on the use of maternal health services in developing countries (65-69). Studies from developing countries have consistently shown that women's education, wealth status, and accessibility to health services are among the major factors that influence use of maternal health services (66-70). There is also a large body of research that documents the negative consequences of unintended pregnancy on use of maternal health services, particularily antenatal care, in developed countries (22, 23, 71, 72). Most of these studies showed that unintended pregnancy is associated with late initiation and inadequate use of antenatal care services. It is found that women who have mistimed or unwanted conceptions tend to initiate antenatal care later in pregnancy and receive less antenatal care than women who have intended the pregnancy.

Even among the developed countries, a majority of the studies on the effects of unintended pregnancies on antenatal care comes from the United States. These US studies used large national surveys such as the National Maternal and Infant Health

Survey (NMIHS), National Survey of Family Growth (NSFG) and National Longiutidinal Survey of Youth (NLSY). For instance, Kost et al used data from the 1988 NMIHS and the 1988 NSFG to investigate whether women with unplanned births differ from other women in their pregnancy behavior. Using the NMIHS data, they found that women with unintended pregnancies were significantly less likely [OR, 0.69, 0.67] than women with intended pregnancies to seek out early prenatal care, after controlling for recognition of the pregnancy (22). They suggested that women with unintended pregnancies may not seek antenatal care as early as do women with intended pregnancies, either because of late recognition of the pregnancy or because they delay in deciding whether to terminate the pregnancy.

Joyce et al also used the NLSY data from 1979-1992 to investigate the links between unintended pregnancy, maternal antenatal and postpartum health behavior and found that women with unwanted pregnancies (not mistimed) were 2.8 perecntage points more likely to intiate antenatal care after the sixth month of pregnancy than women whose pregnancies were intended (23).They argued that differences in the timing of ANC reflect a tendency of unwanted pregnancies to be recognised later than wanted pregnancies, thereby delaying the start of ANC. Korenman and collegues also found similar marginally significant effects of pregnancy intention on the timing of antenatal care among married women using fixed effects models, however the effects were larger for young unmarried women (35). A more recent study from the USA by Cheng and Colleagues using longitudinal data (PRAMS) of 2001 to 2006 also showed that women with unintended pregnancies were less likely to initiate antenatal care during the first trimester [OR 0.34, 95% CI 0.3–0.5] (72). In Spain, Ro drı´guez et al. assessed the effect of unplanned pregnancy on prenatal care utilization and observed that unplanned pregnancy was a significant risk factor for inadequate use of antenatal care [OR, 2.1, 95% CI; 1.2–3.7] and it was an independent predictor for a delayed first antenatal care visit and for a reduced number of visits (73).

Most developing countries studies were based on DHS data (36, 38, 74-76). Some of these studies found that women with unintended pregnancies are less likely to use

antenatal care services and or less likely to receive adequate antenatal care (66, 67). A study from Kenya showed that women experiencing unwanted or mistimed births had, on average, fewer antenatal care visits and were more likely to delay the timing of the initial visit than women with wanted births (75). In Ecuador, a study by Eggleston (2000) using data from the 1994 Ecuador DHS showed that mothers with unwanted pregnancies were significantly less likely to have received antenatal care [OR = 0.68; 95% CI: 0.57–0.82], and less likely to have received an adequate number of antenatal care visits [OR = 0.71; 95%CI: 0.57–0.89], compared with women who wanted pregnancies even after controlling for socio-demographic characteristics (25). A study from Brazil also showed that women having an unplanned pregnancy were found to be more likely to have had inadequate antenatal care than women who had planned their pregnancy (77).

A recent study from Tanzania looked at the effects of mistimed and unwanted pregnancies on the timing of antenatal care intitation in three districts, and found that women with mistimed and unwanted pregnancies were 1.68 (95% CI, 1.10–2.58) times more likely to intiate ANC in the second trimester than women who intended the pregnancy (19). In Ethiopia, although several studies have investigated the determinants of antenatal care utilization, there were few studies that assessed the relationship between unintended pregancy and maternal health care. A study of the determinants of antental care utilization in Yem special woreda found that women with a planned pregnancy were nearly twice as likely as women with unplanned pregnancy to have used antenatal care during pregnancy (78).Similarily, another study from southern Ethiopia, using data from Yirgalem and Jimma towns, showed that women who wanted their pregnancy are 1.5 times as likely to have used antenatal care as women who did not want their pregnancy (79).

However, an inconsistent pattern of relationships between unintended pregnancy and antenatal care utilization was reported in some other studies from developing countries [40, 68-69]. In a multi-country study using DHS data from five developing countries, Marston and Cleland found that women experiencing unintended pregnancies were

significantly more likely to delay antenatal care in three (Peru, Kenya and Philippines) of the five countries but not in two others (Egypt and Bolivia). Another study that used DHS data from Kenya and Nambia also found such an inconsistent association between unintended pregnancy and antenatal care (72). Given this inconsistent pattern of relationships, we conducted a Meta analysis of the association between pregnancy intention and antenatal care including studies from both developed and developing countries. We found that the odds of delayed antenatal care use and inadequate antental care are significantly higher among women with unintended pregnancies compared to women with intended pregnancies (80). Sub group analysis for developed and developing countries also showed significant associations.

There are few studies that assessed the relationship between unintended pregnanacy and delivery care. Those in developing countries found no or marginal association between pregnancy intention and delivery care utilization(36).The study by Marston and Cleland assessed the relationship between unintended pregnancy and delivery care utilization, and found increased odds of unsupervised delivery for unwanted children in Peru and Kenya, but not in the other 3 countries (36). Gage analysed the 1993 Kenya DHS and the 1992 Nambia DHS data to assess the association between pre-marital sex, unintended pregnancy and maternal health care (76). This study showed that pregnancy intention is not a significant determinant of the likelihood of institutional delivery in Nambia, except in Kenya where women were less likely to deliver at a health facility if they are dissatisfied with the timing of the pregnancy (76).Women with mistimed pregnancy had a 17% lower likelihood of institutional delivery than wanted births. A study from Thailand also found that wantedness status of births had no effect on the use of delivery care after controlling other socio-demographic variables(81). In a study conducted in the Slums of Nairobi to assess the effects of women's autonomy and related factors on institutional delivery, Fotso and collegues found that unplanned pregnancies were less likely to be delivered at appropriate health facilities compared to planned pregnancies (69). Overall, existing studies on the subject are either limited or have reported inconclusive findings.

However, most of the evidence on the effects of unintended pregnancy on maternal health care comes from cross-sectional studies such as the DHS which are affected by post hoc rationalization and recall bias. Moreover, although most studies from the developed countries have shown the effects of unintended pregnancy on antenatal care, the few studies from developing countries have shown mixed findings.

1.4.2.2 Unintended Pregnancy and Maternal Psychosocial Health

Mental health problems, such as depression, are among the top causes of disability among women although they are not an imprtant component of reproductive health care (20). Studies have shown that depression, anxiety, and stress in pregnancy are risk factors for adverse outcomes for women and children. Depression places pregnant women at greater risk for inadequate prenatal care, increased alcohol use and poorer weight gain in pregnancy (82, 83) and also influences children's health, development, and behavior (20, 83). For instance, a meta-analyis involving studies from both developed and developing countries showed that antenatal depression is associated with preterm birth, intrauterine growth restriction, and low birth weight (84). A study from Ethiopia found that antenatal common mental disorders such as depression, anxiety and somatic symptoms are associated with prolonged labor, delayed initiation of breast feeding and more diarrheal episodes for infants (85). Moreover, antenatal depression is a predictor of postnatal depression--women who are depressed during pregnancy have a higher risk of developing depression during the postpartum period (86, 87).

Unlike postnatal depression, which is increasingly recognized as an important public health issue in low-income countries, antenatal depression and its effects on maternal and child health is relatively less studied. Estimates of the prevalence of antenatal depression vary substantially. A systematic review of studies from developed countries found that antenatal depression affects 13% of pregnant women in the second and 12% of women in third trimester (88). Studies from South Asia and Latin America have reported rates of 20% and higher (89-91). Evidence from developing countries suggests

that depression during pregnancy is common-- in Sub-Saharan Africa prevalence ranged from 8.3% to 39% (92, 93).

The high prevalence of maternal depression in poor countries may be related to women's exposure to several depression-related risk factors, including poverty (91, 92, 94), low social support (95-98), domestic violence (92, 99-101), HIV/AIDS (20, 102, 103) and reproductive health behaviors such as high parity, unwanted pregnancy, unsafe abortion, infertility, and pregnancy complications (20, 104-107). The intersection of unintended pregnancy and maternal mental health, however, is not well studied in developing countries. The few studies from developed countries that considered the influences of unintended pregnancy have shown that women with an unintended pregnancy are at an increased risk of depression during pregnancy than women with intended pregnancies [89-93]. For instance, in a study from Hong Kong, among pregnant women in their 2nd trimester, women with unintended pregnancy were nearly twice as likely (OR, 1.8, 95% CI; 1.3-2.5) to experience antenatal depressive symptoms than women with intended pregnancy (108).

In another study from Ireland, McCrory and McNally used data from the 'growing Up in Ireland society', a large nationally representative cohort studies, to assess the effect of pregnancy intention on maternal prenatal behaviours and parent and child health. They found that unintended pregnancy was associated with increased risk of depresion (RR, 1.36, 95% CI, 1.19-1.54) and parental stress than women with intended pregnancies (26). Orr et al. assessed the effects of unintended pregnancy reported at first prenatal care visits on maternal psychosocial factors among 1163 low income African American women in Baltimore, USA.They found that women with unintended pregnancies, especially unwanted pregnancy, were significantly more likely to report higher levels of exposure to stressors, higher levels of depressive symptoms, low partner support, and higher levels of dissatisfaction than women with intended pregnancies(109). However, the study did not adjust for potential confounders and should be interpreted with caution. Another study among a sample of black women enrolled at prenatal care clinics in the District of Columbia showed that women who were unhappy with the pregnancy

had higher odds than happy women of smoking, being depressed and experiencing intimate partner violence during pregnancy (110). A study from Indonesia by Hardee et al, found that unintended pregnancy was associated with lower levels of psychological well-being among Indonesian women (111). Women who had reported ever experiencing an unintended pregnancy were nearly three times more likely to be in the low psychosocial well-being category than in the high well-being cluster.

Relatively large number of studies assessed the association between unintended pregnancy and postpartum depression. A study of the mental health of women with unintended pregnancies resulting in live births in Australia found that women whose pregnancies were unintended were more likely to be depressed (RR= 5.2, 95% CI: 3.6 – 7.6) and anxious (RR= 2.6, 95% CI: 1.9 – 3.5) at 3–5 days and 6 months postpartum than women with planned pregnancies (112). Mercier et al (2013) interviewed pregnant women during their 15-19 weeks of gestation at prenatal clinics at the University of North Carolina Hospital Center, then classified them by their pregnancy intention and interviewed them at 3 and 12 months postpartum. They found that women with unintended pregnancy were more likely to have postpartum depression. At 12 months women with unintended pregnancies were twice (RR 2.0, 95% CI 0.96–4.0) as likely to have postpartum depression (110). In another study from the USA, Cheng et al (2009) found that women with unwanted (OR 1.98, 95% CI 1.48–2.64) and mistimed pregnancies were (OR 1.34, 95% CI 1.08–1.68) more likely to report postpartum depression than women with intended pregnancies (72).

On the other hand, there were some studies that showed lack of association between unintended pregnancy and depressive symptoms during pregnancy (89, 113). A study by Philips et al among pregnant adolescent girls in the USA found that pregnancy planning was not associated with adverse pregnancy risk factors or outcomes (113). A study of common mental disorders among pregnant women of low socio-economic status (SES) in Sao Paulo also showed lack of association between pregnancy planning and antenatal depression(89).

Unintended pregnancy may increase a woman's level of depressive symptoms by increasing her exposure to psychosocial stressors, decrease social support provided to her by the partner, and decrease her overall life satisfaction (27, 30). Moreover, unintended pregnancy may increase a woman's exposure to partner violence. Studies show that women who experience an unplanned pregnancy are at increased risk of physical abuse compared to women who have intended the pregnancy (114, 115). In a study by Goodwin and colleagues, women who had mistimed or unwanted pregnancies reported significantly higher levels of abuse at any time during the 12 months before conception or during pregnancy compared with those with intended pregnancies [121]. In a study by Gazmararian and colleagues, women with unintended pregnancy were reported to have four times the odds of experiencing physical violence than did women with intended pregnancies (114, 115). Thus, women with unwanted or mistimed pregnancies may be at an increased risk for violence by their partners compared with women with intended pregnancies.

1.4.3 Unintended Pregnancy and Birth Weight

Low Birth Weight (LBW), defined as birth weight under 2500 grams by the World Health Organization (116), is the principal risk factor for neonatal and infant mortality in developing countries. Studies show that LBW babies are more likely to die than heavier babies (117, 118) and nearly 60-80% of neonatal deaths occur among LBW infants (119). Moreover, LBW is related to childhood motor skills, cognitive and social development (120, 121). The reduction of LBW is a key indicator for the attainment of lowering child mortality by two-thirds as part of the Millennium Development Goals (MDGs). The knowledge of the magnitude and determinants of LBW is important in developing policies aimed at reducing neonatal and infant mortality in countries with high neonatal mortality rates.

According to the United Nations Children's Fund (UNICEF) and WHO, it is estimated that more than 20 million infants worldwide, representing 15.5% of all births, were LBW in 2000 (122). The incidence of LBW in developing countries is more than double the

level in developed regions (16.5% and 7% respectively), and over 95% of all LBW occurs in developing countries. Among developing countries, higher incidence of LBW has been reported from south Asian countries of India and Bangladesh (123, 124) Studies from Ethiopia indicate incidence rates ranging from 10-28% (125-128).

Studies have identified several risk factors for LBW, although the risk factors may differ between populations. In several studies, maternal height and pre-pregnancy weight, gestational weight gain, mid-upper arm circumference (MUAC), cigarette smoking, alcohol consumption and low socio-economic status were found to be the main risk factors for LBW (123, 129-131), Socio-demographic factors such as infant's sex, maternal age, primparity, maternal education and birth interval were also mentioned in several studies (124, 132, 133). Studies from Ethiopia reported that poverty, smaller MUAC size, lack of ANC attendance, infant sex, primparity and short maternal stature are associated with low birth weight (127, 128, 130). However, very few studies have considered the effects of psychosocial factors such as pregnancy wantedness and prenatal depression on LBW in developing countries.

Unintended pregnancy may influence birth outcomes through increased levels of stress, and adoption of risky behaviors such as smoking, delayed initiation or inadequate prenatal care and reduced willingness to seek social support during pregnancy (34, 134, 135). However, findings on the association between pregnancy intention and birth weight has been inconsistent. Several studies from developed countries found that pregnancy intention is associated with birth weight, although some others reported a lack of statistically significant association between unintended pregnancy and birth weight.

In the USA, a study by Kost et al, using data from the National Maternal and Infant Health Survey (NMIHS) and the National Survey of Family Growth (NSFG), found that unintended pregnancy increases the likelihood that infant health will be compromised including being born low birth weight,premature and small for gestational age (22). However, in analyses controlling for the mother's background characteristics, a mistimed pregnancy had no significant effect on birth weight. In another study from the

USA, Korenman and his colleagues (2002) investigated the effects of parental disaggrement about pregnancy intention and found that the risks of LBW are higher when a pregnancy was not intended by the mother, but differed little according to father's intention (35). Sable and Wilkinson also assessed the effects of perceived stress, major life events and pregnancy attitudes on low birth weight in the US , and found an elevated risk of low birth weight among women who denied the pregnancy (OR 1.67) and among those unhappy about the pregnancy (OR 1.39) respectively (52). These findings of the association between unintended pregnancy and LBW in developed countries was confirmed by a meta-analysis of observational studies, by Shah et al, who observed an increased risk of LBW and pre-term birth among unintended pregnancies compared with intended pregnancies (34). The meta-analysis showed increased odds of LBW among unintended pregnancies [OR 1.36, 95% CI 1.25, 1.48] ending in a live birth.

Studies from developing countries on the relationship between pregnancy intention and birth weight are very limited. In the only study from from Ecuador, South America, Eggelston et al examined the association between unwanted pregnancy and the risk of low birth weight using DHS data and found that low birth weight (≤ 2,500 grams) was significantly more frequent among births that were considered unwanted (OR: 1.64), though this association was not found for mistimed Births (136). On the otherhand, it is essential to mention that there are some studies where a lack of association was reported. In the US, Joyce and his colleagues (2000) assessed the effect of pregnancy intention on child development including low birth weight, and found no significant effects on birth weight for unwanted births after controlling for exogenous variables (33). Another study from the US by Keeton et al. (2007), found that intended pregnancy is associated with a slightly higher risk than unintended pregnancy of a very low birth weight /very preterm birth in young white women (ages less than 22 years) and black women of all ages(137).

1.4.4 Unintended Pregnancy and Child Health

The fourth Millennium Development Goal (MDG) calls for reducing child mortality by two-thirds by 2015. Progress in child health (MGD 4) is measured using three indicators; under-five mortality rate, infant mortality rate and proportion of infants immunized against measles (138, 139). In the years from 1990 to 2012, global under-five mortality has declined by about 41% (5). Remarkable achievements were made in several developing countries including Ethiopia, although many countries could not achieve the MDG goals on child survival. For instance, the under-five mortality rate in Ethiopia declined from 166 deaths per 1000 live births in 2000 to 88 deaths per 1000 births by 2011, a decline of 47% in 11 years (2, 7, 140). Similarily, infant mortality declined rapidly and child immunization levels has increased remarkably in many developing countries. In 2011 about 83 percent of infants worldwide were vaccinated with three doses of diphtheria-tetanus-pertussis (DTP3) vaccine, and 162 countries have reached DPT3 coverage of 80 percent - the global Universal Childhood Immunization initiative goal for Routine Immunization coverage (14).

According to UNICEF, the major causes of death among children under five in the sub-Saharan African region are neonatal diseases, pneumonia, malaria and diarrheal diseases, AIDS, and Measles(139). The interventions and practices required to avert most child deaths are also known. Majority of deaths can be prevented through cost effective prevention efforts including vaccinations, appropriate nutrition and appropriate health care practices. Thus, more access to health care services and facilities, including antenatal care, medical attendance at birth, and participation in immunization programs are essential to reduce child morbidity and mortality. Moreover, several studies have shown that maternal education is strongly linked to better child health outcomes, including improved child health care, participation in vaccination programs and survival (141, 142).

Studies have shown that preventing too early and too late pregnancies, closely spaced pregnancies and too many pregnancies through family planning also improves child

health. Large family size is thought to have a direct effect on child welfare primarily through its reduction in per-capita resources as they get divided amongst more children in a family. In developing countries, studies on the effects of family size on child well being, have shown that large family size, especially having many younger sibilings, influnces child's educational attainment (143, 144), and nutritional status (31). Most studies focused on mortality and relatively few studies assessed the relationship between unintended pregnancy and preventive and curative health care. Jensen and Ahuburg, who assessed the impact of unwantedness and number of children on child health and preventive and curative care argued that whether a child is wanted should serve as a proxy for parent's willingness to invest resources in a child (40). Desai (1995), who also used DHS data from 15 developing countries, showed that having more younger siblings decreased a child's health because of increased competition for resources in 11 of the 15 countries she studied (145). Similarily, Montgomery et al (1997) argue that unintended fertility is an exogenous shock that imposes new and unanticipated demands on resources that were not planned for, displacing the parent's childbearing and rearing strategy from what would otherwise have been optimal (39).

Studies on the association between pregnancy intention and child mortality mainly come from developing countries where child mortality is a major health problem. These studies reported mixed findings, however. The one study from the USA by Sable et al (1997), indicated that women who categorized their pregnancies as unwanted or mistimed during their prenatal visit were two times as likely to have children who died during the first 28 days of life (37). Among developing country studies, the study by Montogemery and colleagues, using DHS data from five developing countries, showed that infant survival probabilities during the neonatal period are higher among children who were wanted by both parents rather than only one parent or by neither parent (39). But no significant association was found with postneonatal or child mortality.This study is affected by recall bias given that the DHS data collects pregnancy intention for all births in the five years preceding the survey.

Two recent studies used longitudinal data from Asian countries to examine the effects of pregnancy unwantedness on child survival (32, 38). The study by Chalasani and colleagues analyzed longitudinal data from rural Bangladesh collected in the period 1982-2002 in which child wantedness is measured prospectively and on a sex-specific basis (32).They included a sub-sample from the longitudinal data and authors employed two analytical strategies, fixed effects and a “natural experiment” to remove the effects of confounding. Using the fixed effects model, they found that unwanted births were two times more likely to die during the Neontal and post-neonatal period than wanted births. In another study from India, Singh and collegues followed up a cohort of women selected from the 1998-1999 National Family Health Survey until 2002/2003 in four Indan states for which pregnancy intention was assessed prospectively (38). After adjusting for several maternal socio- demographic variables, they found that births that were identified as unintended during pregnancy had 83 % higher risk of neonatal mortality compared to wanted births.

Other studies from developing countries tried to relate unintended pregnancy to child nutritional status (36, 42), breastfeeding (36, 37), and educational attainment (39, 144). Studies from developed countries also show that unintendedness is associated with poor mental health and a less close mother-child relationships (41, 146). Some studies have shown that unintended pregnancies have implications for the child that last from early child hood through adolescence and into adulthood (43). For instance, a longitudinal study called the ‘Prague study’ followed the development and mental well-being of 220 children born in 1961-1963 in Prague to women twice denied abortion for the same unwanted pregnancy. The children were pair matched at age nine with 220 children from accepted pregnancies and were followed for 35 years. They found that differences in psychosocial health between those who were denied abortion and accepted pregnancies widened over time, but lessoned at around age 30. The author concluded that denial of abortion for unwanted pregnancy entails an increased risk of negative psychosocial development and mental well-being in adulthood (43).

1.4.5 Summary of Litreature Review

Overall, our review of the literature on the relationship between pregnancy intention and maternal and child health showed that there is a relatively consistent evidence of the effects of unintended pregnancy on maternal prenatal care utilization and psychosocial problems like depression. However, findings of existing studies on other outcomes including infant survival, child preventive and curative care are mixed and inconsistent. Some researchers have suggested that the association between pregnancy intention and child health is sensitive to controls for maternal characterstics and family background, and suggested that these variables may serve as the mechanism through which unintended pregnancy affects child outcomes. There are also several limitations with previous studies. One is its dependence on retrospective reports of women's pregnancy intention, which has been criticized for underreporting of the magnitude of unintended pregnancy due to post hoc rationalization. Moreover, most of the research evidence available is from the developed countries and only very few have been conducted in the developing world. These inconsistencies and challenges point to the need for improved understanding and measurement of pregnancy intention across study settings and outcomes.

1.5 Conceptual Framework of the study

Figure 1 shows the pathways by which unintended pregnancy influences maternal health behavior and child health. The framework is adapted from Gipson et al (2008), who developed a conceptual framework of the effects of unintended pregnancy on maternal, child and parental health after a comprehensive review of litreatures on the subject. It is hypothesized that unintended pregnancy may lead to a range of health consequences with respect to maternal behavior during pregnancy such as delayed or non use of prenatal care and delivery care, depression and anxiety during pregnancy and domestic violence against women. Through its effects on maternal health behavior in pregnancy, unintended pregnancy may also influence birth outcomes – prematurity and low birth weight. Unintended pregnancy is also related to maternal postpartum

behaviors such as breastfeeding, and use of preventive and curative care for the child and the mother herself. Through its effects on maternal behavior during pregnancy and the postpartum period, it may affect the health outcomes of infants and children contributing to child morbidity and mortality, poor nutritional status, and reduced child growth.The health impacts of unintended pregnancy may also be persistent extending into childhood and later adulthood. Although there is research on consequences of unintended pregnancies that result in abortion or miscarriage, in this study we focus mainly on the consequences of those unintended pregnancies that are carried to term. There are several other social, demographic and health care related factors related to unintended pregnancy and each of the health behaviours and healthoutcomes we study. Among social factors, we consider the influnces of women's autonomy, social support, household wealth status and related factors on maternal health behavior and child health.

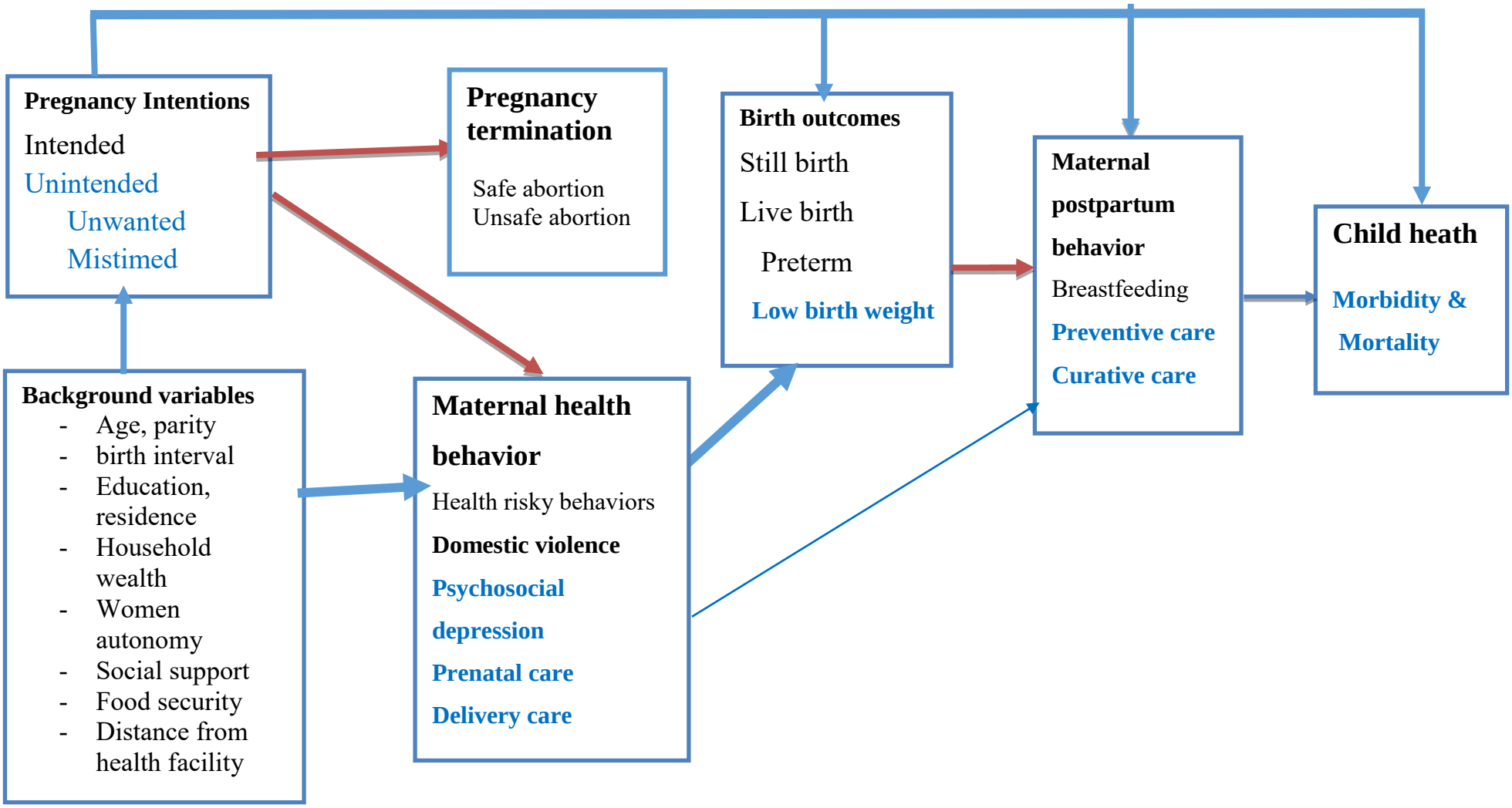


Figure 1: Conceptual framework of the effects of pregnancy intention on maternal health behavior and child health, Adapted from Gipson et al, 2008

2.0 Research Questions and Objectives

2.1 Research Questions

1. Do women with unintended pregnancies differ from those with an intended pregnancy interms of maternal health care utilization?
2. Are women with unintended (unwanted) pregnancies more at risk of depression during pregnancy than women with intended pregnancies?
3. Are children from unintended (unwanted) pregnancy less likely to receive preventive and curative health care compared to births from an intended pregnancy?
4. Do women's pregnancy intention and related maternal health behaviours contribute for low birth weight?

2.2 Objectives

2.2.1 General Objective

The overall purpose of the study was to examine the effects of pregnancy intentions on maternal and child health and health behavior in Gilgel Gibe DSS area, Jimma Zone, southwest Ethiopia.

2.2.2 Specific Objectives

1. To determine the magnitude of unintended pregnancy and its associations with the use of maternal health services.
2. To examine the relationship between unintended pregnancy and child health care and survival.
3. To determine the magnitude of depressive symptoms and its association with pregnancy Intention and related maternal and household factors.
4. To determine the effects of pregnancy intention and pregnancy related maternal behaviors on birth weight.

3.0 Methods

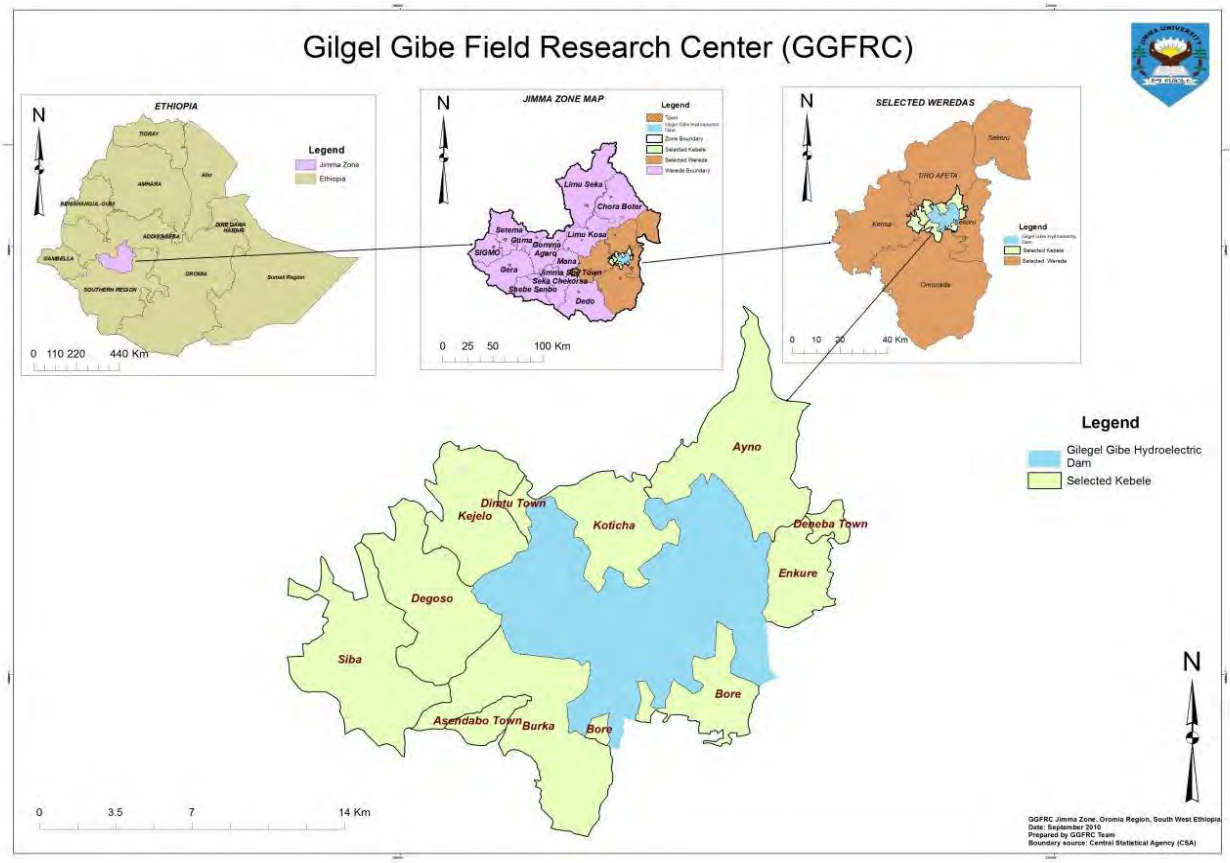
3.1 The Study Setting

The research setting is Gilgel Gibe area of Jimma zone, Oromia region, an area located at about 260 Kilometers to the Southwest of the capital (Addis Ababa) of Ethiopia and currently used by Jimma University as a Demographic Surveillance Site (DSS). Jimma Zone is one of the 18 zones in Oromia region located in the western part of the region. The areas within 10 kilometers distance from the reservoir of the Gilgel Gibe Hydro-electric Power Dam and consisting of eleven Kebeles[1] (including three urban Kebeles) has been selected by Jimma University as a field research center (Demographic Surveliance Site)**.** The Gilgel Gibe DSS begun in 2005 in ten kebeles which are found in 4 districts surrounding the dam – Omo Nada, Dimtu, Kersa and Sekoru. The area is predominantly rural and the population relies primarily on subsistence farming. There are three small towns with in the DSS; namely Asendabo, Deneba and Dimtu, the later was separated from Kejelo kebele and included as a separate urban kebele recently. There are three health centres (Asendabo HC, Deneba HC and Dimtu HC) located in those three towns within the DSS area.The health centers provide curative and preventive health services including antenatal care, delivery care, vaccination and other maternal and child health services. Moreover, every kebele in the DSS has a health post staffed with two health extension workers.

A census was conducted in all the kebeles in the DSS area to provide baseline information for the demographic surveillance in 2005.Since then, a demographic surveillance has been going on in the area where data on vital events, pregnancy, birth outcomes, and causes of death/verbal autopsy are collected on a continuous basis. But, since 2012, data collection is done quarterly. Data collection is done by trained enumerators, who are based in the DSS villages. The population of the DSS area was about 55,000 in 2011, of which 72% were rural. Over 80% of the population in the area are Muslim by religion and Oromo by ethnicity. The area has a total fertility rate of 5.0

[1] Kebele is the smallest administrative unit in Ethiopia

with a population growth rate of 2.7% (147, 148). With this rate of growth the DSS area will have a population of about 60,000 by 2014.



Source: Gilgel Gibe Field Research Centre, Jimma University.

3.2 Study Design

This is a mixed methods study involving quantitative and qualitative methods of data collection. The quantitave study, which is the major source of data for this study, involved a cross-sectional survey among women with recent live births and a prospective study in which pregnant women were followed from pregnancy through to delivery. A qualitative study was also included to understand the perceptions and experiences of women on unintended pregnancies and its outcomes. Focus group discussion was the major source of data for the qualitative study.

3.3 Sample Size and Sampling Method

The quantitative study involved a cross-sectional study of women with a recent live births and follow-up study among pregnant women.The cross-sectional survey was conducted to assess the relationship between pregnancy intention, maternal health care and child health and addressed two of the study objectives. The target populations for the cross-sectional study were women who had a live birth in the two years before the survey. They were randomly selected from the list of women with a live birth in the last two years from the DSS registration.The DSS registration data, updated with additional listing of births after the last round of DSS data collection, was used as a sampling frame for this study, and sample size was allocated to each of the 11 kebeles based on sampling probability proportionate to size technique.

Sample size for the cross-sectional study was calculated using STATA statistical software (STATA Corporation, 2009) version 11.0 and using the assumptions given in Table 1. A formula of sample size for test of differences in proportions was used to calculate the sample size. Moreover, a confidence level of 95% and power of 80% were applied. The largest sample size calculated for the cross-sectional survey was 1456, and thus this sample was used for the crossectional survey (Table 1).

The information used for the sample size calculations was partly obtained from the literature; however, because of the lack of appropriate data we made several assumptions. The following assumptions are made in calculating sample size for the first objective which considers antental care utilization as an outcome variable. Based on the 2005 EDHS data, 28% of women used antenatal care for their most recent birth(149). Since the latest EDHS (2011) result was not released at the time the study proposal was submitted, we assumed that antenatal care use will be higher than 28%, and to be more conservative in our sample size calculation, we assumed 50%. Although the difference in ANC use was 4% for the national level in EDHS 2005, the difference at the region (Oromia) level was higher (6.4%) between women with intended and unintended pregnancies. Moreover, one previous study using data from Jimma and Yirgalem towns in southern Ethiopia found a difference in ANC use of 16% between

women with intended pregnancy (77%) and unintended pregnancy (61%) [45]. we then assumed that a difference in ANC use ranging from 4% to 16% is possible, and a difference of 8% between the two groups is considered. Similar assumptions were made for the other objectives (Table 1).

The follow-up study was conducted to determine the effects of unintended pregnancy and related maternal behaviours on birth weight. The main outcome variables for the follow up study were 1) maternal depression during pregnancy and 2) low birthweight. The target population of the cohort study were pregnant women living in the eleven kebeles in Gilgel Gibe DSS area. The assumptions used in the estimation of sample size for the cohort study is shown in Table 1. Since the second outcome variable (low birth weight) gave us the largest sample size, we used sample size of 627 for the cohort study. Because the number of pregnant women registered in the DSS area at the time was only 708, we decided to include all pregnant women in their second and third trimester of pregnancy over the 2 months baseline data collection period. Thus, the cohort study included all pregnant women in the second and third trimester of pregnancy living in the DSS area. However, those women who were ill and can not respond to the study questionnaire were excluded. Then follow up was made from the time of the baseline survey through to delivery (June 2012 to February 2013).

Table 1: Sample Size Calculations and its Assumptions

Objectives (Outcome)	Study design	comparision of interst	Outcome proportion in groups	Sample size (n) including non response rate
Maternal health care (ANC)	Crossectional comparative α=5%, power=80%	intended vs unintended pregnancies	P1=50% P2=42%	n_1 = 723 n_2 =723 total = **1456**
Completion of childhood vaccinations	Crossectional comparative α=5%, power=80%	Intended births vs unintended births	P_1=20% & P_2=13%	n_1 = 540 n_2 =540 total = **1080**
Treatment up on illness	Crossectional comparative α=5%, power=80%	Intended births vs unintended births	P1=40% & P2=32%	n_1= 539 n_2= 539 Total = **1078**
Depression during pregnancy	Follow up study α=5%, power=80% (exp:nonexp ratio 1:2)	intended vs unintended pregnancies	P1=10% & P2=20%	n_1 = 174 n_2 = 348 total **= 522**
Low birth weight	Follow up study, α=5%, power=80% (exp:nonexp ratio 1:2)	intended vs unintended pregnancies	P_1=14% & P_2 =24%	n_1= 209 n_2= 418 Total **= 627**

3.4 Study Population

The source population for the cross-sectional survey were women, of age 15–49 years, with a live birth in the two years before the survey date (March 2012) living in the DSS area. Since the DSS collects vital events data through an update of multiple times in a year; we were able to obtain the list of women with live births in the two years (January 2010- January 2012) before the survey. We updated the list by including women with

births since the last round of DSS registeration by making a census. However, women who have recently given birth (in less than a month of beginning of data collection) were not included because of the culture that postpartum women are mostly expected to stay inside until a month after delivery. Accordingly, in the DSS area consisting of over 55,000 people, there were 3293 women with live births in the 2 years before the survey date (January 2010- January 2012), of which 1456 were randomly selected for this study. Participants for this survey were then drawn from eleven kebeles[a] using a simple random sampling procedure and based on sampling proportionate to size technique. All households in the DSS area have a unique household identification number, and we used this number to randomly select households in SPSS. Then, guides recruited from the local communities assisted interviewers to locate the selected household and the women to be interviewed.

The source population for the follow up study was all pregnant women residing in the Gilgel Gibe DSS area. The study population was pregnant women in the 2nd and 3rd trimester of pregnancy living in the eleven kebeles in the DSS area. A house to house listing was done to register new pregnant women and to update the DSS list. In some Kebeles, listing of pregnant women was supported by Health Extensions Workers and 'women's development army' group because of the difficulty in identifying pregnant women. Gestational age was determined by asking the last normal menustral period (LNMP). A total of 642 pregnant women with a pregnancy older than three months were identified of which 627 were included in the present study. We also excluded pregnancies reported to be less than 3 months in the absence of a pregnancy test.

3.5 Data collection

3.5.1 Quantitative Data Collection

As mentioned above, the quantitative data collection of this research involved a cross-sectional survey and a follow up study. Data collection for the Cross-sectional survey was conducted from March 1 to April 30, 2012, while the baseline survey was conducted from June to July, 2012 for the follow up study. For both the cross-sectional

and baseline follow up surveys, we selected trained and employed ten female data collectors who have had at least a college diploma in Clinical Nursing or related fileds. They were given four days of intensive training which focused on the content of the questionnaire, the different scales, learning to administer the questionnaire and ways of addressing questions that could arise during the interview. The training was given in the form of discussions, role plays and field practice to pilot- test the questionnaire. A manual describing each of the questions and scales was prepared and explained during the four days of training.They were supervised by supervisors with at least a diploma level training and an experience in survey supervision. Supervisors attended the same training and received additional guidance on their role, about sampling techniques, mechanisms for supporting interviewers, following up non-responses and quality control procedures like spot checks.They checked the completeness and consistency of the responses on the spot. One supervisor supervised five data collectors. Training of data collectors and supervisors included the care to be given for pregnant women while collecting data for the cohort study. Interviews were not conducted when the pregnant women felt week or ill, was brief and short. In the case of illness, interviewers and supervisors were advised to provide information about where to seek for care.

With the cross-sectional survey, we collected data on pregnancy intention, maternal health care, child health care and survival including vaccination, illness in the two weeks before the survey and health care seeking, women's autonomy and household food security situation. The baseline survey was done to assess women's pregnancy intention and related maternal behaviours including presence of depressive symptoms, social support, use of antenatal care, experience of any pregnancy related morbidity, presence of domestic violence and measured maternal MUAC size.They were followed from pregnancy (the baseline survey) through to delivery to determine the effects of unintended pregnancy and related maternal health behaviours on birth weight.

All birth weight measurements were made within 72 hours after birth using Seca scale with accuracy within 10 gram. The scale was always checked and calibrated before weighting. The measurement was done by DSS data collectors and guides who were

based in each village. A one day training was given before the baseline survey on the pourpose of the study, identifying pregnant women for the study, and how to caliberate and make birth weight measurements using Seca Scale.The birth weight data collectors were informed by village informants and Health Extension Workers soon after the women delivered. These activities were closely supervised by the DSS supervisors who also live and work in the DSS villages. Data collectors who conducted the birth weight measurment also completed a short form prepared to capture birth outcome. The short form asks questions about date of delivery, place of delivery, sex of the newborn, pregnancy outcome (live birth, still birth), date of birth weight measurement, time at measurement (in hours) after birth, the weight of the newborn, whether the child is still alive and whether the mother used ANC during pregnancy.

3.5.2 Qualitative Data Collection

To adequately describe and understand the dynamics of unintended pregnancy, and its individual and familial impacts, qualitative study is important. The qualitative study also served as a means to understand and provide an explanation to results that emerged from the quantitative analysis. Acordingly, eight focus group discussions (FGDs) were conducted after the surveys. The focus group participants were women with live births in the past three years, pourposively selected from the community in Gilgel Gibe area, and were categorized based on parity (above three children), and rural-urban residence forming different discussion groups. We conducted 8 focus groups discussions, four each in rural and urban areas disaggregated by parity. There were a total of 62 participants in the FGDs (32 rural and 30 urban). Each focus group consisted of an average of 8 participants (ranges of 6-10 participants). An FGD field guide was developed, pretested and used for conducting the FGD.

The principal Investigator along with two research assistants conducted the qualitative study. The research assistants were fluent in the local language and had MPH degree in Public health with prior experience in qualitative data collection. They were trained on how to conduct the qualitative study –on the informed consent process, administration of the field guides and moderating techniques. The Principal investigator, along with one

research assistant moderated the discussion while the other research assistant took notes.

3.6 Definitions and Measurement of Variables

3.6.1 Outcome variables

The main outcome variables of the study were maternal health care, presence of depression during pregnancy, birth weight and child health care and survival. These outcome variables are defined and measured as follows;

Maternal health care: refers to use of any antenatal care during pregnancy and whether women delivered their last child at a health facility. Women were asked whether they have used antenatal care during their most recent pregnancy, whether they delivererd at a health facility, and who assisted them during delivery. These variables were measured on a binary scale as 'yes' for those who used the services, and 'no' for those who did not use the services. For antenatal care, we also collected information on the timing and number of ANC visits to examine whether women made the recommended four or more ANC visits and started ANC in the first trimester of pregnancy.

Depressive symtpoms were measured using the Edinburgh Postnatal Depression Scale (EPDS), which describes depression as cognitive and affective features that last for at least one week, including the inability to laugh, the inability to look forward to things with enjoyment, blaming oneself unnecessarily, anxiety or worry, being scared or panicky, the inability to cope, difficulty sleeping, feeling sad or miserable, crying, and thoughts of harming oneself (150). The EPDS is widely used and has been validated for use during pregnancy in different countries and settings (151-155), including urban and rural Ethiopia (153, 156). The items were scored on a scale of 0-3, allowing a total score ranging from 0 to 30. Like other previous studies that used EPDS cut of point of 13 and above (92, 157), we used a cut of point of 13 and above on the scale to identify women with high depressive symptoms.

***Low Birth weight*:** the WHO definition of a birth weight of less than 2500 gram was used (116). Birth weight of all births to women followed through the follow up study were

measured within 72 hours of delivery using Seca scale. Weight was done using seca scale as a continous outcome but was later recoded based on the set standard (2500 gm).

Child Health Care**:** Includes whether a child had received all childhood vaccinations and received treatment at health facility for the most recent illness in the 2 weeks before the survey**.** For childhood vaccination**,** we used the WHO definition for full vaccination which states that children are considered to be fully vaccinated when they have received a vaccination against Tuberculosis (BCG), three doses each of DPT-HepB-Hib vaccine and Polio vaccines, and a Measles vaccination by the age of 12 months. Similarily, women were asked whether their child had fever, diarrhea, and cough with short breathing in the two weeks before the survey, and whether they have taken their child for a treatment to a health facility.

Child mortality*:* whether the child is still alive at the time of the survey or not. All women participating in the cross-sectional survey were asked whether the child is still surviving or not.To estimate mortality, we collected birth histories data for all births in the two years before the survey. Date of birth, date of death and months and years of death data were collected.

3.6.2 The Explanatory Variables

Pregnancy Intention*:* whether the pregnancy was intended or not. A pregnancy is considered as unintended if it is either mistimed (occurred sooner than the women wanted) or unwanted (occurred when the woman did not want to have any more pregnancies at all).

Pregnancy wantedness: whether the pregnancy was wanted or not at conception**:** This variable compares all those pregnancies that were wanted now or later (intended and mistimed) against those that were reported as unwanted. This is because the motivation to avoid pregnancy is different among the two categories of unintended pregnancy.

Apart from pregnancy intention and wantedness, we used other demographic indicators of fertility behaviour, including parity (parity of 5 and above indicating excess fertility),

birth interval or number of under-five children in a family and attitudes towards the pregnancy.

Several other Independant variables were included to assess the independent effects of the exposure variables on the outcomes of interest controlling for potentially confounding effects of some individual background and household characteristics. Accordingly, we included demographic, socio economic, reproductive health behavior and women's autonomy indicator variables based on their relationship identified in literature. Among socio-demographic factors, women's age, education, place of residence, wealth status, women's participation in decision making and distance from health facility were included. The presence of partner violence during pregnancy, use of maternal health care, social support, food security status and maternal anthropometry were included in the studies on depression, birthweight and child health. These variables were defined and measured as follows:

***Wealth index*:** was used as a relative measure of socio-economic status. It was computed from ownership of the following household assets: radio, television, electricity, refrigerator, bicycle, motorcycle, car, type of floor, type of wall material, type of roof material, toilet facilities, farm land, and of domestic animals such as cattle, sheep, and goats.

Women's autonomy (women's participation in decision making): was measured by asking the DHS questions on; "who makes decisions in your household about: (1) obtaining health care for yourself; (2) large household purchases; (3) household purchases for daily needs; and (4) visits to family or relatives?". The responses were: (1) respondent alone, (2) respondent and husband/partner (3) husband/ partner alone, (4) someone else. Women were considered to participate in a decision if they usually make that decision alone or jointly with their husbands. Then a composite index was constructed by grouping women into two categories: women who have any say (alone or jointly) in all four household decisions, indicating a higher level of empowerment, and women who do not have any say in one or more decisions.

Food security – Household food security status was measured with a six- item scale based on previously validated measures in developing countries (158). Women were

asked whether because food ran out or money was not enough to buy food, in the last 3 months, they: (1) worried about running out of food, (2) ran out of food, (3) reduced the variety of food for their children, (4) did not have enough food to give their children to eat, (5) spent the whole day without food, and (6) or anyone else in the household had ever had to ask others for food or money to buy food. For each item, 'yes' was coded with "1" and no coded as "0" and a summative index of food insecurity was created. Households were classified as 'food-insecure' if the respondent answered affirmatively to two or more of the six household food security questions.

Social support- the presence of social support from family, friends and husband during pregnancy was measured using the Maternity Social Support Scale (MSSS) developed by Webster and colleagues (159). The scale contains six items and each item was measured on a five-point likert scale, with a total score of 30. We classified social support in to two categories based on the mean score; high social support (for scores above 23), and low social support (below 23) categories.

Intimate partner physical violence was measured by asking women whether they have ever been beaten during the current pregnancy by their husbands or partners.

Mid Upper Arm Circumference (MUAC) measurements were made during the baseline survey using MUAC tape and following standard procedures. MUAC was measured during pregnancy as a proxy for maternal nutritional status. It was measured to the nearest 0.1 cm following standard procedures. A cut off point of 230 mm was used to show poor nutritional status.

Distance from health facility: all women participating in the study were asked how long it takes to reach to the nearst health center when walking on foot. This was measured as a continous variable (in minutes/ hours) but later recoded in to two categories (less than an hour and more than hour walking distance).

Other independent variables included were age (measured as continous variable but later recoded to 3 categories of 15-24, 25-34 & 35 and above), education (recoded to 3 categories as no education, primary and secondary and above), parity, place of

residence, experience of pregnancy related morbidity and experience of pregnancy loss.

3.7 Instruments of Data Collection

For the purpose of data collection, we used structured questionnaire for the survey and unstructured FGD guides for the qualitative study. The structured questionnaires were adopted from standard and validated instruments previously used in the measurement of pregnancy intention and other key variables. This included Questionnaire from the DHS, the National Survey of Family Growth (NSFG), the Edinburgh Postnatal Depression Scale (EPDS), the Maternity social support scale and the food security scale. In addition to questions for socio-demogrphic variables such as wealth index, we used the standard DHS questionnaire for pregnancy intention, which categorizes pregnancies as intended, mistimed, or unwanted based on the question: 'At the time you became pregnant, did you want to become pregnant then, did you want to wait until later, or did you not want to have any (more) children at all'?

To measure maternal depression during pregnancy, we used the Edinburgh Postnatal Depression Scale (EPDS). Though there are several scales to assess common mental disorders, the EPDS is the most widely validated screening instrument for depression in pregnancy and the postnatal period across a range of cultural settings [71]. There are also published validation data from several countries in sub-Saharan Africa including Ethiopia [72, 73]. Moreover, the EPDS was designed specifically to detect depression during pregnancy and the postpartum period. A psychiatrist checked the translation and back translation of the depression questions. Moreover, considering the difficulty in understanding items 1 to 3 of the depression scale (EPDS), we used examples suggested and applied by Hanlon and colleagues in their validation study in Butajira [45]. The internal consistency of the EPDS was tested using Cronbach alpha and was found to be adequate (alpha of 0.85).

We used the Maternity Social Support Scale (MSSS) developed by Webster and colleagues (159) to measure social support in pregnancy due to its simplicity and ease

for use. The scale contains six items and includes questions on family support, friendship network, help from spouse, conflict with spouse, feeling controlled by spouse, and feeling unloved by spouse.It was carefully translated to Oromo language and back translated to English, and has been pre- tested before use. The internal consistency of the MSSS was tested using Cronbach alpha and was found to be adequate (0.74).

The questionnaire was pre-tested on 5% of the sample in both the cross-sectional and follow-up study in Bulbul kebele - a different setting than the Gilgel Gibe DSS. The main purpose of the pre-test was to ensure that the respondents are able to understand the questions and answer them usefully. We conducted the pre-test and made necessary modifications on its contents, ordering and clarity of the questions before the survey. For the qualitative study, an open ended FGD topic guide was used. The FGD guide was also pre-tested before use for the actual data collection.

3.8 Data Quality Control and Management

Different mechanisms were used to ensure the quality of the data. First, the questionnaire was translated to local language (Oromo language) and back translated to English for consistency. A pre-test was made to improve on their clarity, ordering, and nature of questions. On the field, supervisors helped the interviewers with difficult situations and made sure that they are actually doing their work. Supervisors reviewed each of the questionnaires after the interview, identifying inconsistencies and skipped questions. At the end of each day's interview, the researcher reviewed some of the questionnaire. Questionaires with errors or inconsistencies were sent back to the filed for checking. Moreover, the data collected were entered into computer software (EPI Data) immediately after the questionnaire is reviewed. The questionnaire was double entered in EPI data and EPI data validation checks were used to check for inconsistencies in data entry. Then data cleaning and checks for errors or of inconsistency of responses were done. After data entry was completed, we looked at the frequcncy distribution of variables to recheck for missing values, outliers, and other data errors. Errors found in data entry were validated against the questionnaires and corrections were made before analysis.

3.9 Data Analysis and Management

3.9.1 Quantitative Data Analysis

Data were entered to EPI Data software and were exported to STATA 11(StataCorp, College Station, TX, USA) for analysis. Then appropriate univariate, bivariate and multivariate statistical analysis were done using STATA version11. First, we conducted univariate analyses of each of the measures, checked for data irregularities and examined the feasibility of the proposed analytic plans based on the distributions of the variables. Univariate analysis was made using mean, median, standard deviation, frequency and percentage distribution and graphs. Where necessary, estimates of population parameters were presented with their 95% confidence interval. Transformation of variables was made where necessary following some standards used in the literature and also based on the distribution of the data. Bivariate analysis was done to test the association between the dependant and independent variables. For bivariate tables, statistical significance of categorical variables is measured by the chi-squared p-value. Variables were included in to the multivariate model based on association of the variable to the outcome variable as found in literature and based on their association at the bivariate analysis level. Variables with a chi-squared p-value less than 20% were included in the multivariate models. But, statistical significance was tested at the level of 5% at the multivariate level. Multivariate analyses were done to identify the independent effect of the main explanatory variable (pregnancy intention) on the outcomes of interest after adjusting for several other confounding variables. Adjusted Odds ratios/relative risks and 95% confidence intervals were reported.

At the multivariate level, we applied different statistical models based on the nature of the outcome variables. Two of the outcome variables (maternal health care and child health care) were measured as categorical outcome variables, while the remaining were recoded to categorical/dummy outcomes based on some set standards. Accordingly, multiple logistic regression and multinomial logistic regression analysis were employed for these categorical outcome variables.Maternal depression was measured on a scale of 0 to 30, but was later categorized (based on EPDS score of 13 and above) in to two

– had depressive symptoms or not. Then logistic regression model was fitted to identify the association between pregnancy intention, other independent variables and depressive symtpoms.

Birth weight was measured on a scale and as a continuous variable. However, we categorized birthweight into low birth weight and normal birth weight based on the WHO definition of LBW. Then log-bionomial regression was used to model the risk of low birth weight. Log-bionomial regression, which gives relative risk than odds ratio, is preferred over the usual logistic regression because it was found that odds ratio overstates the relative risk for cohort studies of common outcomes (>10%) (160, 161). Moreover, survival analysis was used to compare the differences in mortality of children born to women with live births in the two years before the survey. Poisson regression was used to determine the association between pregnancy intention, other socio-demographic and health care related variables and child mortality. Accordingly, Incidence rate ratio and its 95% confidence intervals were reported.

Assumptions of all the statistical models and model fitness have been checked before running the analysis. For logistic regression, model fitness was checked using the Hosmer and Lemeshow goodness of fit test. For log binomial and poisson regression, we used AIC and deviance tests (160). Moreover, where appropriate we assessed the potential for moderation (interaction) and mediation effects of variables using recommended procedures (162). Examples of interactions tested include the correlation between pregnancy intention and parity in the models for maternal health care and child survival. Other examples include interactions between depression and pregnancy intention in predicting low birth weight. The presence of mediation effects was checked for depression and social support in predicting LBW. Moreover, the existence of multicollinarity effect in the model was checked using variance inflation factor (VIF) and found out that there was no multicollinarity effect (none had VIF above 10).

The wealth index was constructed using Principal Component Analysis (PCA) as an indicator of living standard from variables related to ownership of household assets, farm land, number of livestocks, materials used for housing construction, and ownership

of improved water and sanitation facilities. Twenty variables were included in to the PCA of which 11 were retained after dropping variables whose commonality scores were below 50%. Three principal components with eigen- values greater than one, and a total explained variance of 76%, were summed up to construct wealth tertile. The resulting index was then divided into three categories representing poor, middle and wealthy.

3.9.2 Qualitative Data Analysis

The qualitative data for the present study was collected through focus group discussion. Unstructured FGD guide was used to lead the discussions and these were then followed up using the respondent's own words and phrases to elicit further narration. All focus group discussions were conducted in the local language (Oromiffa) and audio recorded by the qualitative interviewers, after obtaining the consent of participants. Following each of the FGDs, the audio tapes were transcribed verbatim, and then translated to English before analysis.Transcription of the audio-record was done by the two research assistants along with the prinicipal investigator. Moreover, a careful translation to English was made by the research team.The analysis was done manually following thematic content analysis approach. The pourpose of the qualitative study was to describe the findings of the quantitative study and the context. Thus, for analysis, we used our research questions to group our data and then looked for important decriptions and quotes from the data.

3.10 Ethical Considerations

Ethical clearance was obtained from the ethical review committee of the school of Public Health and Institutional Review Board of the College of Health Sciences, Addis Ababa University. Moreover, permission (letter of support) to conduct the study was obtained from the regional health bureau and district offices before the data collection process started. Participation in the study was completely voluntary, and an informed oral consent was obtained from each study participant. Consent was asked in private after the interviewers shared the information sheet with the participant and before any survey questions were administered. Consent forms were prepared and read in the

participant's first language. With the consent form, participants were informed of the potential benefits and risks of the study. Potential risks associated with participation in the study were very minimal. There were no diagnostic procedures nor did blood sample required for this specific study.The number of potentially sensitive questions were very limited given the study topic. Data collectors were all females with a secondary and above level of education, trained intensively on data collection procedures and ethical issues.

Moreover, study participants were assured by the data collectors that interviews were completely voluntary, all data will be kept confidential and that their names will not be linked to the data in any way. They were told that questions can be skipped or the interview can be stopped at any point if they feel uncomfortable. Interviewers and supervisors were trained to take care of all ethical issues afformentioned. For all women participating in the study and particularily pregnant women in the follow up study, attempt was made to provide information about where to seek for health care in the case of morbidity or pregnancy related problems. Data collectors and supervisors were trained in such a way that they advise them to visit the nearst health institution.

Participants in one of the FGDs

Table 2: Summary table of the four papers and methods for the effects of pregnancy intentions on maternal health behavior and child health, SW Ethiopia, 2012/2013

Papers	**Study design**	**Study population**	**Sample size (**planned & actual)	**Data Collection Method**	**Data Analysis**
1. Associations of unintended pregnancy with maternal health care	Cross-sectional study, Qualitative study	Women with live birth in the two years before the survey	1456 women (1370 women Interviewed) 8 FGDs	Interview FGD	Descriptive, Logistic / multinomial logistic regression Thematic analysis
2. Associations of unintended pregnancy and depressive symptoms in pregnancy	Baseline survey of the prosepctive study	Pregnant women	627 women (622 interviewed)	Interview and measurement	Descriptive, logistic regression
3. Effects of unwanted pregnancy and pregnancy related maternal behaviors on the risk of LBW	prospective study	Pregnant women & newborns	627 women (537 birth weights)	Interview and measurement	Descriptive & log-binomial regression
4. Effects of unintended pregnancy on child health care and survival	Cross-sectional survey	Women with a live birth in the two years before the survey	1456 women (1382 births)	Interview	Descriptive , multinomial logistic and Poisson regression

4.0 Results

4.1 Characteristics of the Study participants

Of 1456 women eligible for the cross-sectional survey, 1370 were successfully interviewed with a response rate of 94%. The non-responses included refusals to participate (37), failure to find after repeated visits (18), failure to participate due to illness (8), and rejection of questionnaires for inconsistency and incompleteness (23). Similarly, 622 of the 627 women selected for the follow-up study were involved in the baseline survey, and 612 (97.6%) of them were followed through to delivery. Of the 612 pregnancies that were followed to delivery, birth weights of 537 births were measured with in 72 hours of birth and included in this analysis. The remaining 85 were not included because of failure to take weights within 72 hours (n=37 births), occurrence of still births, multiple births, early neonatal death and miscarriage (Figure 1).The mothers of included and excluded births were not different in terms of key socio-demographic variables.

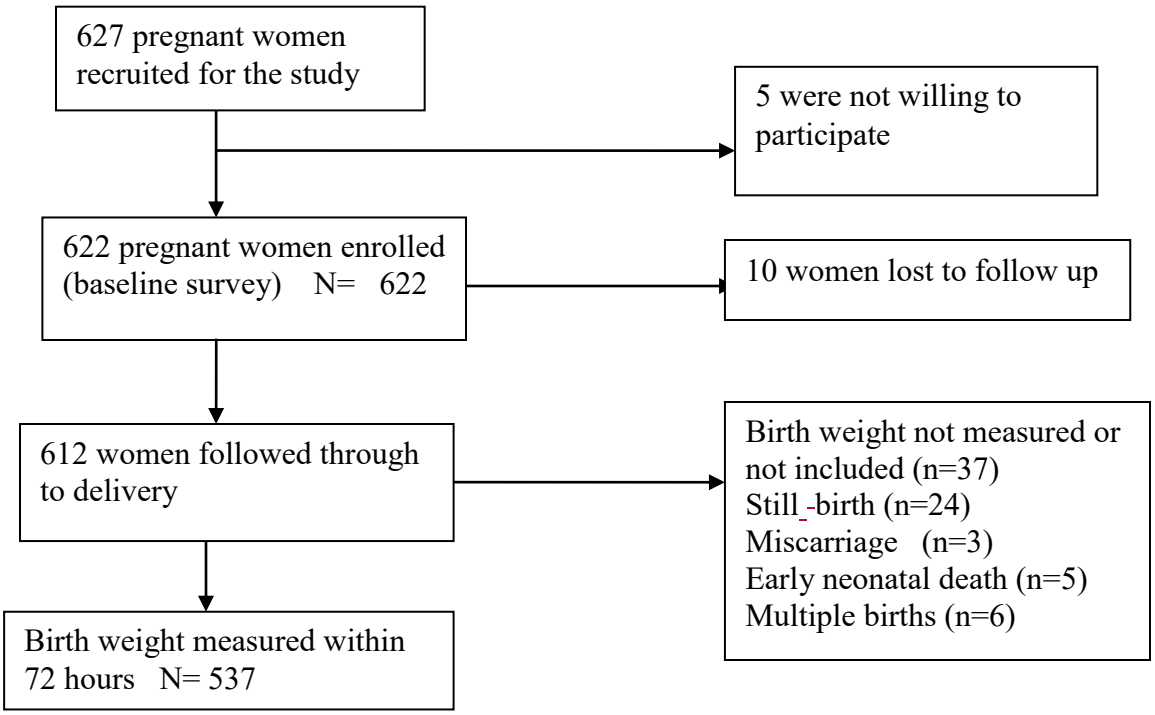


Fig 2: Flow chart showing the cohort and birth weight measurement

Table 3 shows the characteristics of the study participants for both surveys. The median age of the study participants was 27 years for the cross-sectional study, and 25 years for the baseline survey respectively. About 58% of the study participants were in the age ranges of 25-34 years. In both surveys, over 70% of study participants were from rural areas, more than 98% were married and more than two-thirds had no formal education. More than half of all women (53% in the cross-sectional study and 59.6% in the baseline survey) reported that they participate in all four household decisions. The average number of children ever born was 4.3(±2.3) for the cross-sectional study and 3.4 (±2.38) for the baseline survey. About 37% of participants in the cross-sectional survey had more than five children compared to 23.5% in the baseline survey. Over 50% of women who participated in the surveys lived in more than an hour walking distance from health centers. Household food security status varied with the two surveys; 25% in the cross-sectional study (March and April) and 41% in the baseline survey conducted in June and July.

Table 3: Characteristics of the study population in the two surveys, SW Ethiopia,2012

Socio-demographic Variables	Cross-sectional study		Follow-up study	
	N	%	N	%
Age of the mother				
15-24	373	27.2	207	33.3
25-34	790	57.7	360	57.9
35+	207	15.1	55	8.8
Marital status				
Currently married	1342	98.0	618	99.4
Divorced or widowed	28	2.0	4	0.6
Religion				
Muslim	1266	92.4	591	95.0
Christian	104	7.6	31	5.0
Educational status				
No formal education	1021	74.5	447	71.9
Primary	305	22.3	146	23.4
Secondary & above	44	3.2	29	4.7
Residence				
Rural	1012	73.9	475	76.4
Urban	358	26.1	147	23.6
Wealth tertile				
Low	457	33.4	208	33.4
Middle	458	33.6	207	33.3
High	455	33.2	207	33.3
Participation in household decisions				
No	643	46.9	251	40.4
Yes	727	53.1	371	59.6
Number of children ever born				
0	-		95	15.3
1-2	406	29.7	187	30.1
3-4	462	33.7	194	31.2
5^{+}	502	36.6	146	23.5
Mean	4.3		3.4	
Distance from health center				
< 1 hour	685	50.0	251	40.4
≥ 1 hour	685	50.0	371	59.6
Household food security status				
Food secure	1024	74.7	365	58.7
Food insecure	346	25.3	257	41.3
Total	1370	34.9	622	41.0

4.2 Levels of Unintended Pregnancy

The level of unintended pregnancy varied between the two surveys. In the cross-sectional survey, women reported that 35% [95% CI, 32.5-37.5] of the live births in the 2 years before the survey were from unintended pregnancy. The proportions of mistimed and unwanted pregnancies were 25% [95% CI, 22.8-27.4] and 10% [95% CI, 8.6-11.8] respectively. The proportion of women who reported unintended pregnancy in the follow up study was higher at 41% [95% CI,37.1 - 44.9] ; 28% [95% CI, 24.7-31.8] was mistimed while the remaining 13% [95% CI, 10.5-15.7] was unwanted (fig 2). In both cases a higher proportion of the unintended pregnancies were mistimed pregnancies.

Fig 3: Levels of Unintended pregnancy in two surveys, southwest Ethiopia, 2012 (n=1370 for the cross-sectional study and 622 for the follow-up study)

In the qualitative study, FGD participants mentioned that unintended pregnancy is common in their community. They described unintended pregnancy as a 'pregnancy that happens when a woman has no plan to have a child at that moment'. They described it as a pregnancy that happens sooner after the previous pregnancy, a pregnancy that happens to unmarried girls and or older women and a pregnancy after 'contraceptive failure'. Some participants mentioned that there are women who become pregnant before their menses return. For instance, a 32 year old woman, mother of 7, explains how she got pregnant with the last pregnancy;

"I thought I had enough children when I found myself pregnant with my last child, even before I saw my menses. I did not want to be. I went to market and bought a drug and took it with an intention to terminate the pregnancy. However, the pregnancy continued and I gave birth. I was very sad because we were struggling to bring up the six children".

Some FGD participants also pointed out that providers deny family planning unless they prove the return of menses, and as a result women get unintended pregnancy. One FGD participant, age 27 and mother of 4 mentioned;

"When we go [to health facility] for family planning after delivery, providers deny giving us family planning unless we show the menses (bleeding). I was denied a method at the health post for my menses were not seen a year after the birth of my child, and was pregnant three months later. Unfortunately that pregnancy was lost".

In the FGDs conducted with high parity women, women mentioned that they already have more children than they wanted. They point out economic challenges as the reason for demanding fewer children than they already have. In some FGDs, mainly urban, discussants mentioned that there are women who became pregnant while using a family planning method. Some mentioned cases of contraceptive failure that led to unintended pregnancy. A 31 year old woman, mother of 5, explains how she got pregnant three years ago while using family planning,

"I became pregnant for the sixth time while I was on a pill. I came to the health center to be sure, and they told me [I was pregnant, three months]. I told the Nurse that I did not want the pregnancy, he advised me to go to the hospital [Jimma] if I wanted to terminate. I did not go for abortion, but was later admitted to a hospital for a serious illness in which the pregnancy was lost [miscarried]."

Likewise, the contraceptive behaviour of women before the index pregnancy collected in the two surveys showed that more than 83% of women were not contracepting before their last pregnancy, while 11% reported inconsistent use. Method failure was mentioned as a cause for unintended pregnancy among 4% of the study participants in the baseline follow up study. In the qualitative study, the reasons for not using

contraception were discussed and fear of side effects turns out as the main reason for not using. Discussants mentioned that injectables and pills 'make them sick'. The side effects most mentioned were irregular bleeding *or* spotting, absence of menses 'gogsa', and tiredness for injectables.

A 35 year old woman, mother of 8 said;

"I used to take the injection one. But, my menses did not stop for some time. I went back to health center and told them the problem. They tried to reassure me it will stop soon, but it did not. I stopped using it and soon got pregnant with my youngest child".

Although the issue of side effects of contraception came out in all FGDs as a major problem, for most discussants, it was not based on their personal experience but mainly hearsays or experiences of a few neighbours. Apart from side effects, discussants in rural areas also mentioned husband's opposition to family planning, stating that their husband's desire more children and oppose family planning for religious reasons. Those who have ever used or currently using say that once the side effects are felt, or once the husband finds out, they have to stop using it. Some discussants also believed that women who use these methods should get good food, which they thought is not available for a rural woman.

Apart from women's stated pregnancy intentions, intention related fertility preferences were assessed by asking husband's pregnancy intention, ideal family size, desire for more children and happiness with current pregnancy. Sixty nine percent of women reported that husband's intended the most recent pregnancy. The average desired number of children was 4.3 (95% CI, 4.19-4.45) for women and 5.7 (95% CI, 5.5-5.9) for men (based on women's reports) based on the cross-sectional study. With regards to desire for more children, nearly 37% of women responded that they do not want another child, and a further 44% wanted to wait for more than 2 years. Moreover, women who participated in the follow up study were asked for their attitudes about current pregnancy (whether they feel very happy, happy or not happy), and 27% of women responded that they were not happy with their current pregnancy (Table 4).

Table 4: Indicators of pregnancy intention, pregnancy attitudes and fertility Preferences, Southwest Ethiopia, 2012

Variables	Cross-sectional study		Follow up study	
	N	%	N	%
Contraception before pregnancy				
Not used	1173	85.7	513	83.0
Inconsistent use	153	11.1	72	11.6
Method failure	44	3.2	27	4.3
Perceived husband's intention				
Intended	944	68.9	402	64.6
Mistimed	325	23.7	173	27.8
Unwanted	101	7.4	47	7.6
Happiness with current pregnancy[a]				
Very happy			116	18.7
Happy	-	-	338	54.3
Not happy			168	27.0
Ideal family size				
Women	1370	4.3(4.2-4.5)	622	4.1(3.9-5.3)
Men	1370	5.7(5.5-5.9)	-	-[b]
Desire for more children				
Want with in 2 years	207	15.1	57	9.2
Want after 2 years	603	44.0	358	57.6
Want no more child	500	36.5	132	21.2
Undecided/ Can't give birth	60	4.4	75	12.1
Total	1370	100	622	100

a=happiness with pregnancy was not asked in the cross-sectional study
b=husband's ideal family size was not asked in the baseline survey.

Table 5 shows the percentage of women by different socio-demographic factors with their reported pregnancy intention. Accordingly, a higher proportion of older women (35 years and older) reported unintended pregnancies than younger women (15-24 years). As expected, higher proportion of women with no formal education reported unintended pregnancies compared to women with primary or secondary and above education. Similarly, rural women were more likely to report unintended pregnancy than urban women. Higher proportion of women with low participation in household decisions,

women with higher parity (5+), and women with shorter birth intervals reported that their most recent (current) pregnancy was unintended (Table 5).

Table 5: Percentage distribution of women with recent live births and pregnant by pregnancy intention according to selected characteristics, SW Ethiopia, 2012

Socio-demographic Variables	Cross-sectional study			Follow-up study		
	N	Unintended pregnancy (%)	P	N	Unintended Pregnancy (%)	P
Age of the mother						
15-24	373	28.1	0.05	207	19.8	0.001
25-34	790	37.4		360	58.0	
35+	207	38.2		55	61.8	
Educational status						
No formal education	1021	37.9	0.001	447	47.0	0.001
Primary	305	28.5		146	27.4	
Secondary & above	44	11.4		29	17.2	
Residence						
Rural	1012	38.0	0.001	475	45.3	0.001
Urban	358	26.4		147	27.2	
Wealth tertile						
Low	457	35.7	0.826	208	44.7	0.298
Middle	458	35.4		207	41.1	
High	455	33.9		207	37.2	
Participation in decisions						
No	643	39.0	0.003	251	46.2	0.030
Yes	727	31.4		371	37.5	
Number of children						
None	-	-	0.001	95	8.4	0.001
1-2	406	19.7		187	30.5	
3-4	462	34.8		194	45.9	
5^{+}	502	47.4		146	69.2	
Birth interval*						
First births /pregnancy	177	15.8	0.001	81	19.1	0.03
<24 months	165	46.1		127	54.4	
24-35 months	528	45.7		205	47.8	
36-59 months	187	34.8		133	43.3	
60+ months	314	22.9		76	42.1	
Total	1370	34.9		622	41.0	

*represents birth to pregnancy interval for the longitudinal study

4.3 Unintended Pregnancy and Maternal Health Care (Paper I)

One of the objectives of the cross-sectional study was to examine the associations between pregnancy intention and maternal health care. Table 6 shows the percentages of women who used antenatal care by different background variables. Nearly 42% [95% CI, 39.1-44.3] of women made at least one antenatal care visits for their most recent pregnancy. Use of antenatal care varied by maternal and household characteristics. Higher proportion of women of age 15-24 years (45%), urban women (62%), women with secondary and above education (82%), women in the highest wealth tertile (59%), women who intended the pregnancy (45%), women participating in all household decisions (46%), women with first parity (50%), and women living nearer to health facility (46%) used antenatal care as compared to their counter parts.

In the logistic regression analysis pregnancy intention was associated with use of antenatal care, after adjusting for socio-demographic variables. The odds of using ANC was 24% lower (OR: 0.76, 95% CI, 0.58-0.98) for women with unintended pregnancy compared to women with intended pregnancy. Factors other than pregnancy intention significantly associated with use of antenatal care were; women's education, wealth tertile, residence, presence of pregnancy related illness, distances from health facility and ever use of family planning. Women's participation in decision-making was also associated with antenatal care. The odds of using antenatal care were 34% higher (OR, 1.34, 95% CI, 1.06-1.70) for women who have a say in all four decisions compared to women who do not have a say in all household decisions (Table 6).

Table 6: Percentage distribution of women by antenatal care use according to pregnancy intention, socio-demographic and household charactersitics, SW Ethiopia, 2012

Variables	N	ANC use (%)	Antenatal care COR (95% CI)	Antenatal care AOR (95% CI)[1]
Age				
15-24	373	44.8	1.00	1.00
25-34	790	42.2	0.90(0.70-1.15)	1.03 (0.72-1.47)
35+	207	34.3	0.64(0.45-0.92)**	0.79 (0.49-1.29)
Educational status				
No education	1021	36.0	1.00	1.00
Primary	305	54.8	2.15(1.66-2.78)*	1.45(1.07-1.96)*
Secondary & above	44	81.8	7.98(3.67-17.4)***	3.04(1.33-6.97)**
Residence				
Rural	1012	34.6	1.00	1.00
Urban	358	61.7	3.05(2.38-3.92)**	1.21 (0.87-1.69)
Pregnancy intention				
Intended	892	45.3	1.00	1.00
unintended	478	34.9	0.66(0.53-0.83)***	0.76 (0.58-0.98)*
Wealth index				
Low	456	25.0	1.00	1.00
Middle	457	41.4	1.62(1.24-2.12)***	1.64 (1.21-2.21)**
Upper	457	59.0	1.96(1.50-2.56)***	2.31(1.64-3.26)***
Participation in decisions				
Low	643	36.4	1.00	1.00
High	727	46.4	1.51(1.21-1.88)***	1.34 (1.06-1.70)*
Parity				
1-2	315	48.0	1.00	1.00
3-4	410	44.6	0.85(0.65-1.10)	1.07(0.73-1.56)
5^{+}	602	35.9	0.58(0.45-0.76)**	0. 96(0.63-1.45)
Distance from facility				
< 1 hour	685	53.9	1.00	1.00
≥ 1 hour	685	29.5	0.36(0.29-0.45)***	0.66 (0.50-0.87)**
Illness in pregnancy				
No	976	40.0	1.00	1.00
Yes	394	46.0	1.28(1.01-1.62)*	1.32(1.02-1.72)*
Everuse of family planning				
No	1025	34.0	1.00	1.00
Yes	345	64.6	0.28(0.22-0.36)***	2.58(1.95-3.40)***
Total	1370	41.7		

*P<0.05 **P<0.01 *** p<0.001

1Adjusted for age, parity, education, wealth index, residence, participation in decisions, distance from health facility, and ever use of family planning.

In the qualitative study, discussants mentioned that women with unintended pregnancy may not go for antenatal care due to the disappointment of getting pregnant unintentionally , being ashamed of a pregnancy that happened too close, or when the pregnancy happened at older age. One FGD participant, age 30 and mother of 2 explains;

“A woman who gets pregnant unintentionally may not go for antenatal care because this makes her angry and anxious, and as a result she may be reluctant to go for care.Sometimes a woman becomes pregnant sooner after a previous birth and she may feel ashamed”.

Similarly, a 32 year old woman, mother of seven, mentions her own experience during her last pregnancy as follows,

> *“When I tried to terminate the pregnancy and was not successful, I was very angry. I did not go for antenatal care at all”.*

Even for women who used antenatal care during pregnancy, majority did not receive ANC according to the recommendations. Only 13% started ANC visit in the first trimester, and this proportion ranged from 16% among women with intended pregnancy to 9% among women with unintended pregnancy. The median duration of pregnancy at the time of first antenatal care visit was 4 months. Seventen percent of women made four or more visits, and this varied from 19% among women with intended pregnancy to 12% of women with unintended pregnancy. There is a difference in some components of quality of ANC service received as well, although the differences were not statistically significant (Table 7).

Table 7: Quality of Antenatal care received by pregnancy Intention, SW Ethiopia, 2012

Variables	N	Intended pregnancy	unintended pregnancy	P
Number of months pregnant at 1st visit (n=1370)	799	54.9	64.7	0.001
No ANC visit	182	15.7	8.8	
<4 months	365	27.6	24.8	
4-6 months	24	1.8	1.7	
7+ months				
Number of ANC visits (n=1370)				
None	799	54.9	64.7	0.001
1-3	341	25.9	23.0	
4+	230	19.2	12.3	
ANC components received (n=571)				
Informed about pregnancy complications	173	31.8	26.6	0.216
Blood pressure measured	467	81.8	81.6	0.959
Urine sample taken	335	58.7	58.6	0.978
Blood sample taken	417	74.6	69.2	0.185
Tetanus toxid vaccination received(n=1370)				
Yes	592	46.5	37.2	0.001
No	778	53.5	62.8	
Total				

In the multinomial logistic regression analysis, we compared women who had adequate antenatal care (4 or more ANC visits), women who made inadequate visits (1-3 ANC visits) with women who did not make any ANC visit (see table 4, paper I). The results showed that the odds of receiving adequate antenatal care were 33% lower (RR: 0.67, 95% CI, 0.46-0.96) among women with unintended pregnancies compared to women who intended their pregnancy, after adjusting for socio-demographic variables. The time of pregnancy recognition was also significantly associated with receiving adequate antenatal care. About 52% of women with unintended pregnancy reported that they found out their pregnany after 3 months of gestation compared to less than 40% of women with an intended pregnancy. The multivariate analysis also showed that the odds of receiving adequate ANC was significantly lower (RR: 0.61, 95% CI 0.44-0.85) among women who recognized the pregnancy after three months compared to those who recognized their pregnancy before 3 months.

With regards to institutional delivery, 12% [95% CI, 10.6-14.0] of women delivered their most recent child in a health facility; 2% in a hospital, 9% in a health center and 1% in a private clinic. Twelve percent of women were assisted by a skilled provider - a doctor, a nurse or a midwife. There were significant differences in place of delivery with pregnancy intention, other socio-demographic and household variables. A higher proportion of women of age 15-24 years (16%) women from urban areas (25%), women with secondary and above education (47.7%), women from the highest wealth tertile (22.6%), women who intended the pregnancy (14.1), women with lower parity (19.0%) those living closer to health facilities (19.3%) and with a previous use of ANC had delivered their most recent birth at health facilities than their counterparts. With regards to pregnancy intention, 14% of women with intended pregnancy have given birth at a health facility compared to 8.6% of women with unintended pregnancy, and the difference was statistically significant (Table 8).

Unintended pregnancy was associated with delivery care at the bivariate level, but this association was attenuated once we adjusted for socio-demographic and household factors in the multivariate analysis. Factors other than pregnancy intention significantly associated with delivery care were; women's education, wealth tertile, distance from health facility, ever use of family planning and use of ANC during the index pregnancy. (Table 8).

Table 8: Percentage distribution of women by place of delivery according to pregnancy intention, socio-demographic and household characteristics, SW Ethiopia, 2012

Variables	N	Delivery care (%)	Delivery care COR (95% CI)	Delivery care AOR (95% CI)
Age				
15-24	373	16.1	1.00	1.00
25-34	790	11.0	0.65(0.45-0.92)*	0.78 (0.47-1.29)
35+	207	9.7	0.56(0.33-0.96)*	0.81 (0.39-1.69)
Educational status				
No education	1021	9.0	1.00	1.00
Primary	305	17.7	2.17(1.51-3.13)**	1.05 (0.70-1.59)
Secondary & above	44	47.7	9.22(4.91-17.30)***	2.21(1.08-4.56)*
Residence				
Rural	1012	7.6	1.00	1.00
Urban	358	25.1	4.08(2.92-5.69)**	1.43 (0.94-2.20)
Pregnancy intention				
Intended	892	14.1	1.00	1.00
unintended	478	8.6	0.59(0.41-0.85)**	0.73 (0.49-1.11)
Wealth index				
Low	456	4.1	1.00	1.00
Middle	457	10.1	2.13(1.34-3.39)**	1.52 (0.84-2.74)
Upper	457	22.6	3.12(1.99-4.87)***	2.40 (1.32-4.36)**
Participation in decisions				
Low	643	10.7	1.00	1.00
High	727	13.5	1.30(0.93-1.80)	1.05 (0.73-1.51)
Parity				
1-2	315	19.0	1.00	1.00
3-4	410	11.0	0.53(0.36-0.78)*	0.66(0.38-1.11)
5^{+}	602	9.0	0.46(0.31-0.68)*	0.79(0.44-1.43)
Distance from facility				
< 1 hour	685	19.3	1.00	1.00
≥1 hour	685	5.1	0.23(0.15-0.33)***	0.55 (0.34-0.89)*
Illness during pregnancy				
No	976	15.0	1.00	1.00
Yes	394	11.1	1.42(1.01-1.99)*	1.40(0.96-2.05)
Ever use of FP				
No	1025	7.9	1.00	1.00
Yes	345	24.9	3.87(2.77-5.40)***	2.27(1.56- 3.31)***
ANC use				
No	799	5.8	1.00	1.00
Yes	571	21.2	4.40(3.07-6.30)***	2.24 (1.51-3.34)***
Total	1370	12.2		

*P<0.05 **P<0.01 ***P<0.001

Adjusted for age, parity, residence, wealth index, education, participation in decisions, distance from facility and use of antenatal care.

In the follow up (cohort) study, we asked pregnant women where they want to give birth (home versus health facilities) and reasons for their preferences. The majority,72%, preferred to give birth at home. Asked why they prefer to deliver at home, 42% said facility delivery is not necessary unless they have health problem during pregnancy/delivery. Other reasons for preferring home delivery include health facility being too far (18%), that facility delivery requires lots of money (15%), institutional delivery being not customary (14.5%), transportation problem (6.5%) and service related reasons (fig 3). At the end of the follow up, 83.6% delivered at home, while the remaining 16.5% gave birth at health facilities (data not shown).

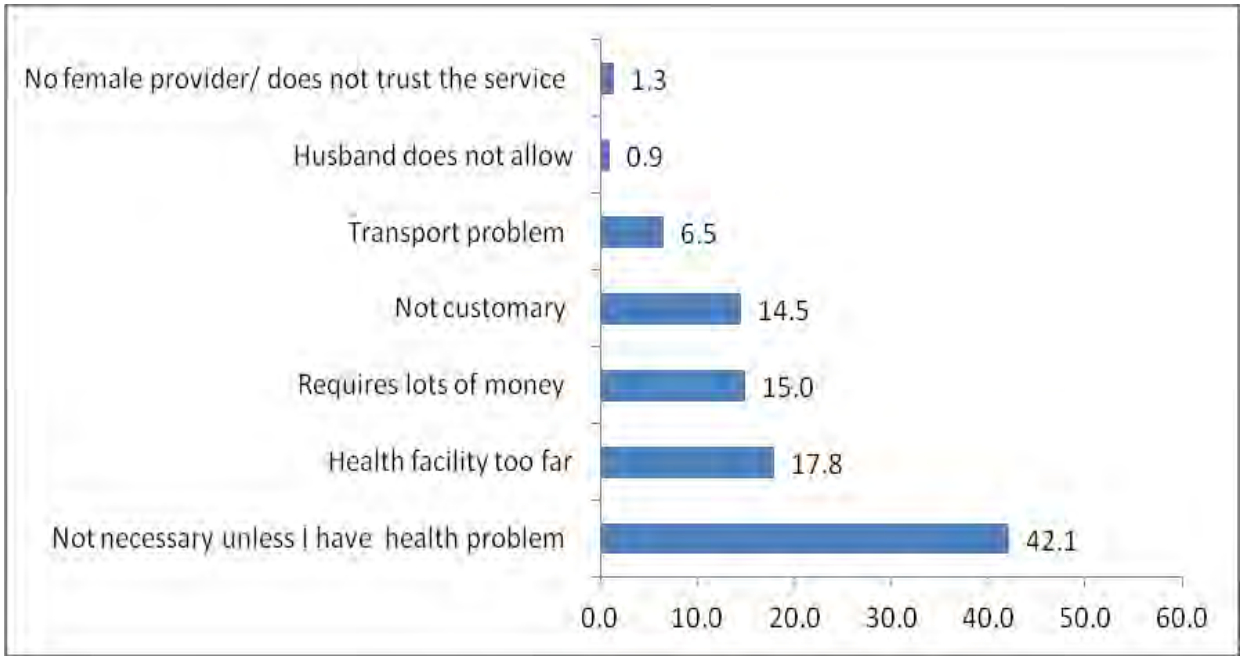


Fig 4: Reasons for home delivery among women who wanted to deliver at home (n=448)

4.4: Unintended Pregnancy and Depression in Pregnancy (Paper II)

Data collected in the baseline survey among 622 pregnant women was used to determine the magnitude of depressive symptoms and its association with pregnancy intention and related maternal socio-demographic and household charactersitics. The overall prevalence of depressive symptoms among the pregnant women was 19.9% (95% CI, 16.8-23.1) using the EPDS cutoff point of 13 and above. The mean score on

the EPDS was 8 (SD ±5.4). Bivariate analysis showed that the prevalence of depression varied by maternal education, occupation, pregnancy intention, happiness with the pregnancy, social support, perceived work burden during pregnancy, intimate partner physical violence, food security status and previous experience of pregnancy loss. Higher proportion of women with unwanted pregnancy (35), women with secondary and above education (22%),urban women (21%), women with low social support (27%) , women engaged in farming (44%), women with high perceived work burden (28%), women with parity of five and above (24%), women who have experienced intimate partner physical violence during pregnancy (46%), women with household food insecurity (37%) and women with a history of pregnancy loss (37%) reported depressive symptoms than their counter parts.

Unadjusted and adjusted results from logistic regression analysis of factors associated with depressive symptoms in pregnancy are shown in table 9. We included the three categories of pregnancy intention and found that women with a mistimed pregnancy did not differ from those with an intended pregnancy in the bivariate analysis. Moreover, happiness with pregnancy was dropped due to its strong correlation with pregnancy wantedness. Accordingly, pregnancy intention, social support, occupation, household food security and presence of partner violence were significantly associated with depressive symptoms. The odds of being depressed was nearly twice higher (OR, 1.96, 95% CI: 1.09-3.5) among women with unwanted pregnancy compared to women with an intended pregnancy. The odds of depression was significantly lower (OR: 0.46, 95% 0.30-0.69) among women with high social support compared with women who had low social support during pregnancy. Moreover, the odds of being depressed were significantly higher among women with household food insecurity and among those who experienced partner violence during pregnancy compared to their counter parts (Table 9).

Table 9: Prevalence of maternal depressive symptoms by women's pregnancy intention, social support and other characteristics, Southwest Ethiopia, 2012

Variables	Depressive symptoms		% with depressive symptoms	Unadjusted OR (95% CI)	Adjusted[1] OR (95% CI)
	No	Yes			
Pregnancy Intention					
Intended	307	60	16.4	1.00	1.00
Mistimed	139	36	20.6	1.33(0.84-2.10)	0.97(0.56-1.66)
Unwanted	52	28	35.0	2.76(1.61- 4.70)***	1.96 (1.09- 3.54)*
Social support					
Low	175	66	27.4	1.00	1.00
High	323	58	15.2	0.48(0.32-.71)**	0.46 (0.30-0.69)**
Educational status					
No formal education	347	100	22.4	1.00	1.00
Primary	129	17	11.6	0.46(0.26-.79)*	0.56(0.30-1.05)
Secondary & above	22	7	24.1	1.10(0.46-2.66)	1.72(0.64-4.93)
Wealth tertile					
Poor	165	43	20.7	1.00	1.00
Middle	159	48	23.2	1.16 (0.73-1.85)	1.43 (0.82-2.51)
Rich	174	33	15.9	0.73(0.44-1.20)	0.88(0.48-1.62)
Occupation					
Housewife	411	71	14.7	1.00	1.00
Farmer	51	40	44.0	4.47(2.76-7.25)**	3.73(2.14-6.51)**
Employed / business	36	13	26.5	2.29 (1.15-4.52)*	1.95 (0.88-4.35)
History of pregnancy loss					
No	462	103	18.2	1.00	1.00
Yes	36	21	36.8	2.62 (1.47-4.67)**	1.27(0.62-2.57)
Intimate partner violence					
No	484	112	18.8	1.00	1.00
Yes	14	12	46.2	3.70 (1.67-8.23)**	3.53 (1.36-9.16)**
Household food security					
Food Secure	336	29	8.0	1.00	1.00
Food insecure	162	95	37.0	6.79(4.31-10.72)**	4.60(2.75-7.70)***
Perceived work burden					
Difficult	109	43	28.3	1.00	1.00
Moderate	185	41	18.1	0.56(0.34-.92)*	0.72(0.41-1.26)
Easy	204	40	16.4	0.49(0.30-0.81)**	0.68(0.38-1.19)
Total	498	124	19.9		

*P<0.05 **P<0.01 ***P<0.001

Adjusted for age, parity, education, wealth, occupation, partner violence and household food insecurity

Pregnant women were asked to rate their perceived health status (excellent, very good, good, fair or poor) to assess its correlation with depressive symptoms in pregnancy and found that depressive symptoms in pregnancy is correlated with self rated health status

(r=0.65). The proportion of women with depressive symptoms increased as women's perceived health status changed from excellent to poor self rated health (fig 4).

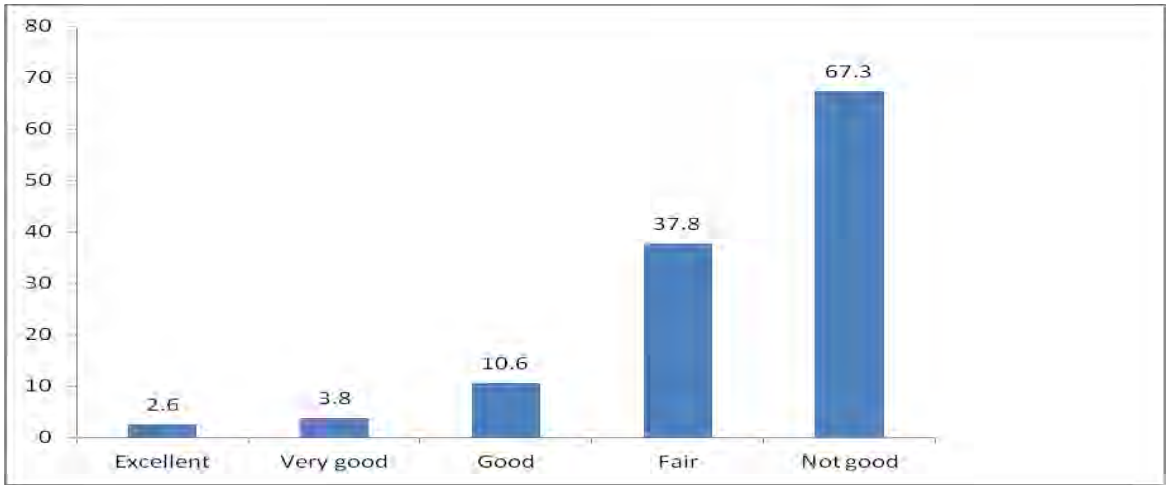


Fig 5: Magnitude of depressive symptoms and self rated health status among pregnant women, SW Ethiopia, 2012

4.5 Unintended pregnancy, maternal health behaviour and birth weight (paper III)

Of the 622 pregnant women enrolled in the cohort study, 612 (97.6%) of them were followed through to delivery to determine birth out come. Among those successfully followed, 588 (96.0%) ended in a live birth, 21(3.4%) ended with a still birth and three were miscarriages. The mean birth weight among those weighted at birth was 2989 grams (SD± 504 grams). Among the 537 neonates whose birth weight was taken, the incidence of LBW was 17.9%, (95% CI; 14.6, 21.1). Table 11 shows that the magnitude of low birth weight varied with maternal socio-demographic and household characteristics. A higher proportion of low birth weight births were born to women aged 35 and above (26%), to rural women (20.3%), among women from low wealth tertile (25%), women with small MUAC size (27.4%), women with antenatal depressive symptoms (26.2%), and low social support (22.4%).Twenty eight percent of unwanted births were born LBW compared to 14.6% of births that were wanted at conception.

Table 10: Magnitude of low birth weight by pregnancy intention, and other socio-demographic factors, southwest Ethiopia

Variables	N	Birth weight		Unadjusted OR (95% CI)	P
		>2500 g	<2500 g		
Age					
15-24	176	84.1	15.9	1.00	1.00
25-34	319	82.1	17.9	1.15 (0.70-1.89)	0.580
35+	42	73.8	26.2	1.88 (0.84-4.16)	0.122
Sex of the newborn					
Male	268	82.8	17.2	1.00	
Female	269	81.4	18.6	1.10(0.71-1.71)	0.67
Educational status					
No formal education	383	80.4	19.6	1.00	
Primary	128	85.2	14.8	0.72 (0.41-1.24)	0.232
Secondary & above	26	92.3	7.7	0.34(0.079-1.48)	0.151
Residence					
Rural	433	79.7	20.3	1.00	
Urban	104	92.3	7.7	0.33(0.15-0.70)	0.03
Wealth tertile					
Poor	181	74.6	25.4	1.00	
Middle	182	84.9	15.1	0.52 (0.31-0.89)*	0.017
Rich	184	87.0	13.0	0.44(0.26-0.76)*	0.003
Parity					
0	80	83.8	16.3	1.00	
1-2	160	82.5	17.5	1.09(0.53-2.25)	0.808
3-4	169	82.8	17.2	1.07(0.52-2.18)	0.858
5^{+}	128	79.7	20.3	1.31(0.63-2.74)	0.466
Pregnancy Intention					
Wanted then	314	85.4	14.6	1.00	
Mistimed	156	80.1	19.9	1.44(0.87–2.39)	0.151
Unwanted	67	71.6	28.4	2.31(1.25-4.27)*	0.008
History of pregnancy loss					
Yes	51	76.5	23.5	1.00	
No	486	82.7	17.3	0.68(0.34-1.35)	0.27
ANC use					
Yes	295	86.8	13.2	1.00	
No	242	76.5	23.5	2.02(1.29-3.17)*	0.002
Social support					
Low	255	77.7	22.4		
High	282	86.2	13.8	1.00	
				0.56(0.36-0.87)**	0.01
Depression in pregnancy					
No	430	84.2	15.8	1.00	
Yes	107	73.8	26.2	1.89(1.14- 3.12)*	0.01
Mother's MUAC					
< 230 cm	113	72.6	27.4		
≥ 230 cm	424	84.7	15.3	1.00	
				0.48(0.29-0.78)*	0.003
Total	537	82.1	17.9		

Results of the unadjusted log binomial regression shows that among socio-demographic and psychosocial factors; place of residence, maternal education, wealth status, pregnancy intention, antenatal care use, social support, antenatal depressive symptoms and maternal MUAC were associated with low birth weight (P<0.20). These variables were entered to a multivariate model at different stages to examine whether the association between pregnancy wantedness, depressive symptoms and LBW was mediated by the presence of social support and other maternal characteristics. Pregnancy intention was recategorized as wanted (including pregnancies that were wanted then and mistimed) and unwanted because there was no statistically significant difference between pregnancies that were wanted then and pregnancies that were mistimed at conception. In multivariate model II, we included the three psychosocial factors (Pregnancy intention, depression and social support) and all three were significantly associated with LBW. However after adjusting for socio-demographic factors and other maternal characteristics (model III), unwanted pregnancy was only marginally associated with LBW while the association of antenatal depression with LBW was attenuated. The association with social support also remained significant. The fact that the association between unwanted pregnancy and LBW is significantly reduced and the association of depression with LBW is attenuated indicates that the relationship is mediated by factors like social support and use of antenatal care or maternal charactersitics.

The other factors that were significantly associated with LBW in the final model were wealth status, ANC use and maternal MUAC size. LBW was significantly lower among births from upper wealth tertile (RR: 0.55, 95% CI 0.31-0.97) compared with those of lowest wealth status. The risk of giving birth to LBW was significantly higher (RR: 1.66, 95% CI 1.04-2.67) for women who did not use ANC during pregnancy. Higher MUAC size was also associated with lower risk of LBW (Table 11).

Table 11: Relative risks from log binomial regression showing association between pregnancy intentions, maternal depression and social support with LBW, SW Ethiopia

Variables	Model I RR,(95% CI)	Model II RR, (95% CI)	Model III RR, (95% CI)
Pregnancy wantedness			
Intended		1.00	1.00
Mistimed		1.24(0.72–2.12)	1.25(0.73–2.14)
Unwanted		2.12(1.05-4.28)*	2.08(1.02-4.23)*
Depressive symptoms			
No		1.00	1.00
Yes		1.77(1.03-3.04)*	1.68(0.87-2.91)
Social support			
Low		1.00	1.00
High		0.59(0.37-0.94)*	0.59(0.36-0.94)*
Interaction (Depression*unwanted pregnancy)			0.84(0.42-1.69)
Mother's education			
No education	1.00		1.00
Primary	0.82 (0.45-1.49)		0.86(0.47-1.59)
Secondary & above	0.48(0.10-2.21)		0.50(0.11-2.40)
Residence			
Rural	1.00		1.00
Urban	0.49(0.22-1.13)		0.43(0.19-0.98)*
Wealth tertile			
Lower (reference)	1.00		1.00
Middle	0.52 (0.31-0.89)*		0.57(0.31-1.01)
Upper	0.44(0.26-0.76)*		0.55(0.31-0.97)*
ANC received			
Yes	1.00		1.00
No	2.02(1.29-3.17)*		1.66(1.04-2.67)*
Has history of still births			
No	1.00		1.00
Yes	0.68(0.34-1.35)		0.72(0.34-1.54)
Maternal MUAC			
< 230 mm	1.00		1.00
≥ 230 mm	0.48(0.29-0.78)*		0.56(0.36-0.94)*

*p<0.05 **p<0.01 ***P<0.001

Adjusted for age, parity, residence,wealth index, education, depressive symptoms, ANC use, and social support,and MUAC size

4.6 Unintended Pregnancy and Child Health

Child health was measured using childhood vaccinations, whether the child received treatment for illness and mortality until age two. There were 1382 children born to 1370

women who participated in the cross-sectional survey although only 1304 were alive at the time of the survey and were included in this analysis.

4.6.1 Vaccination (paper IV)

Information on vaccination coverage was collected from the mother's verbal report and from vaccination cards. When vaccination cards are available, interviewers copied the vaccinations received from the cards. Accordingly, 74.3% (972) of all children alive at the time of the interview and 78% (690) of children age 12-24 months have ever been vaccinated. However, only 37% (95% CI, 33.5-39.9) of children age 12-24 months had received all basic recommended vaccinations (Figure 6).

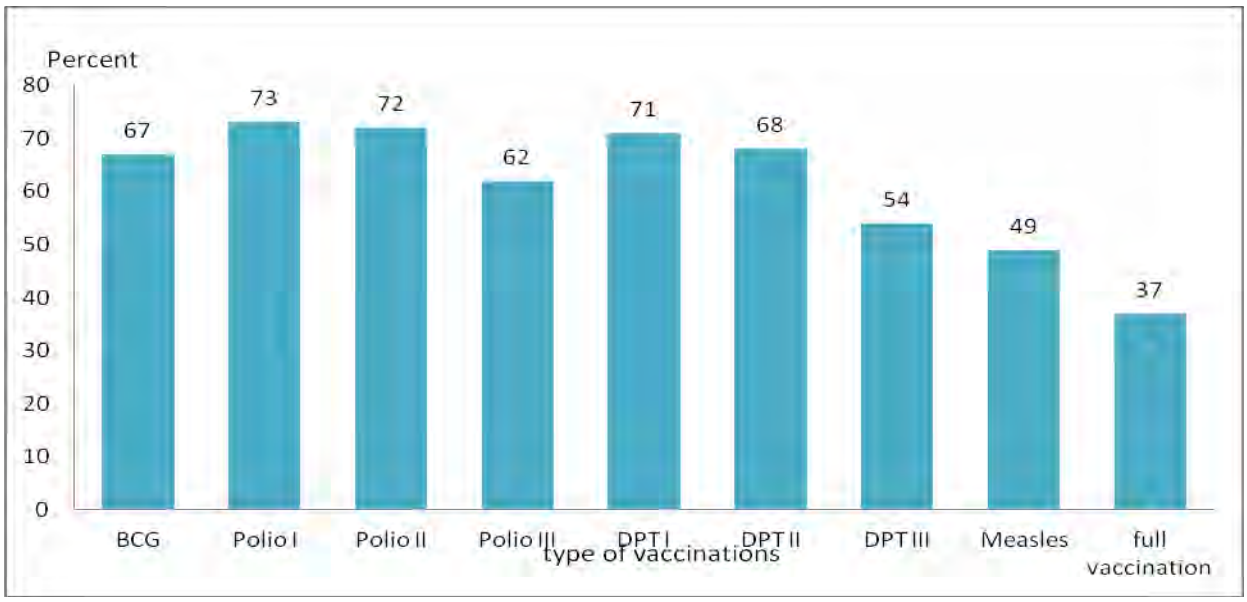


Fig 6: percentage of children age 12-24 months who received different vaccinations series and full vaccination in Gilgel Gibe HDSS area, 2012 (n=853)

Table 12 shows bivariate associations between demographic, social and health care factors with child vaccination (receiving at least one vaccination and full vaccination). The analysis showed that both receiving at least one vaccination and completion of basic childhood vaccinations varied by sex of the child, place of residence, mother's education, women's participation in household decision making, pregnancy intention,

number of under-five children in a family, antenatal care use, place of delivery, distance from health facility and household food security ($p < 0.20$).

Table 12: Child vaccination by pregnancy intention, maternal socio-demographic and household factors, southwest Ethiopia, 2012

Socio-demographic Variables	Any vaccination		p	Fully vaccinated		p
	n	%		n	%	
Mother's Age						
15-24	359	74.9	0.276	215	38.6	0.774
25-34	754	75.1		503	37.0	
35+	194	69.6		135	34.8	
Sex of the child						
Male	663	75.4	0.128	428	40.0	0.078
Female	641	73.0		425	34.1	
Educational status						
No formal education	970	71.8	0.001	649	34.8	0.024
Primary	290	79.3		177	42.4	
Secondary and above	44	95.5		27	55.6	
Residence						
Rural	953	70.1	0.000	645	33.5	0.001
Urban	351	85.5		208	48.1	
Wealth tertile						
Low	436	70.4	0.034	274	33.9	0.206
Middle	434	74.3		292	36.3	
Upper	434	78.2		274	40.9	
Pregnancy Intention						
Intended	848	76.5	0.016	557	38.8	0.131
Unintended	456	70.3		296	33.6	
Participation in decisions						
Low	603	68.8	0.007	381	31.9	0.004
High	701	78.9		472	41.3	
Number of U5 children						
1	513	77.8	0.001	343	41.4	0.012
2	683	74.2		456	35.5	
3+	108	58.8		53	21.2	
ANC use in pregnancy						
None	760	64.2	0.001	499	29.5	0.000
1-3 visits	326	85.9		206	43.2	
4 or more visits	218	91.8		148	54.1	
Place of delivery						
Home	1143	72.4	0.001	759	34.7	0.000
Health facility	158	87.3		94	54.8	
Distance from facility						
<60 minutes	659	82.7	0.001	557	38.8	0.000
≥ 60 minutes	642	65.6		290	33.6	
Household food security						
Food secure	975	76.2	0.006	635	39.6	0.008
Food insecure	324	68.5		218	29.5	
Total	1304	74.3		853	37.1	

A higher proportion of male births, urban children, children of mother's with higher education, children of mother's with higher participation in household decisions, intended births, and children of mothers with fewer under-five children had received vaccinations. Vaccination coverage was also higher for children whose mother's had four or more ANC visits during their most recent pregnancy, who delivered at a health facility and those who lived closer to health facilities compared with their counter parts. Moreover, vaccination coverage was higher for children of food secure households than food insecure households.

Multivariate logistic regression showed that wealth index, mother's education, pregnancy intention, place of delivery and household food security were not significantly associated with vaccination status. Among demographic factors, child's sex, the number of under-five children in a family and women's participation in decision making were significantly associated with completion of basic childhood vaccinations. The odds of receiving complete vaccination was higher (OR, 1.35; 95% CI, 1.01-1.82) among male children compared to female children. The odds of receiving complete childhood vaccinations were significantly lower (OR; 0.45, 95% CI, 0.21-0.96) if there were three or more under-five children in the household. The odds of receiving all vaccinations were 1.35 times higher for children whose mothers participated in all household decisions than those who did not participate in all household decisions. Maternal education, use of antenatal care during pregnancy and distance from the nearest health facility were also associated with both completion of childhood vaccination and receiving at least one vaccination (Table 13).

Table 13: Odds ratio from logistic regression predicting factors associated with child vaccination coverage, southwest Ethiopia, 2012

Variables	Received at least one vaccination[1],AOR (95% CI)	Fully vaccinated[1], AOR ,(95% CI)
Sex of the child		
Female	Ref	Ref
Male	1.27 (0.98-1.66)	1.35 (1.01-1.82)*
Mothers education		
No education	Ref	Ref
Primary	0.98 (0.69-1.38)	1.22 (0.87-1.55)
Secondary and above	2.60 (0.60-11.34)	1.35 (0.96-2.42)
Wealth tertile		
Poor	Ref	Ref
Middle	0.92 (0.71-1.34)	0.96 (0.67-1.38)
Rich	1.05 (0.74-1.48)	1.03 (0.70-1.52)
Pregnancy intention		
Intended	Ref	Ref
Unintended	0.86 (0.64-1.07)	0.91 (0.67-1.26)
Number of under-five children		
1	Ref	Ref
2	1.07 (0.79-1.45)	0.97 (0.71-1.34)
3+	0.56 (0.35-0.91)**	0.45 (0.22-0.93)*
Participation in decisions		
Low	Ref	Ref
High	1.46 (1.12-1.92)**	1.39 (1.03-1.87)*
Distance from facility		
≤ 60 minutes	Ref	Ref
> 60 minutes	0.61 (0.45-0.83)**	0.55 (0.39-0.78)**
Antenatal care visits		
None	Ref	Ref
1-3 visits	2.77 (1.93-3.96)**	1.51 (1.06-2.15)*
4 or more visits	4.34 (2.58-7.32)**	2.28 (1.51-3.44)**
Place of delivery		
Home	Ref	Ref
Health institution	1.42 (0.83-2.42)	1.44 (0.89-2.33)
Household food security		
Food secure	1.00	1.00
Food insecure	0.78(0.58-1.06)	0.73(0.51-1.03)

* P<0.05 ** P<0.01 **** p<0.001

Adjusted for age, parity, residence, wealth, education, participation in decisions , distance from Facility and household food security.

Pregnancy intention was not associated with completion of basic childhood vaccination or receiving any vaccination, showing that intended and unintended births may not be differently treated. In the FGDs, discussants were asked whether children from unintended pregnancies are treated differently to those that were intended in terms of child care. Most discussants believed that they do not discriminate between their children even though the pregnancy (birth) may be unintended. But, there were discussants who mentioned that children may get less care when the mother has to care for many smaller children, when she works outside the home or when she is pregnant again. FGD participants mentioned other reasons for not completing vaccinations. Asked why women do not get all the vaccinations needed for their children, a 30 year old woman, mother of 5 said;

"Some women fail to vaccinate their children because of lack of awareness about vaccination. Some women fail to vaccinate due to lack of time. Some say it makes my child sick and irritable. Some forget the appointment date and may gradually ignore other vaccinations".

A lactating woman with a baby and her two other young children**.** Having many under-five children is associated with lower child health care

4.6.2 Health Care seeking for childhood Illness

Mothers of all children alive were asked whether their child had symptoms of illness such as fever, diarrhea and cough in the two weeks before the survey. Overall, 24% (95% CI, 21.8-26.4) of children had symptoms of illness in the two weeks. The most common types of illness reported were fever (16.4%) diarrhea (14.6%) and cough/short breathing (13.1%) respectively. The proportion of children with illness varied by the mother's characteristics. A higher proportion of children born to young women of age 15-24 years (25%), male births (26.4%), rural children (25.6%), and children from poor households (27.6%) had experienced illness in the two weeks. Moreover, slightly higher proportion of children from unintended pregnancy than intended pregnancy and from food insecure households than food secure households had experienced illnes.

Of the children with any illness, 59.2% (95% CI, 53.8-64.7) received treatment or advice at health facilities. The proportion of children who received treatment was higher (63.9%) for children with fever than for cough (57.3%) or diarrhea (56.5%). The proportion of children who obtained treatment for their illness varied with maternal and child and household chracteristics. Higher proportion of male births (61%), children of mothers with few under-five children (66.7%), children of mothers with higher education (85.7%), urban children (68.6%), children from rich households (63.5%) and food secure households (62.4%) had received treatment or advice from health providers. Sixty two percent of births from intended pregnancy had received treatment compared to 51% of unintended births. Differences were also observed with place of delivery and distance from health facility (Table 14).

Table 14: Percentage distribution of children with any illness who received treatment according to Pregnancy Intention and selected variables, southwest Ethiopia, 2012.

Variables	N	% with illness	Treatment received (n=315)		P
			Yes	No	
Sex of the newborn					
Male	663	26.7	61.0	39.0	0.370
Female	641	21.4	56.9	43.1	
No.of under five children					
1	513	22.8	66.7	33.3	0.075
2	683	22.9	56.1	43.9	
3+	108	25.3	45.8	54.2	
Mother's age					
15-24	359	23.4	58.3	41.7	0.245
25-34	751	24.4	56.8	43.2	
35+	194	24.2	67.2	32.8	
Mother's education					
No formal education	970	24.7	55.8	44.2	0.040
Primary	290	23.1	68.7	31.3	
Secondary & above	44	15.9	85.7	14.3	
Residence					
Rural	953	25.6	56.6	43.4	
Urban	351	19.9	68.6	31.4	0.071
Wealth tertile					
Poor	435	27.6	57.0	43.0	
Middle	434	24.1	58.3	41.7	0.069
Rich	435	20.9	63.5	36.5	
Pregnancy Intention					
Intended	848	23.4	62.7	37.3	
Unintended	456	25.3	51.3	48.7	0.021
Participated in all decisions					
No	603	25.2	56.2	43.8	0.254
Yes	701	23.1	62.5	37.5	
ANC use in pregnancy					
None	760	27.5	56.3	43.7	0.070
1-3 visists	326	24.5	59.2	40.8	
4 or more visits	218	22.9	63.3	36.7	
Place of delivery					0.029
Health facility	1145	24.5	67.7	32.3	
Home	159	21.5	58.2	41.8	
Distance from H. facility					
<1 hour	659	21.7	67.1	32.9	0.009
≥1 hour	645	26.6	52.6	47.4	
Food security status					
Secure	979	21.7	62.4	37.6	0.463
Insecure	325	31.2	58.0	42.0	
Total	1304	24.1	59.4	40.6	

At the multivariate level, we used multinomial logistic regression to compare the risk of receiving treatment for illness, not receiving treatment for illness with those who had no illness. Accordingly, receiving health care up on illness was significantly associated with household wealth, maternal education, antenatal care use in pregnancy (Table 15).

Table 15: Relative risk from multinomial logistic regression of the effects of pregnancy intention and other factors on receiving treatment up on illness.

Variables	Treated for illness ARR,(95% CI) [1]	Not treated for illness ARR,(95%CI) [1]
Pregnancy Intention		
Intended	1.00	1.00
Unintended pregnancy	0.85(0.59-1.22)	1.56 (1.05-2.31)*
Number of under-five children		
1	1.00	1.00
2	1.02(0.72-1.44)	1.27(0.82-1.97)
3+	0.74(0.36-1.49)	1.69(1.04-2.56)*
Wealth tertile		
Poor	1.00	1.00
Middle	1.03 (0.70-1.51)	1.07 (0.67-1.68)
Rich	1.81(1.15-2.84)*	0.69(0.42-1.14)
Participated in all decisions		
No	1.00	1.00
Yes	1.09 (0.75- 1.59)	0.78(0.56- 1.07)
Distance from HF		
< 1 hour	1.00	1.00
≥ 1 hour	0.81 (0.56-1.15)	1.64 (1.06-2.53)*
Education		
No education	1.00	1.00
Primary	1.11 (0.76-1.63)	0.68(0.40-1.15)
Secondary+	1.38(1.08-1.79)*	0.44(0.10-1.91)
ANC use		
None	1.00	1.00
1-3 visits	1.04(0.70-1.55)	1.49(0.95-2.35)
4 or more visits	1.43(1.10-1.86)*	1.03(0.66-1.59)
Delivery place		
Health facility	1.00	1.00
Home	0.97(0.60-1.58)	0.85(0.43-1.68)
Received any vaccination		
No	1.00	1.00
Yes	1.94(1.41-2.67)**	1.37(0.83-1.89)

* P<0.05 ** P<0.01 **** p<0.001

[1] Adjusted for age, number of underfive children, residence, education, participation in decisions and distance from facility.

On the other hand, variables such as unintended pregnancy, distance from health facility and having more than 3 under-five children were associated with not receiving treatment up on illness. With regards to pregnancy intention, the odds of not receiving treatment up on illness to that of being not sick were 56% higher (RR,1.56 95% ,CI: 1.09-2.33) for children born as unintended compared to those that were intended. The odds of not receiving treatment up on illness were higher when there are several under-five children in the household. Moreover, living farther than an hour walking distance from health facilities were associated with higher risks (RR, 1.64; 95% CI: 1.06-2.53) of not receiving treatment up on illness.

4.6.3 Child Mortality (manuscript being compiled)

All women who participated in the cross-sectional survey were asked about their birth history, and more specifically about the births that took place in the two years before the survey to estimate child mortality. Among the 1382 children born to 1370 women in the two years before the survey, there were 78 deaths showing a mortality rate (MR) of 51 per 1000 person years [95% CI, 40.4-63.1].Table 18 shows the number of child deaths by maternal socio-demographic, household characteristics and health care related factors. Among socio-demographic factors, child mortality varied by maternal age, wealth index, place of residence, birth interval and distance from health facility (at $P<0.20$). A statistically significant difference in mortality is not observed by child sex, pregnancy intention and parity. However, there were 59 deaths per 1000 PYs among children born after unintended pregnancy compared to 49 deaths per 1000 PYs among children born from intended pregnancy.

Table 16 summarizes the results of the poisson regression analysis of the relationship between child mortality and maternal and household charactersitcs. Pregnancy intention was not associated with infant mortality both in the unadjusted and adjusted analysis. The multivariable model shows that age, wealth tertile, women's participation in household decisions and receipt of any vaccination were significantly associated with child mortality. The incidence rate of dying in the first two years of birth were more than

two times (IRR, 2.35, 95% CI; 1.03-5.41) higher for children born to older women of age 35-49 compared to children born to younger women (15-24 years). The incidence rate of dying was 46% lower (IRR, 0.54, 95% CI; 0.29-0.98) among those born to rich households compared to children born to poor households. The incidence rate of dying during the first two years of life was 42% lower (IRR,0.58, 95% CI; 0.36-0.95) when the mother participates in all household decisions compared to children whose mother's do not participate in all household decisions. Receiving childhood vaccination is also important for infant survival. The risk of dying is significantly lower (IRR, 0.55, 95%CI; 0.33-0.90) for infants who received any of the basic childhood vaccination compared to those who did not.

Low socio-economic status is associated with lower child health care and higher risk of childhood mortality

Table 16: Incidence Rate Ratio from Poisson regression of the association of pregnancy intention and other factors with child (<2) mortality, SW Ethiopia,2012

Variables	N	No. of deaths	person years	deaths per 1000 PY	Unadjusted IRR, 95% CI	Adjusted[1] IRR, 95% CI
Maternal age						
15-24	358	15	400	37.5	1.00	1.00
25-34	753	45	903	49.8	1.40 (0.78-2.52)	1.43 (0.72-2.54)
35+	193	18	241	74.7	2.12 (1.10-4.21)**	2.35 (1.03-5.41)*
Birth interval						
First births	177	5	192	26.1	0.54(0.21-1.39)	0.66(0.23-1.94)
<24 months	166	20	157	127.2	2.28(1.28-4.07)**	2.06(1.11-3.84)**
24-35 months	527	26	632	41.1	0.94(0.55-1.60)	0.95(0.55-1.64)
36+ months	512	27	563	47.9	1.00	1.00
Residence						
Rural	1022	67	1152	58.2	1.00	1.00
Urban	360	11	392	28.1	0.47(0.25-0.88)*	0.73(0.66-1.83)
Pregnancy intention						
Intended	1019	55	1154	47.7	1.00	1.00
Unintended	363	23	390	58.9	1.17 (0.72-1.91)	1.10 (0.40-1.27)
Wealth index						
Low	461	40	525	76.1	1.00	1.00
Middle	461	23	499	46.1	0.57 (0.34-0.96)*	0.64 (0.38-1.09)
Upper	460	15	510	29.4	0.38(0.21-0.68)*	0.44(0.21-0.90)*
Participation in decisions						
Low	651	49	701	69.9	1.00	1.00
High	731	29	843	34.4	0.53 (0.33-0.83)**	0.61(0.38-0.97)*
Distance from facility						
≤ 1 hour	692	33	788	41.9	1.00	1.00
≥1 hour	690	45	746	60.3	1.37 (0.87-2.14)	1.10 (0.60-1.69)
ANC use						
None	811	48	807	59.5	1.00	1
1-3 visits	341	21	392	53.7	0.91(0.51-1.62)	0.64(0.31-1.32)
4 or more ANC	230	15	345	43.4	0.67(0.33-1.38)	0.51(0.26-0.98)*
Place of delivery						
Home	1218	68	1366	49.8	1.00	1.00
Health facility	164	10	178	56.3	1.18(0.63-2.23)	1.79(0.90-3.57)
Any vaccination						
No	371	36	1194	108.4	1.00	1.00
Yes	1011	42	350	33.5	0.43(0.27-0.67)**	0.49(0.30-0.79)*
Total	1382	78	1544	50.5		

* P<0.05 ** P<0.01 **** p<0.001

[1]Adjusted for age, parity, birth interval, residence, wealth, distance from health facility, and participation in household decisions

Table 17: Summary of the main findings of the papers included in the dissertation

No.	Objectives	Main findings
1	Determine the magnitude of unintended pregnancy and its associations with the use of maternal health services.	• 35% of women in the cross-sectional study and 41% in the follow up study reported unintended pregnancy. • Higher proportion of rural, poor and illiterate women reported unintended pregnancy • 42% of women used any ANC and 12% delivered at a health facility. • The odds of using ANC was significantly lower among women with unintended pregnancy (OR, 0.76, 95% CI; 0.58-0.98) compared to women with intended pregnancies. • The association with institutional delivery was attenuated after adjusting for other socio-demographic factors
2	Magnitude of depressive symptoms during pregnancy and its association with pregnancy Intention	• 19.9% (95% CI, 16.8-23.1) of pregnant women had symptoms of depression • The odds of being depressed were nearly twice higher (OR,1.96, 95% CI; 1.09-3.54) among women with unwanted pregnancy compared to women with a wanted pregnancy. • Household food insecurity, intimate partner violence and lower social support were associated with depressive symptoms during pregnancy.
3.	Determine the effects of pregnancy intention and pregnancy related maternal behaviors on birth weight.	• Birth weights of 537 births were measured within 72 hours with mean birth weight of 2989 grams (SD± 504 grams). • The incidence of LBW was 17.9%, (95% CI; 14.6, 21.1). • The risk of LBW was two times higher (RR, 2.03; 95% CI, 1.08-3.81) among births after unwanted pregnancy compared to births from wanted pregnancy. • Other risk factors of LBW include household poverty, lower maternal MUAC, lower social support and non use of ANC.
4	Examine the relationship between unintended pregnancy and child health care and survival.	• 37% (95% CI, 33.5-39.9) of children age 12-24 months received all basic childhood vaccinations. • 24% [95% CI; 21.8-26.4], of children had experienced illness during the two weeks before the survey, and 59%(95% CI, 53.8-64.7) had received treatment and advice from health facilities for the illness. • There was a mortality rate of 51 per 1000 person years [95% CI, 40.4-63.1] among the 1382 children born to women involved in the cross-sectional survey. • There was a significant effect of unintended pregnancy on treatment seeking (RR, 1.56 95%, CI: 1.09-2.33) but corresponding effects on vaccination and mortality were not observed

5.0 Discussion

5.1 Levels of Unintended Pregnancy

The level of unintended pregnancy in the study area is considerably high in light of the goals of ensuring the reproductive health and rights of women and couples. In the cross-sectional survey, women reported that 35% of the pregnancies that led to live births in the two years before the survey was unintended. The proportions of mistimed and unwanted pregnancies were 25% and 10% respectively. This is comparable to the level of unintended pregnancy for most recent births in the 2011 EDHS, in which 32% of women reported their most recent pregnancy as unintended. However, it is higher than the level reported for births in the five years before the 2011 EDHS in which 28% of births were unintended (2). A 2014 report of the Performance, Monitoring and Accountablity (PMA) 2020 study showed that the magnitude of unintended pregnancy in Ethiopia among married women is even higher at 42% (17). This is comparable to the finding from our follow-up study in which 41% of pregnant women reported their pregnancies as unintended. The level of unintended pregnancy reported in the follow-up study was higher compared to the cross-sectional study. This is attributed to the fact that the follow-up study is less affected by recall bias and post-hoc rationalization than the cross-sectional study. Several studies reported that rates of unintended pregnancy fluctuate depending on whether pregnancy intentions are measured during a pregnancy or after a birth. Women tend to become more accustomed to a pregnancy over time and reports of intention increase with time from conception (58-60).

The magnitude of unintended pregnancy varied by maternal socio-demographic and household charcteristics. Several studies have shown that unintended pregnancy varies with maternal socio-demographic characteristics such as age, education, wealth status, exposure to media, number of living children and preceding birth intervals (163, 164). A higher proportion of older women (age 35 years and above), women with no formal education, rural women, women with low participation in household decisions, women with higher parity (5+) and women living more than an hour walking distance from

health facility reported unintended pregnancies. In the qualitative study as well, participants mentioned that unintended pregnancy is common among older women, among those who get pregnant sooner after a previous pregnancy, and among those who get pregnant before seeing their menses. The main reason for the high level of unintended pregnancy was non use of family planning and inconsistent use. In both surveys, it was observed that more than 83% of women were not contracepting before the pregnancy. In the FGDS, participants mentioned that the main reason for not using contraception was fear of side effects.

5.2 Pregnancy Intention and Maternal Health Care (Paper I)

Our results show that the level of maternal health care is very low in the study area. Forty two percent of women used ANC, 12% delivered in a health facility and 12% had skilled assistance at delivery. This result is slightly higher than the findings of the 2011 EDHS that reported ANC use of 34% and institutional delivery of 10% (2). The recent Mini DHS showed ANC use of 40% and institutional delivery of 14.5%(165). In both cases, the level of maternal health care is very low in Ethiopia compared with International (MGD) and national (HSDP IV) targets as well as levels of other Sub-Saharan African countries. The MDG target for deliveries attended by skilled provider or institutional delivery is 90% by 2015. Moreover, the comparative figures of health facility delivery for neighbouring countries of Kenya and Tanzania were 43% (147) and 50%(166) respectively. In addition to the low levels of ANC use, very few women received adequate ANC and started antenatal care early enough in the pregnancy. Considering the WHO recommendations of four antenatal care visits with the initial visit occurring before the fourth month of pregnancy, only 17% of women received the recommended number of visits and 13% begun antenatal care according to these recommendations.

Use of maternal health services varied by maternal socio-demographic and household charactersitics. Higher proportion of women of age 15-24 years, urban, women with

secondary and above education, highest wealth tertile, women who intended the pregnancy, those participating in all household decisions, women with first pregnancy, and those living nearer to health facilities used antenatal care. Our multivariate analysis showed that pregnancy intention is associated with use of antenatal care and receiving adequate antenatal care, but not with delivery care. The odds of receiving antenatal care were 24% lower for women with an unintended pregnancy compared to women with an intended pregnancy. Similarly, the odds of receiving adequate (4+) ANC to that of no ANC visit was 33% lower among women with unintended pregnancies compared to women with intended pregnancies.

Several previous studies from developed and developing countries found similar results regarding antenatal care. Where as studies from developed countries focused on the effects of unintended pregnancy on the timely initiation of ANC or receipt of adequate ANC, developing countries' studies assessed the relationship between unintended pregnancy and use of ANC or use of adequate ANC. For instance, studies from the US found that women with unintended pregnancies initiate antenatal care late and receive incomplete antenatal care compared with women with intended pregnancies (72, 167, 168). Studies from India (38), Ecuador (74), Kenya and Tanzania (75, 169) also reported that women having an unintended pregnancy were significantly less likely to seek out antenatal care or have had adequate antenatal care visits compared to women who had intended their pregnancy. However, there were also studies in which no or inconsistent associations were reported (36, 76, 170). Given the inconsistency of results from previous studies, we conducted a meta-analysis of observational studies to estimate the effect of pregnancy intention on use of antenatal care services. Our analyses showed increased odds of delayed antenatal care use (OR 1.42, 95% CI, 1.27-1.59) and inadequate antenatal care use (OR 1.64, 95% CI 1.47-1.82) among women with unintended pregnancy compared to women with intended pregnancy (see paper V attached).

The reasons why women with unintended pregnancies do not use antenatal care or receive inadequate care is less clear. One hypothesis is that women with unintended

pregnancies, compared to those with intended pregnancies, are likely to be less emotionally and financially prepared for the demands of pregnancy and childbearing and more likely to take less care of themselves and the developing fetus during pregnancy (167, 168). This was observed in our FGDs: Women with unintended pregnancies may not obtain adequate care due to the disappointment of getting pregnant or they may feel ashamed when the pregnancy is too close to the previous birth or because of their age (i.e older women may be embarrassed they are pregnant). Another line of argument is that women with unintended pregnancies recognize the pregnancy late, and do not start antenatal care early in the pregnancy (33). It is also observed in this study that women with unintended pregnancies recognized the pregnancy later than women with intended pregnancies. In the FGDs, participants mentioned that an unintended pregnancy may happen after the recent birth of a child and before menses returns, and in this case the pregnancy may not be recognized early.

Only 12% of women delivered their most recent child in a health facility. A higher proportion of women from urban areas, with secondary and above education, from the highest wealth tertile, those living closer to health facilities and who used ANC during the index pregnancy had delivered their most recent birth at health facilities. With regards to pregnancy intention, 14% percent of women with an intended pregnancy gave birth at a health facility compared to 8.6% of women with an unintended pregnancy, and the difference was statistically significant at the bivariate level ($P<0.05$). However, the association of pregnancy intention with institutional delivery was attenuated once we controlled for other socio-demographic factors. Although pregnancy intention was no longer siginificantly associated with institutional delivery, the association remained significant for women with an unwanted pregnancy showing that the odds of using delivery care was significantly lower for women with an unwanted pregnancy.The association between pregnancy intention and place of delivery has been inconsistent across several other studies (36, 76).

Other factors independently associated with ANC and institutional delivery includes women's education, household wealth status, distance from health facility and previous use of modern family planning services. In several studies, including studies from Ethiopia, such variables as women's education, wealth and accessibility to health services were found to be factors that influence use of maternal health care (66, 68, 171, 172). Women's education in particular has been consistently associated with use of maternal health services. Education provides women with a range of information and greater ability to access modern health services. Moreover, it improves women's ability to acquire greater power in decision making and thus the decision to seek health care when required (173). The association of distance to a health center and use of maternal health services shows that accessibility to health services remains an important factor for access to maternal health services. Several other studies from developing countries showed an association between service accessibility and use of modern health services (21, 166, 169). Women's participation in decision-making was also associated with antenatal care use, but not with delivery care.

There are other important reasons for low institutional delivery. Pregnant women who were involved in the follow-up study were asked where they want to give birth, and about 72% preferred to deliver at home. The main reasons for preferring home delivery were; that facility delivery is not necessary unless there is a health problem, the health facility being too far, that facility delivery costs a lot of money and transportation problems. Similar reasons were given in the 2011 EDHS: About 62% said that health facility delivery is not necessary and a considerable proportion mentioned transportation problems and distance as reasons for not delivering in a health facility (2).

5.3 Pregnancy Intention and Depression (Paper II)

The magnitude of 19.9% (95% CI, 16.8-23.1) antenatal depressive symptoms in the current study is very high**.** However, it is within the range of findings reported from SSA countries and other developing countries (89, 90, 92, 93, 157). In Sub-Saharan Africa,

the prevalence of antenatal depression ranged from 8.3% to 39% (92, 93, 174). The later was a community-based study among low income pregnant women in Cape Town. Depressed mood in pregnancy was measured using the EPDS with a cutoff point of 12 and above (92). Overall, the magnitude of depressive symptoms during pregnancy in this study is high when compared to findings from a systematic review that showed a prevalence of prenatal depression of 12% in developed countries and 15.6% in developing countries(88).One study from the Gilgel Gibe DSS used the Hopkins Symptoms Checklist (HSCL) to measure the prevalence of postnatal maternal and paternal symptoms of anxiety and depression and found a prevalence of depression (defined as mean score for each HSCL item of ≥1.75) of 37% (94). However, it is important to note that studies on antenatal depression used different depression scales, making comparision of the magnitude of depression across studies difficult. Depression in pregnancy is correlated with self-rated health status: Almost two-thirds of women with depressive symptoms report poor self-rated health.

The magnitude of depressive symptoms in pregnancy varied by maternal socio-demographic, household and obstetric factors. A higher proportion of women with no formal education, higher parity (5 and above), a history of pregnancy loss, an unwanted pregnancy, household food insecurity, experience of domestic violence and lower social support during pregnancy reported depressive symptoms.The multivariate analysis also showed that pregnancy wantedness, household food insecurity, partner violence and social support were associated with depressive symptoms in pregnancy. With regards to pregnancy intention, the odds of being depressed during pregnancy were nearly two times higher among women with an unwanted pregnancy as compared to women with a wanted pregnancy. Several previous studies from developing countries have shown such an association between unwanted pregnancy and depression in pregnancy (3, 175).

Although there are studies that showed a lack of association between unintended pregnancy and antenatal depression (89, 176), a number of studies demonstrated that uninteneded pregnancy increases the risk of depression during pregnancy. Unintended

pregnancy may increase a woman's exposure to psychosocial stressors, decrease social support provided to her by the partner and may thus increase her level of depressive symptoms (27, 177). This is also true in the present study where a low level of social support and relatively higher magnitude of depressive symptoms were observed among women with an unwanted pregnancy. Our multivariate analysis also showed that social support is significantly associated with depressive symptoms in pregnancy. The association between social support and depression during pregnancy has been confirmed by studies from both developing and developed countries. These studies have shown that social support plays a buffering role from stressful life events by providing resources, support and strength during pregnancy (96, 178).

On the otherhand unintended pregnancy may increase a woman's exposure to violence from the partner and hence increase her dissatisfaction with life and depression (115, 179). In this study too, although few women (about 4%) reported being beaten during the current pregnancy, the magnitude of depressive symptoms was very high (46%) among women who had been beaten compared to women who did not experience partner violence during pregnancy (19%). The association between intimate partner violence and depression during pregnancy was also significant even after adjusting for the effects of other socio-demographic variables. Intimate partner violence exposes women to a wider range of physical and mental health problems including depression and anxiety (100, 101).

Other factors significantly associated with depressive symptoms in pregnancy were household food insecurity and women's occupation. About 41% of women in this study reported food insecurity, which can be one main cause of stress. Food insecurity is a major problem in rural Ethiopia and in the present study area in particular (94). This study took place in the summer months of June and July, a time when most households run out of food in rural Ethiopia, and food insecurity tends to be high during this season. Household food insecurity predisposes women to depression and anxiety. Another study conducted in the same setting also reported an association between food insecurity and maternal symptoms of anxiety and depression (94).

5.4 Pregnancy Intention and Birth weight (Paper III)

We examined the associations between pregnancy intention and the incidence of LBW using data from a follow-up study in which pregnant women were followed from pregnancy through to delivery. Of the 612 pregnant women followed through to delivery, 96% resulted in a live birth. However, the pregnancy outcomes reported here may not represent the overall picture of pregnancy outcome in a rural Ethiopian population since women were enrolled in the study after the first trimester of pregnancy. A previous study from eastern Ethiopia reported that spontaneous abortion and still birth are common in rural Ethiopia (180). Moreover, a relatively higher proportion of pregnancies that were unintended ended up in a still birth or miscarriage than pregnancies that were intended.

The incidence of low birth weight was 17.9% showing that LBW is common in the study area. Previous studies from Ethiopia showed an incidence of LBW ranging from 10-28% (125-128, 130). The majority of these studies were hospital-based studies and showed lower level of LBW than community-based studies. In Ethiopia, nearly nine in ten babies are born at home and are not weighted at birth. In particular, birth weight of rural births where home birth is still the tradition is not known and such community-based studies focusing on rural populations found higher incidence of LBW than facility-based studies. For instance, recent community based studies in eastern and southern Ethiopia found higher incidence of LBW of 28% and 17% respectively (127, 130). In the 2011 EDHS women reported that 21% of all live births in rural Ethiopia in the five years preceding the survey were very small in size, as reported subjectively by the mother(2).

The incidence of LBW varied by maternal socio-demographic and household characteristics. A higher proportion of low birth weight births were born to women aged 35 and above, women in lowest wealth tertile, women with unwanted pregnancy, women with small MUAC size, women with antenatal depressive symptoms , and those with low social support. About 15% of births from an intended pregnancy were born LBW compared to 28% of births from an unwanted pregnancy. The proportion of LBW

births also varied from 16% among women with no antenatal depression to 26% among women with depressive symptoms.

Our regression analysis showed that unwanted pregnancy and depressive symptoms were associated with LBW at the bivariate level. The association between LBW and unwanted pregnancy remained marginally significant after multivariable adjustment showing that an unwanted pregnancy was more likely to result in a LBW baby. Several previous studies reported such an association between pregnancy intention and LBW (134, 135, 181). A meta-analysis of observational studies also found an increased risk of LBW among births from unwanted and mistimed pregnancies compared to births from intended pregnancies (34).Unwanted pregnancy may contribute to LBW through adoption of risky behaviors such as non use of antenatal care, delayed initiation or inadequate antenatal care use and reduced social support during pregnancy. This same study has indicated that women with unintended pregnancy were less likely to use ANC during pregnancy and less likely to receive adequate ANC compared to women who intended the pregnancy. Thus unintended pregnancy can influence birth outcome through maternal health behaviours during pregnancy.

Lack of antenatal care was also associated with a higher risk of LBW. Several previous studies reported on the role of ANC in improved birth outcome (127, 182, 183). Antenatal care provides a series of medical, nutritional and education interventions to reduce the incidence of LBW and adverse pregnancy conditions. In this study, 47% of women did not attend any antenatal care during pregnancy. As a result they did not obtain education and counseling on proper nutrition and balanced diet as well as other routine checkups for weight, height, gestational weight gain, hypertension and related health conditions that are given during ANC visits in Ethiopian health facilities. These interventions could contribute for the differences in birth weight between women who attended antenatal care and those who did not.

The relationship between antenatal depressive symptoms and LBW was attenuated in the multivariate models adjusting for pregnancy intention and other socio-demographic

factors. The association between depression and LBW has not been consistent although a meta-analysis has shown that prenatal depression increases the risk of LBW and pre-term birth (84). We suspected that the association between depressive symptoms and LBW was mediated by the presence of social support, and ran different regression models to explore this relationship. Social support plays a mediating role between depressive symptoms and LBW reducing the effects of depression on LBW. Social support, which measured the presence of support from families, friends and the partner during pregnancy, was significantly associated with LBW. The risk of LBW was significantly lower among women with higher social support during pregnancy. Several studies from developed countries have reported on the role of social support in facilitating better birth outcomes (95, 184). These studies have shown that social support plays a buffering role from stressful life events by providing resources, support and strength during pregnancy.

Other factors independently associated with LBW in the multivariate analysis included household wealth status and maternal MUAC size. The effect of wealth status on LBW has been observed in several studies (127, 131, 185).These studies have shown that births from poor households were more likely to be of LBW than those from better off families. This might be related to the better nutrition and pregnancy care obtained under higher SES situations. Similarily maternal MUAC, a proxy for nutritional status, was also associated with LBW. The risk of LBW was lower when the mother had a MUAC size of 230 mm and above. Several previous studies have reported similar findings (127, 130, 186). MUAC is found to be a good anthropometric indicator to identify acutely malnourished pregnant women and to predict adverse birth outcomes (187). The association shows that maternal nutritional status is one of the factors that influence birth weight, as better maternal nutrition results in higher birth weight.

5.5 Pregnancy Intention and child health (Paper IV)

The associations between pregnancy intention and three child health indicators - childhood vaccination, treatment-seeking for childhood illness and mortality - were

assessed using data from the cross-sectional survey. We found that 74% of children alive at the time of the survey, ages 1-24 months, had received at least one of the basic childhood vaccininations, although only 37% of children ages 12-24 months received all basic childhood vaccinations. The proportion of children age 12-24 months who were vaccinated with DPT3 was 54%. Considering the fact that DPT3 is an indicator of the Global Universal Childhood Immunization initiative, this level of DPT3 vaccination in the study site is quite low compared with the global average of 83% coverage in 2012 (14). The 2011 EDHS also showed that only 24% of children 12-23 months received all basic vaccinations and 37% received DPT3 vaccine (2).These results show that the coverage and completion of basic vaccinations in rural areas is still low. The completion of basic childhood vaccinations varied by maternal and child socio-demographic and household characterisitcs. A higher proportion of male births, urban children, children of mother's with secondary and higher education, children of mother's with higher participation in household decisions, intended births, and children of mothers with fewer under-five children had received vaccinations. Moreover, vaccination coverage was also higher for children whose mother's had four or more ANC visits during their most recent pregnancy, who delivered in a health facility, who lived closer to health facilities and food secure households compared with their counter parts.

All women whose index child was alive at the time of the survey were asked whether the child had a cough, fever and diarrhea in the two weeks preceding the survey. This is based on the understanding that pneumonia, malaria and diarrhea are the major causes of childhood morbidity and mortality. A study conducted in the same setting on the determinants of child mortality also found that pneumonia, malaria and acute diarrheal diseases are the major causes of infant mortality in the study area (188). Likewise, this study observed that nearly one-fourth (24%) of the children included in the study have experienced illness in the two weeks before the survey, the most common types of illness being fever (16.4%) followed by diarrhea (14.6%) and cough/short breathing (13.1%).

Treatment or advice was sought from health facilities for 59% (95% CI, 53.8-64.7) of those children with any illnesses. Treatment or advice was sought more for fever (63.9 than cough (57.3%) or diarrhea (56.5%) reflecting the fact that people are more likely to seek treatment for malaria which is an endemic disease in the study area. This health-seeking behavior is higher than what was found in the 2011 EDHS which showed that treatment or advice was sought from a health facility for 32% of children with diarrhea, 24% of children with fever and 27% of children with symptoms of Acute Respiratory Infection (2). Higher proportions of male than female children, children of mothers of age 25-34, children of mothers with secondary and higher education, children from rich households and food secure households had received treatment or advice from health facilities. Moreover, a higher proportion of children from an intended pregnancy than an unintended pregnancy were treated for their most recent illness.

Child mortality was measured for all the births that happened in the two years before the survey. Among the 1382 children born to 1370 women in the two years before the survey, there were 78 deaths showing a mortality rate (MR) of 51 per 1000 person years [95% CI, 40.4-63.1]. Although it was difficult to compare the results of this study with previous studies in the DSS area and other national surveys such as the DHS due to differences in the way the denominators were defined (number of live births vs person years of exposure), the level of mortality observed in this study was lower than the findings of the 2011 EDHS for infant mortality (59 deaths per 1000 live births) (2) and a previous study from the same DSS area (76 deaths per 1000 live births) (188). The DSS data on child mortality was not accessible by the time to validate our findings with data from the routine surveillance.

The proportion of infants who died varied by maternal and household characteristics. A relatively higher proportion of infants born to older women (age 35^{+}), male births, births with an interval of less than two years, births to poor households, births to women with lower decision-making autonomy, births to women who did not use ANC during pregnancy, births in households located more than an hour walking distance from health centers, births to mothers who had no antenatal and delivery care and those who have

never received vaccination died compared to their counter parts.There was no significant difference in child mortality by pregnancy intention.

Pregnancy intention was not associated with completion of childhood vaccinations in this study showing that children from unintended pregnancies were not different from intended children in receiving full vaccinations. Studies that assessed the association between pregnancy intention and child preventive and curative care in some countries also found no effects (189, 190). However, some studies from developing countries reported an association between pregnancy intention and child preventive and curative care. In the FGDs as well, discussants mentioned that mothers do not discriminate between their children unless they have other economic or family problems.

This study did not find associations between pregnancy intention and mortality in the first two years of life. Most previous studies on the association between unintended pregnancy and child mortality found greater effects for the neonatal period than the post-neonatal or childhood periods (37, 39). But, two recent studies from Asian countries using longitudinal data found that children from unwanted births were more likely to die during the neonatal and post-neonatal period than children from wanted births (32, 38). The lack of association with child mortality in the current study may be due to the small sample size or to the limitation of cross-sectional studies in correctly measuring both pregnancy intention and infant mortality. Apart from the limitations mentioned, researchers have noted that the association between pregnancy intention and child health is sensitive to controls for maternal characteristics and family background, and some have suggested that these variables may serve as the mechanism through which unintended pregnancy affects child outcomes (33).

However, children from unintended pregnancies differed from intended pregnancies in health care seeking up on illness. The odds of not receiving treatment if ill to that of no illness were 1.56 times higher for children that were unintended compared to those that were intended. This finding is congurent with findings from two other studies from developing countries which showed that unwanted children were more likely than other

children to become ill and less likely to receive treatment for their illness compared to wanted children (32, 40).The reasons behind the differences are less clear but researchers have argued that unintended fertility reduces a parent's willingness to invest resources in a child (40, 145). This may be the reason for lower health-seeking for children from unwanted pregnancies. It is also observed that a higher proportion of unintended pregnancies occur to women with higher parity, poor and rural women where there is limited capacity to pay for modern health care. In the FGDs, discussants mentioned that factors such as having too many smaller children in the family or being pregnant while the last child is still young, and not having someone else to help with household chores matter more than pregnancy intentions.

Another important demographic factor associated with child health was birth interval and or the number of under-five children in a family (used as a proxy for birth interval). We found that children from families with more than two under-five children were less likely to be fully vaccinated and also to receive treatment for illness. This may be because women with multiple under-five children face higher burden of caring for children and may not be able to take their younger child (ren) for vaccination or treatment for an illness. Other studies from low and middle countries have also found such an association between the number of young siblings or parity and child health care (36, 145, 191, 192). For instance, the study by Desai (1995) found that having younger siblings decreased a child's health because of increased competition for resources. Similarly, shorter birth intervals are associated with increased risk of child mortality. The incidence rate of child death was nearly twice (IRR, 2.06; 95% CI; 1.11-3.84) as high when the interval was less than 24 months. This is consistent with the findings of several previous studies on the effects of shorter birth intervals on infant and child mortality (137, 193).

Women's participation in household decision making was another important factor for predicting child health. It is significantly associated with completion of basic childhood vaccinations and child survival, although not significant in the analysis of child health-

seeking. Studies from Ethiopia (194), Nigeria (195) and India (196) also found that women's autonomy is important in the utilization of child vaccination services. Another study that assessed the associations of women's autonomy with under-five mortality from central Ethiopia also found that women's greater involvement in household decision making was significantly associated with under-five mortality (197). Our results showed that other variables such as maternal education, wealth and use of antenatal care during pregnancy were also significantly associated with vaccination status and obtaining treatment for an illness (60, 198).

This study showed that use of maternal health services is an important predictor of the use of child health care and survival. More importantly, antenatal care had a consistent association with completion of all childhood vaccinations, receiving treatement for illness and child survival. As observed in previous studies (199-201), use of antenatal care during pregnancy and more importantly, completing the recommended ANC visit was strongly associated with providing one's child the full set of vaccinations and providing treatment for illness. Studies have shown that the use of antenatal care encourages the use of subsequent maternal and child health services including institutional delivery, vaccination and health-seeking for sick children (202, 203). Proximity to health facility was also significantly associated with child health care; completion of childhood vaccinations and treatment for illness. This finding is consistent with previous studies from Ethiopia and other low and middle income countries, indicating that access to health facilities is an important factor for the utilization of child health services (204, 205).

6. Validity, strengths and limitations of the study

6.1 Validity and Generalizability

In this study, we implemented a range of mechanisms to ensure the study's internal and external validity. Potential biases that would affect the study's validity were considered and addressed from the outset. To reduce selection bias, we used the list of eligible respondents (women with a live birth in the two years before the survey) from the Gilgel Gibe Field Research Center and picked our sample using simple random sampling. The follow up study included all pregnant women in the second and third trimester of pregnancy and hence sampling was not done. Moreover, non-response was minimum as the two surveys had a higher response rate (above 90%) except in the case of the measurement of birth weight where response rate dropped below 90%. In this case, we have compared the characteristics of women whose birth was measured with those whose birth was not weighted and did not find differences in terms of maternal socio-demographic, obstetric and household characteristics. Recall bias was reduced by including women with recent live births in the cross-sectional study, and currently pregnant women in the follow up study.

Information bias can occur when the means for obtaining information about the subjects in the study are inadequate (206), and we took several measures to address this problem. In both the cross-sectional and follow up studies, study instruments were adapted from standard instruments used in major national and international surveys such as the DHS and the NSFG. We used scales validated in different settings and applied widely in measuring antenatal depression, social support and food security. A pre-testing of the study instruments was also done before the main study, and the pre-test results were used to modify the study questionnaire according to local contexts. Translation to local language (Afan Oromo) and back to English was done carefully including comments from different professionals. Data collectors and supervisors involved in both surveys were experienced and had relevant training (a diploma in nursing and related fields). The data collectors had four days of intensive training for the

purpose of this data collection. The same data collectors collected the baseline follow up study. They were closely supervised by supervisors with more experience and training. Birth weight was done by the DSS data collectors who were based in each of the DSS villages. They had the experience of conducting birth weight measurement for the Gilgel Gibe DSS which had once started birth weight measurement. Similarly, for the qualitative study, public health specialists with an experience of qualitative study conducted the focus group discussions.

For all study outcomes, we have used appropriate statistical models and test statistics including multivariate analysis to adjust for the effects of confounding factors. Factors that were thought to confound the associations between pregnancy intention and each of the outcome variables were included in the multivariate analysis. Moreover, where appropriate we assessed the potential for moderation (interaction) using recommended procedures (162). Examples of interactions tested include the interaction between pregnancy intention and parity in the models for maternal health care, but did not find significant interaction effects. Other examples include interactions between depression and pregnancy intention in predicting low birth weight, which was not significant as well.

We have tried to triangulate the study findings with the application of both quantitative and qualitative methods and designs. The quantitative study included a cross-sectional survey of women with recent births and a follow up study among pregnant women. Indicators measured in both surveys were similar and comparable. The qualitative study, conducted at the end of the quantitative study was used to explain the context and the findings of the quantitative study.

Sample size was determined based on appropriate sample size determination procedures and were adequate. We have shown confidence intervals for most indicators, and the confidence intervals were not wide enough. The findings of the current study can be generalized to the Gilgel Gibe Surveillance area where the study samples were allocated based on sampling proportionate to size technique; to the

districts (Tiro Afeta, Kersa, Omo Nada and Sekoru) from where the respondents were selected and to areas with similar socio-economic conditions outside the study area. For instance, indicators of pregnancy intention, maternal and child health care are similar to findings from the DHS and can be useful at different levels. Moreover, the study included participants from both rural and urban areas and can represent these two settings with similar socio-economic conditions.

6.2 Strengths and limitations of the study

The main strengths of this study are the use of mixed methods to triangulate the findings of the study, a follow up study, different statistical models and data sources. The qualitative study, conducted after the quantitative study, complemented the quantitative study and offered more in-depth explanations for the quantitative findings. The prospective study was used to identify the determinants of birth weight in which case determinants of birth weight were measured before the outcome has taken place. Even in the cross-sectional survey, we included women with births in the two years before the survey - a relatively short recall period compared with surveys such as the DHS. The magnitude of unintended pregnancy was measured in both the cross-sectional and longitudinal study and were comparable with results from national and local studies. Moreover, a meta analysis has been done (although not included in the dissertation) to synthesis findings of existing studies on the association between pregnancy intention and use of antenatal care.

Instruments used for data collection were adapted from standard ones, including widely validated measurement scales. The questionnaire used for the surveys and FGD guides were translated to a local language and were pre-tested before use. Data collectors were experienced, and had relevant training in Nursing, and knew the language and culture of the population**.** There was a high response rate for the surveys. Data analysis was done using appropriate statistical methods after checking the assumptions of the models and adjusted for potential confounding factors. The study was conducted in the

Gilgel Gibe DSS area where data is being collected longitudinally. The present study has benefited from the existing structures and experiences of data collection in the DSS including the use of the DSS list as a sampling frame with minimal updating. On the other hand, it has been a limitation. Our data collection took place concurrently with the DSS data collection, and there were eligible respondents hiding away from our interviewers indicating the community's fatigue to the repeated interviews.

The current study has also some limitations. Most importantly, with the cross-sectional study design, there is a possibility of recall bias and post-hoc rationalization in responding to pregnancy intention questions. Pregnancy intention was assessed retrospectively but this approach is found to underestimate the magnitude of the problem since women's report of pregnancy intentions is affected by post hoc rationalization. In light of the important role husbands (partners) play in the health and wellbeing of children, we failed to include an important unit in studying the effects of pregnancy intention on child health. In the follow up study where we tracked pregnant women through to delivery, women with first trimester pregnancies were not included thus introducing a selection bias in light of the measurement of pregnancy intentions and related health outcomes. Moreover, loss to follow up and failure to make birth weight measurement with in 72 hours was observed. A significant number of women did not want their newborn to be weighted in the first two days, and as a result were excluded from the analysis. However, we assessed the characteristics of women lost to follow up or whose birth weight was not taken and compared them to those that remained within the study sample to check for any selection bias. Women whose births were not weighted were not different from those whose births were weighted in terms of socio-demographic, and household characteristics. Although majority of the data collectors had a diploma in Nursing, they were not practicing clinical nurses. However, due to their training as a clinical nurse, they may introduce a professional bias as most of the questions were health care related. It was discussed in the data collectors training that data collectors do not try to lead or guide respondents to answer a correct one and not to introduce a professional bias.

7.0 Conclusions

This study examined the effects of pregnancy intention on maternal and child health. We measured pregnancy intention retrospectively in both the cross-sectional and follow up studies, although the latter was done during pregnancy within a shorter time after conception. In both surveys, the magnitude of unintended pregnancy was high, particularly among older, high parity, rural, poor, uneducated, and women with lower participation in household decision making.

The study revealed that use of maternal health services was very low in the study area; only 42% of women used ANC during their last pregnancy, and only 17% had 4 or more ANC visits according to the WHO recommendations. Only 12% delivered in a health facility with the assistance of skilled provider. Use of both antenatal care and institutional delivery were lower among women with unintended pregnancies, and a significant association was observed for antenatal care in the multivariate analysis. This indicates that pregnancy intention impacts maternal health behavior, as antenatal care is an important gate way to a continuum of maternal and child health care. However, the association between unintended pregnancy and institutional delivery was attenuated after adjusting for maternal and household characteristics.

Nearly one in five women interviewed during the baseline survey had depressive symptoms. A high proportion of women with unwanted pregnancy, with low social support, with food insecurity, with a history of pregnancy loss and partner violence reported depressive symptoms. The multivariate analysis also showed higher odds of depressive symptoms among women with unwanted pregnancies. It is observed that much of these stressful life experiences is related to the socio-economic context in which women live such as food insecurity, low social support, intimate partner violence and unwanted pregnancy.

Low Birth Weight is common in the study area. Nearly 18% of births to women who were followed from pregnancy through to delivery had LBW births indicating that LBW is

still an important health problem in rural Ethiopia. The incidence of LBW was higher among women whose pregnancy was unwanted, among those who had no ANC, among those who were acutely malnourished and among those with antenatal depression and low social support. At the multivariate level, the association between LBW and unwanted pregnancy remained marginally significant after multivariable adjustment. Other important factors that significantly influenced birth weight were wealth status, use of antenatal care in pregnancy and maternal MUAC size.

The association between pregnancy intention and child health was examined considering the completion of basic childhood vaccinations, treatment for illness and mortality. We found that only 37% of children aged 12-24 months have completed all basic vaccinations indicating that vaccination coverage is still low in rural Ethiopia. Likewise, this study observed that nearly one-fourth (24%) of the children of mothers included in the study have experienced illness in the two weeks before the survey mainly from fever, diarrhea and cough. Treatment or advice was sought from health facilities for over half (59.7%) of those children with any illnesses. Among the 1382 children born to 1370 women in the two years before the survey, there were 78 deaths showing a mortality rate (MR) of 51 per 1000 person years. Pregnancy intention was not associated with completion of basic childhood vaccinations or mortality in the first two years, but with receiving treatment up on illness. The multivariate analysis also showed a significant effect of unintended pregnancy on treatment seeking but corresponding effects on vaccination and mortality were not observed in the analysis.

Overall, the study showed that pregnancy intention affects the use of maternal health services and maternal psychosocial well being during pregnancy. The effect of pregnancy intention on birth outcome is concentrated among women with unwanted pregnancy, however no effects were observed with regards to childhood vaccination and survival in the first two years of life.

8.0 Recommendations

Given the levels and patterns of unintended pregnancy and its effects as observed in this study, improved access to family planning information and services is essential to improve the health of women and children. It is important to build on the current momentum of expanding access to family planning in Ethiopia to help women and families achieve their desired family size. Focus should be given to improving access to family planning among the rural, older, poor and uneducated women who experience unintended pregnancies. Efforts should be made to increase access to more effective, long acting and permanent family planning methods. In doing so, it is essential to focus on women in the postpartum period because most of the unintended pregnancies reported in this study were mistimed pregnancies experienced by women with short inter-pregnancy intervals. The Ministry of Health (MOH) and all stakeholders in family planning service delivery should provide information and education to raise women's awareness on pregnancy risk during the postpartum period and generate demand for postpartum family planning. Health providers, particularly those at the village level (health extension workers) should be informed about fertility return and how to counsel postpartum women on pregnancy risk.

Further research is needed on reasons why women do not use family planning services where the service is accessible. But, improving the quality of family planning services is essential as women mention fear of side effects for not using family planning. This should include better counseling and information supply for clients, availing method mix, and informing the side effects of methods. Family Planning providers, partcularily health extension workers, should be trained on how to counsel women with side effects.

Encouraging use of maternal and child health services, particularily in rural areas, is also important. Lower proportions of women receive ANC as per the recommnedations, and few deliver at a health facility. Women mention that health facility delivery is not needed unless they experience pregnancy related problems. It is essential to provide information and education on the benefits of maternal health care. Women mentioned

distance and transportation problems as major obstacles to obtain maternal health care from health centers and hospitals. In this regard, an outreach mechanism and an efficient referral system may help reduce these barriers.Similarily, lower proportion of children completed all basic childhood vaccinations. Although vaccinations are available at the health post level, it is essential to increase awareness about vaccination, particularily on the need to complete all recommended childhood vaccinations.

Late recognition of pregnancy, late intiation of ANC and making fewer ANC visits is more common among women with unintended pregnancy. Thus, providing Information, education and communication on early pregnancy symptoms before a missed period and early intitation of antenatal care is important. Moreover, it is essential to train health providers on ways of screening for pregnancy intention, depression and availability of social support during antenatal care visits. Understanding women's pregnancy intention at the time of first antenatal care visit is important to encourage women with unintended pregnancies to complete antenatal care and deliver in a health facility. It is also important to screen for depression during pregnancy and provide appropriate counseling. The WHO has made a recommendation as to integrate mental health into primary health care settings in developing countries. However, further research is needed on how to integrate mental health issues in to maternal and child health services in our setting.

Improving the integration of family planning and maternal and child health services is essential. Antenatal care and child immunization visits are two of the opportunities when women come to health services and such opportunity should be used to provide family planning information and services. Informing women about healthy timing and spacing of pregnancy during immunization visits is essential**.** Further integration of family planning and maternal and child heath issues in to other development programs such as food security are also important.

The findings of the current study also highlight the need to improve women's empowerment including greater participation in household decision-making and women's education for better maternal and child health care.

Further research using longitudinal design, in which pregnancy intention is identified before the pregnancy, is needed to examine the effects of pregnancy intention on maternal and child health. Such study should use multidimensional scales for measuring pregnancy intention than the DHS type questions. Moreover, further research using a qualitative design is needed to explore the reasons for lower institutional delivery, lower vaccination coverage and reproductive health and child health care in the study area.

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Annex I: Questionnaire for cross-sectional survey

Name of interviewer:	Kebele name:	Household ID:
Interviewer signature	House number:	Women ID:
Name of supervisor:		
Outcome of first visit	1. Completed 2. Not around home 3. Refused	Date of appointment for other time visit
Outcome of second visit	1. Completed 2. Not around home 3. Refused	Date of appointment for other time visit
Outcome of third Visit	1. Completed 2. Not around home 3. Refused	
Date of interview date/month/ year	-------- /--------/-----------	

	PART I: **SOCIO- DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS**		
101	In what month and year were you born?	________________	
102	How old were you at your last birthday?	Age in completed years ___________________	
103	Have you ever attended formal school?	Yes . . …………………………………….. . . . 1 No . . . . ……. . .. ……….……..…. 2 → 105	
104	What is the highest grade you completed?	Grade ______________________ technical / vocational certificate............................1 university/ college diploma..................................2 university/college degree......................................3	
105	What is your religion?	Muslim……..………..……..……..……..….…….1 Protestant. ………………….………..….…….…….2 Orthodox……………………….………...……….3 Catholic ……………………………………….4 Other ________________________ (Specify)	
106	What is your ethnicity?	Oromo…………………….........………...…….1 Amhara …..……….……..……..….…......….…2 Yem ………………….…..……..…..….......…..3 Guraghe ……………………....…………….....…4 Other…………………..…..……..…..……………5	
107	What is your marital status?	Married---1 Widowed---2 Divorced--3 Separated---4	
108	What was the age at which you married for the first time?	______________________	
109	Does your husband have another wife	Yes---1	

	(wives) besides you?	No ---------- 2 →	111
110	How many other wives does your husband have	_____	
111	What is your usual occupation, that is, what kinds of work do you mainly do? _____	Housewife----------1 farmer ----------2 Government/NGO employee----------3 Merchant----------4 Student ----------5 Other(specify)----------6	
112	What is the main source of drinking water for members of your household?	pipe in dwelling/compound…….....…1 pipe outside compound ……..…..…..……..2 open well ……..…..……..……...3 open spring ……..……4 covered well ……..……...5 covered spring ……..…..……..……....6 surface water (river, pond or lake)…….....7 rain water ……..8 other ……9	
113	What kinds of toilet facility do most members of your household use?	flush toilet .....1 traditional pit toilet.....2 ventilated improved pit ……..…..……..…3 latrine (vip)…….....4 no facility/bush/field .....5 other(specify) _____	
114	Does your household have? Radio Electricity Television Telephone/cell phone Refrigrator An electric mitad A kerosine lamp/pressure lamp A bed/table Own the house living in? Own a bicycle? A motorcycle? A car or truck? Have crop land? Have cattle? How many cattle? Have horse/mule/donkey? Have sheep/goats?	Yes No 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2	
115	Main floor material of the house	earth/sand.....1 dung.....2 wood planks.....3 reed/bamboo.....4 parquet or polished wood.....5 vinyl sheets/tiles.....6 cement .....7 cement tiles/brick .....8 carpet.....9 other _____ (specify)	

116	How many rooms in your house are used for sleeping?	No. of rooms _____	
117	Main roof material of your house	corrugated iron..... 1 Cement/concrete..... 2 wood and mud ..... 3 thatch.....4 reed/bamboo.....5 plastic sheet.....6 mobile roofs of nomads .....7 other _____ (specify)	
118	How many people live in your household?	_____	

	PART II: FERTILITY: Now, I would like to ask you about the births that you have had in your life.		
201	How many children have you given birth to (male and female) in your life who are still alive?	Total _____ Male _____ Female _____	
202	Have you ever given birth to a boy or girl who was born alive but later died?	Yes----------1 No ---------- 2 →	204
203	How many such sons & daughters died?	Sons who died _____ Daughters who died _____	
204	In total how many children have you given birth to in your lifetime?	_____	
205	What was your age when you gave birth to your first child?	_____	
206	How many children did you give birth to in the last 5 years?	_____	
207	Did you give birth to a child in the last 12 months?	Yes----------1 No ---------- 2	
208	When was the last time you gave birth?	Month _____ Year _____	
209	What was your age when you gave birth to your most recent child?	_____	
210	**INTERVIEWER:** record the names of all live births (male and female) the woman had since January 1999 E.C whether still living or not, starting with the latest birth.		

211	Name (start from the youngest)	Were any of these births twins?	Sex	Date of birth d/m/year	Age at his/her last birth day	Is (Name) alive or dead?	date of death
01		Single 1 multiple 2	male 1 female 2			Alive 1 Dead 2	
02		Single 1 multiple 2	male 1 female 2			Alive 1 Dead 2	
03		Single 1 multiple 2	male 1 female 2			Alive 1 Dead 2	
04		Single 1	male 1			Alive 1 Dead 2	

		multiple 2	female 2				
	INTERVIEWER: Refer to Qn.210 and record the names of all live births (male and female) the woman had since January 1999 E.C whether still living or not, starting with the latest birth. Enter names in Qn. 211.						
212	Name of last child, next to last child, etc.	At the time you became pregnant with (Name), did you want to become pregnant then, did you want to wait until later, or did you not want to have any more children at all?					
01		wanted then ……..1 wanted later ……2 not wanted at all ……3					
02		wanted then ……..1 wanted later ……2 not wanted at all ……3					
03		wanted then ……..1 wanted later ……2 not wanted at all ……3					
04		wanted then ……..1 wanted later ……2 not wanted at all ……3					
213	Are you pregnant now?			Yes ----------1 No ----------2 Unsure ----------3		→ 216	
214	How many months pregnant are you now?			_____			
215	At the time you became pregnant with this pregnancy; did you want to become pregnant then?			Yes ……..1 No ……..2			
216	Did you want to wait until later, or did you not want to have any more children?			Wanted later ……. 1 Not wanted at all …….. 2			
217	Have you ever had a pregnancy that was miscarried, was aborted, or ended in a stillbirth?			Yes ……..1 No ……..2		→ 219	
218	When did the last such pregnancy end?			Month _____ Year _____			
218	How many months pregnant were you when the last such a pregnancy ended?			_____			
219	Since sepetmeber 1999 E.C, have you had any other pregnancies which did not end in a live birth?			Yes ……..1 No ……..2		→ 221	
220	How many pregnancies did you have in the last five years that did not end in a live birth?			No. of pregnancies_____			
221	When did your last menstrual period start?			Days ago _____ Weeks ago _____ Months ago _____ Years ago _____ Before last birth …… 995 Other _____ (specify)			
222	If you could choose exactly the number of children to have in your whole life, how many would that be?			Number _____ How many boys _____ How many girls _____			
223	Have you ever discussed with your husband how many			Yes ……..1 No ……..2			

	children to have in your life?		
224	How many children does your husband want to have? how many boys & girls	_____ No. of boys _____ No. of girls _____	

	PART III: Wantedness of Index child Pregnancy: Now I would like to ask you about the pregnancy you had in the recent past.		
301	When was the last time you gave birth?	_____ years ago _____ months ago	
302	At the time you became pregnant with this child, did you want to become pregnant then, did you want to wait until later, or did you not want to have any (more) children at all?	Wanted then……..…….……..… 1 Wanted later ……..…….. 2 Not wanted at all……..……..……....3	
303	What was your husband's feeling about the pregnancy? Did he want you to become pregnant then, did he want you to wait until later or did he not want you to have any more children?	Wanted then……..…….…… 1 Wanted later ……..…….. 2 Not wanted at all……..……..……..3	
304	In the month that you became pregnant.....	You weren't using contraception.....…..…....1 You were using contraception, but not on every occasion..…….……..…..2 You always used contraception, but the method had failed at least once.....3	
305	Right before you became pregnant with your pregnancy, did you yourself want to have a (another) baby at any time in the future?	Yes ……..……..…..…..……1 No……..…..……..…..… 2 Not sure ……..…..……..…..…..…….....3	
306	Did you want to have a baby son or a daughter?	Son……..…...…….…..…1 Daughter ……..……..…..2 Any sex ……..……..…3	
307	When you got pregnant with your new baby, Were you or your husband doing anything to keep from getting pregnant? (ex. using birth control methods.)	Yes ……..……..…..……1 No ……..…..……..……..2	
308	Check 213 (Not pregnant) Now, I have some questions about the future. Would you like to have another child, or would you prefer not to have any more children?	have a/another child ---------- 1 No more ---------- 2 Undecided/don't know---------- 3 can't get pregnant ---------- 4 Unsure / pregnant ---------- 5	
309	How long would you like to wait before the birth of another child?	Months _____ Years _____ Soon/now ---------- 1 Don't know ---------- 2	

No.	PART IV: Maternal Health Care Utilization		
401	How many weeks or months pregnant were you when you first knew that you were Pregnant? (For example, you had a pregnancy test or a doctor or nurse said you were pregnant.)	weeks _________ month _________	
402	After you knew that you were pregnant, did you go any where to receive antenatal care?	Yes 1 No 2 →410	
403	How many weeks or months pregnant were you when you first received antenatal care for the pregnancy?	Number of months……………..…….. |___|___| Weeks...	
404	Where did you receive antenatal care for this pregnancy?	Hospital ……………..……….....…..……1 Health center ………..…………...……. 2 Health post …………..……….……..… 3 Other public facility …..………….…..……4 Private hospital/clinic ….……………..… 5 NGO health facility ……….……………......6 Home ……………………….……...….......7	
405	Whom did you see for antenatal care	Health professional ………..……………1 TTBA ……………………..………...…2 Untrained TBA ……………...………..…3 Community health agent……..………....4 Other _______________(specify)	
406	How many times did you receive antenatal care during the most recent pregnancy?	Number ……………….….. |___|___| Don't know...................................8	
407	During this pregnancy, were any of the following done at least once? Were you weighed? Was your blood pressure measured? Did you give a urine sample? Did you give a blood sample?	Yes No Weight 1 2 Blood pressure 1 2 Urine 1 2 Blood sample 1 2	
408	During this pregnancy, were you given an injection in the arm to prevent the baby from getting tetanus, that is, convulsions after birth?	Yes ----------------------------------1 No -----------------------------------2	
409	During this pregnancy, how many times did you get this injection?	No. of times ____________________	
410	During any of your prenatal care visits did a doctor, nurse, or other health care worker talk with you about any of the things listed below? a. The signs and symptoms of preterm labor (labor more than 3 weeks before the baby is due) b. What to do if your labor starts early c. Getting tested for HIV d. The signs of pregnancy complications e. Where to go for delivery	Yes No a. 1 2 b. 1 2 c. 1 2 d. 1 2 e. 1 2	
412	What is the closest health facility at which a woman can go to deliver a baby with assistance from a doctor, nurse, or midwife?	Gov't hospital…………......…......…1 Gov't health center ……………..…..…2 Health post ………………...….…...3 Private hospital…………….….…..…4	

	What is the name of the facility? _______________	Private clinic ……………….…..…5 OTHER ________________ (specify)	
413	How far is it from here to (facility mentioned in q.414)?	Distance in kms_________ Do not know........................ 8	
414	How long does it take to **walk** from here to (facility mentioned in q.414)?	Minutes................................ Hours .... Don't know 8	
415	At any time during your last pregnancy, did you have a test for HIV?	Yes ------------------------------------1 No -------------------------------------2	
416	At any time during your **last pregnancy**, did your husband push, hit, slap, kick, choke, or physically hurt you in any other way?	Yes ……………….……................1 No.…………………….…………...2	
417	At any time during **the *12 months after*** you gave birth with your new baby, did your husband push, hit, slap, kick, choke, or physically hurt you in any other way?	Yes ………………….….…..............1 No ………………….………….…...2	
418	Did you have any of the following problems during your recent pregnancy? Vaginal bleeding Severe nausea, vomiting, or dehydration High blood pressure, hypertension Labor pains more than 3 weeks before my baby was due Other _______________________	Yes No 1 2 1 2 1 2 1 2	
419	Where did you give birth to your baby for the current pregnancy?	Hospital …………….…………….…………..1 Health center ……….………..……….2 Health post …………………..…….3 Private clinic ……………………....4 Home ……………………….…..….5 Other ______________ (specify)	
420	Who assisted you with the delivery of (name)	Doctor …………………….….……..1 Nurse/midwife…………………….……..2 Other health worker………….……..3 TBA……………………………...4 Relatives…………….…….………..5 Other …………………………….6	
421	Was (name) delivered by caesarian section (when a doctor cuts through the mother's belly to bring out the baby)?	Yes ………….….…………….………...1 No ………………..……………... 2	
422	Why didn't you deliver in a health facility?	Costs too much………….…………....1 Facilities not open …..………..……2 Too far ……………………..................3 No transportation……....…………4 Don't trust facility ………..............…5 No female provider ………………..6 Husband/family did not allow ....7 Not customary …………...….….........8 Other ______________ (specify)	
423	Just before you gave birth to (name), did you experience a prolonged labor (labor more than 24 hours)?	Yes ……………..………………..1 No ………………..…...…….. 2	

424	How long did your labor last before your delivery?	Hours _____	
425	After (name) was born, did a health professional or Traditional Birth Attendant check on your health?	Yes ……..…….…….…..1 No ……..…….….. 2 →	430
426	Who checked on your and (name's) health at that time	Doctor ……..…….…..…1 Nurse/midwife ……...…….… 2 Health Ext. worker……..…..... 3 Other health professional ……..….....4 TTBA …….…….....…..5 Untrained TBA ……..…...…6 Community health agent…..…...…..7 Other _____(specify)	
427	When (NAME) was born, was he/she: very large, larger than average, average, smaller than average, or very small?	Very large ……..……1 Larger ……..…….…..2 Average ……..……3 Small… ……..……4 Very small ……..…….....…5	
428	Was (NAME) weighed at birth?	Yes ……..……1 No ……....…….2 →	433
429	How much did (name) weigh? record weight from health card, if available, grams from card or grams from recall	_____	
430	At how many months or weeks of gestation (pregnancy) was (name) born?	Weeks _____ Months _____	
431	Was the baby born *more* than 3 weeks before his or her due date?	Yes ……..……1 No ……..…….2	
432	Has your menstrual period returned since the birth of the child	Yes ……..……1 No ……..…….2	
433	For how many months after the birth of (name) did you not have a period?	Months _____	
434	Have you resumed sexual relations after the birth of (name)	Yes ……..……1 No ……..…….2	
435	For how many months after birth of (name) didn't you have sexual relations?	Months _____	

PART V: BREASTFEEDING & CHILD IMMUNIZATION PRACTICIES			
500	Is your child alive now?	Yes----------1 No---------- 2	
501	Has your last child,(NAME) ever been breastfed?	Yes----------1 No---------- 2 →	507
502	How long after birth did you first put (name) to the breast?	Immediately ----------o Hours _____ Days _____	
503	For how many months did you breastfeed?	_____	
504	Are you still breastfeeding?	Yes----------1 No---------- 2 →	505

505	Why did you stop breastfeeding?	mother ill/weak……………….……..1 child ill/weak..2 child died...3 nipple/breast problem ....4 not enough milk ....5 mother working...6 child refused...7 weaning age/age to stop............................8 became pregnant..9 started using Contraception....................................... 10 Other__________________(specify)	
506	For how many months did you feed breast milk exclusively (without water, cow milk and any other food)?	______________________________	
507	At what age did you start additional food to your child?	______________________________	
508	How many times did you breastfeed yesterday during the day and night?	________________________________	

509	Has your last child ever been immunized?	1. No →			2. Yes		
510	Do you have vaccination card?	1. No → 512			2. Yes		
511	Check from the card for each whether the following vcaccination are received	No	Yes		No	yes	
A	BCG	1	2	Polio 0	1	2	
B	DPT1 Polio1	1	2		1	2	
C	DPT2 Polio2	1	2		1	2	
D	DPT3, Polio3	1	2		1	2	
E	Measles	1	2				
F	Vitamin A (1)	1	2	Vitamin A(2)	1	2	

512 A	Please tell me if (NAME) received any of the following vaccinations: A BCG vaccination against tuberculosis, that is, an injection in the arm or shoulder that usually causes a scar?	Yes……………………..………..……1 No……………………………..…..….2 Don't know……………....……..8
B	Polio vaccine, that is, drops in the mouth?	Yes…………………….……………1 No…………………………….………2 Don't know………….……………8
C	When was the first polio vaccine received, just after birth or later?	Just after birth............................. 1 later.. 2
D	How many times was the polio vaccine received?	No. of times _________________
E	DPT vaccination, that is, an injection given in the thigh or buttocks, sometimes at the same time as polio drops?	Yes……..…………….…………1 No…………..………..……………2 Don't know…..……….…………8
F	How many times?	No. of times _______________

G	An injection to prevent measles?	Yes……1 No……2 Don't know……8
H	Did (name) receive Vitamin A dose like this one during the last 6 months?	Yes……1 No……2 Don't know……8
I	Is (name) given a certificate for completeing a vaccination schedule	Yes……1 No……2 Don't know……8
513	In addition to the vaccinations and vitamin A capsules, did your child receive any other vaccinations – including vaccinations received in campaigns or immunization days?	Yes ……1 No……2 Don't know ……8
514	Has child (name) been ill at any time in the last six months?	Yes ……. 1 No ……. 2
515	Think about the last time in the past six months your child was sick, did (name) have any of the following symptoms? Fever (hot body) Cough Difficult or fast breathing Diarrhea Vomiting	Yes No 1 2 1 2 1 2 1 2 1 2
516	Did you seek advice or treatment for any of these illnesses? Fever (hot body) Cough Difficult or fast breathing Diarrhea Vomiting	Yes No 1 2 1 2 1 2 1 2 1 2
517	Where did you seek advice or treatment?	Hospital .....1 Health center.....2 Health station/clinic.....3 Health post.....4 Community-based outlet …….....5 Private pharmacy/drug vendor …….. 6 other _____ 7
518	Did (name) have any of the following symptoms during the last 2 weeks? Fever (hot body) Cough Difficult or fast breathing Diarrhea Vomiting	Yes No 1 2 1 2 1 2 1 2 1 2
519	Did you seek advice or treatment for any of these illnesses?	Yes ……1 No ……0
520	Where did you seek advice or treatment? Record all mentioned Any where else _____	Hospital .....1 Health center.....2 Health station/clinic.....3 Health post.....4 Community-based outlet ……....5 Private pharmacy/drug vendor …..... 6 other _____ 7

521	When (your child/one of your children) is seriously ill, can you decide by yourself whether the child should be taken for medical treatment?	Yes .....1 No.....2 Depends.....3
522	In the last six months, have you ever been sick/ill from any causes?	Yes .....1 No.....2
523	The last time you were sick did you seek medical treatment?	Yes .....1 No 2
524	Why did you not seek medical treatment? _____	

	PART VI **: POSTPARTUM CONTRACEPTION**		
601	What methods of contraception do you know (probe and write all methods she knows)	_____ _____ _____ _____ _____ _____	
602	Have you ever used anything or tried in any way to delay or avoid getting pregnant?	Yes----------1 No----------2	
603	Which method did you use?	Pills ----------1 Injectbales----------2 IUD----------3 Norplants ----------4 Condoms ----------5 LAM----------6 Sterilization----------7 Foam/jelly----------8 SDM----------9 Rythum method----------10 Other _____(specify)	
604	Have you ever used an emergency contraception	Yes .....1 No 2	
605	Are you currently using any method to delay or avoid getting pregnant?	Yes ----------1 No ----------2 →	611
606	Which method are you using now?	Pills ----------1 Injectbales----------2 IUD----------3 Norplants ----------4 Condoms ----------5 LAM----------6 Female Sterilization----------7 Male sterilization----------8 Foam/jelly----------9 SDM----------10 Rythum method----------11 Other _____(specify)	

607	From where did you obtain the method that you are using currently	hospital ..... 1 health center..... 2 health station/clinic .....3 health post.....4 community-based outlet .....5 private clinic …….…….. ..6 private pharmacy ……....7 other government _____ (specify)	
608	When did you start using the current method?	Months _____ Years _____	
609	How many weeks or months after the birth of your last child did you start using contraception?	Weeks _____ Months _____	
610	For how long did you use the current method continuously?	Months _____ Years _____	
611	Did you experience any unintended pregnancy or abortion since you started this method?	Yes ----------1 No ----------2	
612	If you/your husband are not using any method, what was your reason for not using any method?	I want to get pregnant ……..…..1 I am not having sex …….....….....…2 My menses did not return……3 fear of health effects----------4 my religion does not allow---------.----------5 I don't want to use anything.----------6 My husband does not want to use any thing --------7 do not know source----------8 Other---------- (specify)	
613	Would you say that you approve of couples using family planning methods	Yes----------1 No ---------- 2	
614	Would you say that your husband approves of couples using family planning methods	Yes----------1 No ---------- 2	
615	Have you ever discussed with your husband about family planning?	Yes----------1 No ---------- 2	
616	In the last 12 months, were you visited by a health extension worker or a community health agent who talked to you about family planning?	Yes----------1 No ---------- 2	

	PART VII: Husband's Characteristics and Women's Autonomy		
700	Are you married or currently living with a man?	Yes ---------- No ---------- 2 →	704
701	How old was your husband/partner on his last birthday?	Age _____	

702	What is your husbands educational status	None …… ….0 Grade _____ technical / vocational certificate.....1 university/college diploma.....2 university/college degree.....3	
703	What is your husband's occupation	Farmer ----------1 Civil servant----------2 Merchant----------3 Student ----------4 Other _____ (specify_	
704	What is your husband's religion	Muslim ……..……1 Protestant Christian ……..……2 Orthodox Christian……..……..3 Other _____(specify)	
705	Do you go to mosque/church and attend the services given at the mosque/church?	Yes ----------1 No ----------2	
706	If your answer to question 705 is yes, how often do you attend mosque/church services?	Daily----------1 Once in a week ----------2 Many days in a week----------3 Once in a month ---------- 4	
707	How often does your husband attend mosque/church services?	Does not attend----------1 Daily----------2 Once in a week ----------3 Many days in a week----------4 Once in a month ---------- 5	
708	Some women take up jobs for which they are paid in cash or kind. Others sell things, have a small business or work on the family farm or in the family business. Are you currently doing any of these things or any other paid work?	Yes ----------1 No ----------2	
709	What is your occupation, that is, what kind of work do you mainly do?	_____ _____	
710	Are you paid in cash or kind for this work or are you not paid at all	Cash only ----------1 Cash and kind ----------2 In kind only ----------3 Not paid ----------4	
711	Who decides how the money you earn will be used: mainly you, mainly your husband/partner, or you and your husband/partner jointly?	You ----------1 Husband/partner ----------2 You & your husband jointly ----------3 Other (specify)----------4	
712	Who decides how the money your husband earns will be used: mainly you, mainly your husband/partner, or you and your husband/partner jointly?	You ----------1 Husband/partner ----------2 You & your husband jointly ----------3 Other (specify)----------4	
713	Who usually makes decision about health care for Yourself :mainly you, mainly your husband, you and your husband jointly, or someone else	You ----------1 Husband/partner ----------2 You & your husband jointly----------3 Other (specify)----------4	
714	Who usually makes decision about making major Household purchases?	You ----------1 Husband/partner ----------2 You & your husband jointly----------3	

		Other (specify)----------4	
715	Who usually makes decision about making purchases for daily household needs?	You ----------1 Husband/partner ----------2 You & your husband jointly----------3 Other (specify)----------4	
716	Who usually makes decision about visits to your family or relatives	You ----------1 Husband/partner ----------2 You & your husband jointly ----------3 Other (specify)----------4	
717	Sometimes a husband is annoyed or angered by things that his wife does. In your opinion, is a husband justified in hitting or beating his wife in the following situations. If she goes out without telling him If she neglects the children If she argues with him If she refuses to have sex with him If she burns the food	Yes No DK 1 2 3 1 2 3 1 2 3 1 2 3 1 2 3	
718	In the last three months, did you ever worry that your household would not have enough food?	Yes ……..……..……..1 No …… 2	
719	In the last three months, did you ever reduced of balanced diet to your child because of lack of food or money to buy?	Yes ……..……..……..1 No …… 2	
720	In the last three months, did you ever reduce the number of meals for in your child a day because of shortage of food or money	Yes ……..……..……..1 No …… 2	
721	In the last three months, did you ever reduce the number of meals eaten for child a day because of shortage of food or money	Yes ……..……..……..1 No …… 2	
722	In the last three months, did you ever spend the whole day without eating because of shortages of food or money	Yes ……..……..……..1 No ……..…… 2	

Part VIII : Social Capital

We would like to ask you questions about the social support and networks you get from different people.

801	I would like to ask you about the groups or organizations, networks, associations to which you or any member of your household belong. Do you belong to: a. Kebele administration b. Gere/Goti leadership c. Idir d. Village committee	Yes No 1 2 1 2 1 2 1 2
802	Of all these groups to which you or members of your household belong, which one is the most important to your household?	_____ [Name of group]

803	If you suddenly needed to borrow some amount of money [ex. hundred birr], are there people beyond your immediate household and close relatives to whom you could turn and who would be willing and able to provide this money?	Definitely ……..…….……..…..…….1 Probably……..…….…….2 Unsure…….…….3 Probably not…….…….……..4 Definitely not…….…….…….5	
804	Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people?	People can be trusted……..…...1 You can't be too careful…….……..2	
805	In general, do you agree or disagree with the following statements? A. Most people in this village/neighborhood are willing to help if you need it. B. In this village/neighborhood, one has to be alert or someone is likely to take advantage of you.	Agree strongly / Agree somewhat / Neither agree or disagree / Disagree somewhat / Disagree strongly 1 2 3 4 5 1 2 3 4 5	
806	If a community project does not directly benefit you but has benefits for many others in the village/neighborhood, would you contribute time or money to the project? A. Time B. Money	Yes / No 1 / 2 1 / 2	
807	In the past 12 months did you or any one in your household participate in any communal activities, in which people came together to do some work for the benefit of the community?	Yes ……1 No ……..2	
809	What are your three main sources of information about what the government is doing (such as agricultural extension, workfare, family planning, etc.)?	1._____ 2._____ 3._____	
810	In general, how happy do you consider yourself to be?	Very happy……..…..……1 Moderately happy……..…..…….2 Neither happy nor unhappy…….……3 Moderately unhappy……4 Very unhappy…….……..5	
811	Do you feel that you have the power to make important decisions that change the course of your life? Rate yourself on a 1 to 5 scale, were 1 means being totally unable to change your life, and 5 means having full control over your life.	Totally unable to change life……..……1 Mostly unable to change life…...…….2 Neither able nor unable……3 Mostly able to change life……4 Totally able to change life……5	

Annex II: Questionnaire for baseline Longitudinal Study

Name of interviewer:	Kebele name:	Household ID:
Interviewer signature	House number:	Women ID:
Name of supervisor:		
Outcome of first visit	1. Completed 2. Not around home 3. Refused	Date of appointment for other time visit
Outcome of second visit	1. Completed 2. Not around home 3. Refused	Date of appointment for other time visit
Outcome of third Visit	1. Completed 2. Not around home 3. Refused	
Date of interview date/month/ year	-------- /--------/-----------	

	PART I: **SOCIO- DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS**		
101	In what month and year were you born?	Month s ____________ Year ____________	
102	How old were you at your last birthday?	____________________	
103	Have you ever attended formal school?	Yes . . ……………………………….….. . . . 1 No . . . . ……. . . .. …………………..…. 2 →	105
104	What is the highest grade you completed?	Grade ______________________ technical / vocational certificate............................1 university/ college diploma................................ 2 university/college degree....................................3	
105	What is your religion?	Muslim……..………..……..………………….…….1 Protestant. ……………….……….…..……….2 Orthodox……………………….……..……..……3 Catholic …………………………….….…………4 Other ___________________________ (Specify)	
106	What is your ethnicity?	Oromo……………………….........………......….1 Amhara ….……….……..………..……...….…2 Yem ………………….…..….……….….…..…..3 Dawro ……………………....…………………...…4 Other…………………..….….……………..…5	
107	What is your marital status?	Married---1 Widowed---2 Divorced---3 Separated--4	
108	What was the age at which you married for the first time?	_______________________	

109	Does your husband have another wife (wives) besides you?	Yes----------1 No ---------- 2	111
110	How many other wives does your husband have?	No. of other wives_____	
111	What is your usual occupation, that is, what kinds of work do you mainly do? _____	Housewife----------1 farmer ----------2 Government/NGO employee----------3 Merchant----------4 Student ----------5 Other(specify)----------6	
112	What is the main source of drinking water for members of your household?	piped into dwelling/compound……..…1 piped outside compound ……..…..……..2 open well ……..…..……..3 open spring ……...…….4 covered well ……..5 covered spring ……..…..……...6 surface water (river, pond or lake)…….....7 rain water ……..8 other ……..……9	
113	What kinds of toilet facility do most members of your household use?	flush toilet .....1 traditional pit toilet.....2 ventilated improved pit ……..…..……3 latrine (vip)…….....4 no facility/bush/field .....5 other(specify) _____ 6	
114	Does your household have?	Yes No Radio 1 2 Electricity 1 2 Television 1 2 Telephone/cell phone 1 2 An electric mitad 1 2 A kerosine lamp/pressure lamp 1 2 A bed/table 1 2 Own the house living in? 1 2 Own a bicycle? 1 2 A motorcycle? 1 2 A car or truck? 1 2 Have farm land? 1 2 Have cattle/camels? How many cattles ? _____ Have horse/mule/donkey? 1 2 How many horses ? _____ Have sheep/goats? 1 2 How many _____	
115	Main floor material of the house	earth/sand.....1 dung.....2 wood planks.....3 reed/bamboo.....4 parquet or polished wood.....5 vinyl sheets/tiles.....6	

		cement .....7 cement tiles/brick .....8 carpet.....9 other _____	
116	How many rooms in your house are used for sleeping?	No. of rooms _____	
117	Main roof material of your house	corrugated iron..... 1 Cement/concrete..... 2 wood and mud ..... 3 thatch.....4 reed/bamboo.....5 plastic sheet.....6 mobile roofs of nomads .....7 other _____ 96	
118	How many people live in your household?	_____	

	PART II: FERTILITY: Now, I would like to ask you about the births that you have had in your life.						
201	How many children have you given birth to (male and female) in your life who are still alive?				Total _____ Male _____ Female _____		
202	Have you ever given birth to a boy or girl who was born alive but later died?				Yes----------1 No ---------- 2 →		204
203	How many such sons & daughters died?				Sons who died _____ Daughters who died _____		
204	In total how many children have you given birth to in your lifetime?				_____		
205	What was your age when you gave birth to your first child?				_____		
206	How many children did you give birth to in the last 5 years?				_____		
207	Did you give birth to a child in the last 12 months?				Yes----------1 No ---------- 2		
208	When was the last time you gave birth?				Month _____ Year _____		
209	What was your age when you gave birth to your most recent child?				_____		
210	Name (start from the youngest)	Were any of these births twins?	Sex	Date of birth d/m/year	Age at his/her last birth day	Is (Name) alive or dead?	date of death
01		Single 1 multiple 2	male 1 female 2			Alive 1 Dead 2	
02		Single 1 multiple 2	male 1 female 2			Alive 1 Dead 2	
03		Single 1	male 1			Alive 1	

		multiple 2	female 2			Dead 2		
	INTERVIEWER: Refer to Qn.210 and record the names of all live births (male and female) the woman had since January 1999 E.C whether still living or not, starting with the latest birth. Enter names in Qn. 211.							
211	Name of last child, next to last child, etc.	At the time you became pregnant with (Name), did you want to become pregnant then?		Did you want to wait until later, or did you not want to have any more children at all?				
01		Yes ……..1 No ……..……...2		wanted later ---------- 1 not wanted at all ----------2				
02		Yes ……..1 No ……..……...2		wanted later ---------- 1 not wanted at all ----------2				
03		Yes ……..1 No ……..……...2		wanted later ---------- 1 not wanted at all ---------- 2				
04		Yes ……..1 No ……..……...2		wanted later ---------- 1 not wanted at all ---------- 2				
212	Have you ever had a pregnancy that was miscarried, was aborted, or ended in a stillbirth?			Yes ……..……..1 No ……..……...2 → 219				
213	Since sepetmeber 1999 E.C, have you had any other pregnancies which did end in a live birth?			Yes ……..……..1 No ……..……...2 → 221				
214	When did the last such pregnancy end?			Month _____ Year _____				
215	How many pregnancies did you have in the last five years that did not end in a live birth?			No. of pregnancies_____				
216	When did your last menstrual period come?			Days ago _____ Weeks ago _____ Months ago _____ Years ago _____ Before last birth …… 995 Other _____ (specify)				
217	If you could choose exactly the number of children to have in your whole life, how many would that be?			Number _____ How many boys _____ How many girls _____				
218	Have you ever discussed with your husband how many children to have in your life?			Yes ……..……..1 No ……..……..…….2				
219	How many children does your husband want to have? how many boys & girls			_____ No. of boys _____ No. of girls _____				

	PART III: Current Pregnancy: Now I would like to ask you about the current Pregnancy		
301	Are you pregnant now?	Yes ……..……..1 No……..……2 Unsure ……..…8	
302	How many months/weeks pregnant are you now?	_____	

303	Including this pregnancy, how many times have you been pregnant in your life?	No. _____	
304	How many weeks or months pregnant were you when you knew that you were pregnant? (For example, you had a pregnancy test or a doctor or nurse said you were pregnant.)	Weeks _____ Months _____	
305	At the time you became pregnant with this pregnancy; did you want to become pregnant <u>then,</u> did you want to wait until later, or did you not want to have any more children?	Wanted then……..…… 1 Wanted later ……..…… 2 Not wanted at all ……..……..... 3	
306	What was your husband's feeling about the pregnancy? Did he want you to become pregnant then, did he want you to wait until later or did he not want you to have any more children?	Wanted then…..……..…..…… 1 Wanted later …….....……. 2 Not wanted at all……..……..…..3	
307	In the month that you became pregnant.....	You were not using contraception.…...1 You were using contraception, but not on every occasion…….……2 You always used contraception, but knew that the method had failed….....3	
308	How happy are you to be pregnant?	Very unhappy…….…….……1 Unhappy……..……..……2 Neither happy nor sad…..…..…..…….3 Happy……..……..……4 Very happy…….…..……..….5	
309	When you got pregnant with your new baby, Were you or your husband or partner doing anything to keep from getting pregnant? (ex. using birth control methods.)	Yes ……..…..……1 No ……...…….……2	
310	Which of the following methods were you/your husband using before you got pregnant?	Pills ----------1 Injectbales----------2 IUD----------3 Norplants ----------4 Condoms ----------5 LAM----------6 Sterilization----------7 Foam/jelly----------8 SDM----------9 Rythum method----------10 Other _____ (specify)	
311	Did you try to terminate the current pregnancy in any ways?	Yes ……..……1 → No ……..……2	313
312	If you had treid, why were you not successful?	_____	
313	Now I have some questions about the future. After the child you are expecting now, would you like to have another child, or would you prefer not to have any more children?	have a/another children----------1 No more ----------2 Undecided/don't know----------3 can't get pregnant ----------4 Unsure ----------5	
313	After the birth you are expecting now, how long would you like to wait before the birth of another child?	Months _____ Years _____ Soon/now ---------- 1	

		Don't know ---------- 2	

Part IV : Social Support and Feelings of Depression

We would like to ask you questions about the support you get from different people and the way you have been feeling in the past weeks

400. For each of the following statements, please give your opinion as to which shows how you feel about the support you have now.	Always	Most of the time	some of the time	rarely	Never
1. I have good friends who support me	5	4	3	2	1
2. My family is always there for me	5	4	3	2	1
3. My husband/partner helps me a lot	5	4	3	2	1
4. There is conflict with my husband/partner	1	2	3	4	5
5. I feel controlled by my husband/partner	1	2	3	4	5
6. I feel loved by my husband/partner	5	4	3	2	1

Tell us the way you have been feeling in the past (1) week including today. In the past seven days,

401	You have been able to laugh and see the funny side of things	As much as I always could……..……..0 Not quite so much now…….…….……1 Definitely not so much now …….……2 Not (hardly) at all …….……....3	
402	You have looked forward with enjoyment to things	As much as I ever did …….…….....0 Rather less than I used to …….……....1 Definitely less than I used to ……..…….……...2 Hardly at all……..……..…….3	
403	I have blamed myself unnecessarily when things **went wrong**	Yes, most of the time……..……..…….…….0 Yes, some of the time ……...…..……1 Not very often ……..…… 2 No, never ……..……...……..3	
404	I have been anxious or worried for no good reason	No, not at all …….……..…..0 Hardly ever …….…..…..……1 Yes, sometimes ……..…..……2 Yes, very often……...…..……3	
405	I have felt scared or panicky for no very good **reason**	No, not at all ……..…..…0 No, not much ……...…...…..1 Yes, sometimes …….…..…….2 Yes, quite a lot ……..…...…..3	
406	Things have been getting on top of me	No, I have been coping as well as ever ……..……..0 No, most of the time I have coped quite well …….…….....1 Yes, sometimes I haven't been coping as well as usual..…..2 Yes, most of the time I haven't been able to cope at all ..…3	

407	I have been so unhappy that I have had difficulty **sleeping**	No, not at all ……0 Not very often ……1 Yes, sometimes ……2 Yes, most of the time ……3	
408	I have felt sad or miserable	No, not at all ……0 Not very often ……1 Yes, sometimes ……2 Yes, most of the time ……3	
409	I have been so unhappy that I have been crying	No, never ……0 Only occasionally ……1 Yes, quite often ……2 Yes, most of the time ……3	
410	The thought of harming myself has occurred to me	Never ……0 Hardly ever ……1 Sometimes ……2 Yes, quite often ……3	
411	Would you say that, in general you health is	Excellent……1 Very good……2 Good ……3 Fair …… 4 Poor …… 5	

NO	**PART V: Maternal Health Care Utilization**	
501	After you knew that you are pregnant, did you go any where to receive antenatal care?	Yes 1 No 2 → 507
502	How many weeks or months pregnant were you when you first received antenatal care for the pregnancy?	Number of months…….. |___|___| Weeks.....
503	How many times did you receive antenatal care during the current pregnancy?	Number …….. |___|___| Don't know.....11
504	Where did you receive antenatal care for the current pregnancy?	Hospital ……1 Health center …… 2 Health post …… 3 Other public facility ……4 Private hospital/clinic ……5 NGO health facility ……6 Home ……7
505	Whom did you see for antenatal care?	Health professional ……1 TTBA ……2 Untrained TBA ……3 Community health agent……4 Other _____(specify)
506	During this pregnancy, were any of the following done at least once?	Yes No

	Were you weighed? Was your blood pressure measured? Did you give a urine sample? Did you give a blood sample?	Weight 1 2 Blood pressure 1 2 Urine 1 2 Blood sample 1 2
507	During this pregnancy, were you given an injection in the arm to prevent the baby from getting tetanus, that is, convulsions after birth?	Yes ----------1 No ----------2
508	During this pregnancy, how many times did you receive tetanus injection?	_____
509	During any of your prenatal care visits did a doctor, nurse, or other health care worker talk with you about any of the things listed below? a. The signs and symptoms of preterm labor (labor more than 3 weeks before the baby is due) b. Signs of pregnancy Complications? c. What to do if my labor starts early d. What to do for Pregnancy complication e. Getting tested for HIV (the virus that causes AIDS) f. Where to go for delivery g. Breastfeeding your baby after birth	Yes No 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2
510	Can you name any danger signs during pregnancy, childbirth, or soon after delivery that indicate a woman has a serious health problem? IF YES: Which ones?	excessive bleeding.....1 baby in bad position.....2 Swelling of the hands or face……..…... 3 Convulsions/fits, eclampsia..... 4 fever.....5 prolonged labor .....6 placenta retained .....7 foul vaginal discharge ..... 8 anemia ..... 9 other _____ (specify) don't know.....
511	What is the closest health facility at which a woman can go to deliver a baby with assistance from a doctor, nurse, or midwife? What is the name of the facility? _____	Gov't hospital…….....….....…1 Gov't health center ……..…..…2 Health post ……..…..3 Private hospital……..……..…..….4 Private clinic ……..…..…5 other _____ (specify)
512	How far is it from here to facility (mentioned in q.414)?	Distance in kms_____ Do not know.....
513	How long does it take to **walk** from here to facility (mentioned in q.414)?	Minutes..... Don't know minutes.....
514	Where do you want to give birth to your baby for the current pregnancy?	Home ……..…..…….…….1 Health post ……..…..…….……2 Health center ……..……..3 Hospital……...…….…4 Private clinic …….……...5
515	If your answer to question 514 is home, why do you prefer to deliver at home	Facility deliver requires lots of money ……..1 Health facility is too far ……..……2 I have no health problem …….…….…….3

		Transportation will be difficult ……..…….4 I don't trust the service quality ……..…….5 There will be no female provider……..……..6 My husband does not allow …….……. 7 It is not customary ……..8 Other _____ _____ _____ (specify)
516	Who do you prefer to assist you with delivery	Doctor ……..…….……..……1 Nurse/Mid wife …….....……2 Health Extension worker …….……..…….3 Other health workers …….……..……..4 TTBA …….……..…..……..…5 Relatives …….……....…..……6 Neighbours …….…….…….....7 Other _____(specify)
517	Did you ever have a baby by cesarean delivery or c-section (When a doctor cuts through the mother's belly to bring out the baby)?	Yes …….…….……1 No …….…….....….2
518	How was your ***last*** baby delivered?	Has no previous birth ……..…...…..……..1 Vaginally……..……..……...…..…..…..2 Cesarean delivery (c-section)……..…... 3
519	Did you have any of the following problems during the current pregnancy? Vaginal bleeding Severe nausea, vomiting, or dehydration High blood pressure, hypertension Other _____	Yes No 1 2 1 2 1 2
520	Did you seek treatment or adive from health facility for this illness	Yes …….…..…….1 No …….…….....….2
521	During the last 3 months of your recent pregnancy, Did you smoke cigarettes, Gaya or Shisha in an average week? Did you drink alcoholic drinks in an average week? Did you chew chat in an average week?	Yes No Cigarette 1 2 Alcohols 1 2 Chat 1 2
522	At any time during your **current pregnancy**, did your husband push, hit, slap, kick, choke, or physically hurt you in any other way?	Yes …….....1 No …….…….…...2

PART VI: Husband's Characteristics ,Women's Autonomy & Household Food Security			
600	Are you married or currently living with a partner?	Yes ---------- 1 No ---------- 2 → 604	
601	How old was your husband on his last birthday?	Age _____	
602	What is your husbands educational status	None …….…… ….0 Grade _____ technical / vocational certificate.....1 university/college diploma.....2 university/college degree.....3	
603	What is your husbands occupation	Farmer ----------1 Civil servant---------- 2 Merchant---------- 3 Student ---------- 4 Other (specify)---------- 5	
604	Some women take up jobs for which they are paid in cash or kind. Others sell things, have a small business or work on the family farm or in the family business. Are you currently doing any of these things or any other paid work?	Yes ----------1 No ---------- 2	
605	What is your occupation, that is, what kind of work do you mainly do?	_____	
606	Are you paid in cash or kind for this work or are you not paid at all	Cash only ----------1 Cash and kind ----------2 In kind only ----------3 Not paid ----------4	
607	Who decides how the money you earn will be used: mainly you, mainly your husband/partner, or you and your husband/partner jointly?	You ----------1 Husband/partner ----------2 You & your husband jointly ----------3 Other (specify)---------- --------4	
608	Who decides how the money your husband earns will be be used: mainly you, mainly your husband/partner, or you and your husband/partner jointly?	You ----------1 Husband/partner ----------2 You & your husband jointly ----------3 Other (specify)---------- ----------4	
609	Who usually makes decision about health care for Yourself :mainly you, mainly your husband, you and your husband jointly, or someone else	You ----------1 Husband/partner ----------2 You & your husband jointly ----------3 Other (specify)---------- ----------4	
610	Who usually makes decision about making major Household purchases?	You ----------1 Husband/partner ----------2 You & your husband jointly ----------3 Other (specify)---------- ----4	
611	Who usually makes decision about making purchases for Daily household needs?	You ----------1 Husband/partner ----------2 You & your husband jointly ----------3 Other (specify)---------- ----------4	
612	Who usually makes decision about visits to your family or relatives	You ----------1 Husband/partner ----------2 You & your husband jointly ----------3	

		Other (specify)---------- ----------4	
613	In the last three months, did you ever worry that your household would not have enough food?	Yes ……..……..……..1 No …….…… 2	
614	In the last three months, did you ever reduced of balanced diet to your child because of lack of food or money to buy	Yes ……..……..……..1 No …….……..…… 2	
615	In the last three months, did you ever reduce the number of meals for in your child a day because of shortage of food or money	Yes ……..……..……..1 No …….…… 2	
616	In the last three months, did you ever reduce the number of meals of eaten child a day because of shortage of food or money	Yes ……..……..……..1 No …….…… 2	
617	In the last three months, did you ever spend the whole day without eating because of shortages of food or money	Yes ……..……..……..1 No …….……..…….2	
618	In the last three months, did you ever ask for food or money to buy food?	Yes ……..……..……..1 No …….……..…… 2	
619	What kinds of work including household chores, did you do in the last 24 hours? Did you cook food for the family Did you fetch water from a stream or river? Did you collect fuel wood from the bush? Did you carry heavy materials? Did you travel a long distance (to a market place?) Did you work on the farm Any other (specify)	Yes No 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2	
620	How do you describe the works you did in the last 24 hours ?	Difficult……..……1 Neither difficult nor easy ……..……2 Easy ……3	

SECTION VIII: Maternal Antropometry

H1	MUAC size	---------- cm

Annex III: Focus Group Discussion Guide

INTRODUCTION AND RAPPORT BUILDING

Good morning/afternoon. My name is … (Also introduce your team). I/we work for Ato Yohannes Dibaba, who is a PhD Candidate at Addis Ababa University conducting a study on how unintended pregnancies influence maternal and child health. The study is conducted in the DSS kebeles in Gilgel Gibe Area. This qualitative study is designed to explore women's perceptions about unintended pregnancy and its health effects.

First of all, I want to thank you all for coming today. As part of our study, we organize and speak to groups of people like this one to find out what people think about unintended pregnancy, its causes and consequences in your community.

The procedures

- This discussion will last about one hour and I'd like to request your permission to tape record the discussion. The reason for tape recording is that we will be comparing our notes and information from the tapes to make sure that your views and opinions are correctly and accurately recorded before we write a report.

- Everything that you say will be kept confidential. Your names will not be included in the report we prepare on the findings of this discussion.

- Everyone should feel free and talk as friends. Because you represent many people in this community who think like you, everyone's opinion is important even if it is different from what others in this group think or say. There is no right or wrong answers, and we are here to learn from you. My role is only to guide the discussion

- Ask the participants to introduce themselves either using a nickname or their first name and note each person's name/nick name. In the course of the discussion, address participants by their name/nicknames.

Focus Group Discussion Guide (for women FGDs)

Questions

1. What are the main livelihood mechanisms for people in this area? What are women's roles and responsibilities?
2. What are people's attitudes towards large family size in this community? Is there a change in the desired family size (number of children)?
3. What are the challenges in attaining desired (small) family size?
   - What happens to couples that have too many children or too frequent births? How does having too many children affect the parents/family? How does it affect the children?
4. Do you think there are couples that become pregnant when they didn't necessarily intend to? What types of pregnancies are considered as unintended (hint: pregnancies to younger, or older women, closely spaced pregnancies…..?)
5. What are the reasons that some women have unintended pregnancies?
6. What happens to a woman who gets pregnant when she did not want to? how does it affect the mother
   - Hint, do they go for maternal health care (focus on antenatal and delivery care) like other women?
   - Do they care for themselves and the pregnancy?
   - Do women with such pregnancies consider abortion as an option?
7. What are the effects to the child of being born after unintended pregnancy?

   (do they get less health care, vaccination, less feeding & child care?)
8. How is unintended child accepted after birth? How do families adjust to unintended birth?
9. What are the reasons that women do not use maternal health care (antenatal and delivery care) in this community?
10. What are the reasons that people in this community (women) do not use child health care such as vaccination?
11. What are the reasons that women do not use family planning in this community?

Annex IV: Pregnancy outcome registration form

1. Kebele name _____ Goxi _____ Gare _____
2. Husband name _____ House number _____
3. Household Unique ID _____
4. Pregnancy Outcome

   Live birth ---------- 1

   Still birth ---------- 2

   Miscarriage/abortion ---------- 3
5. Date of birth _____ _____ _____ (Day/Month/year)
6. Place of delivery:

   Home ----------1 Hospital ----------3

   Health Centre----------2 Health post ----------4

   Private clinic----------5 Other _____
7. Sex of the newborn: Male ----------1 Female ----------2
8. Was the births twin or single? Single ---------- 1 twin----------2
9. How much did the baby weight at birth (gram) _____ (_____)
10. Date birth measurement was made _____
11. Is the child still alive? Yes ----------1 No----------2

12. Was antenatal care sought for the pregnancy? Yes ----------1 No----------2

Name of data collector _____

Signature _____

DECLARATION FORM

LETTER OF DECLARATION (DISSERTATION WORK)

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

Name _____

Signature _____

Date _____

Place _____

Date of Submission _____

This Dissertation has been submitted for examination with my approval as university supervisor.

Name _____

Signature _____

Date _____