Early antenatal care booking and its association with late pregnancy complications and pregnancy out comes in Arbaminch general Hospital, Arbaminch Town, Southern Ethiopia, 2016.

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A thesis submitted to Jimma University, college of health sciences, Department of nursing and Midwifery in partial fulfillment of the requirements for the degree of masters in maternity nursing (MSc)

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JIMMA, ETHIOPIA

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Abstract

Back ground: There is renewed interest in adverse pregnancy outcomes prevention for lower-middle income countries. Early initiation of and properly timed antenatal care (ANC) is thought to reduce the risk of many adverse birth outcomes. To this end current study examined if timing of the first ANC visit influences the risk of late pregnancy complication and adverse pregnancy outcomes. Status of early antenatal care booking and its association with late pregnancy complication and pregnancy out comes is not yet studied in Ethiopia in general. Therefore, this study aims to assess timing of antenatal care booking and its association with late pregnancy complications and pregnancy outcomes in Arbaminch general hospital.

Objectives: to determine the status of early antenatal care booking and its association with late pregnancy complications & pregnancy out comes in Arbaminch Hospital in Arbaminch Town, Southern Ethiopia, 2016.

Method: Hospital based comparative Cross-sectional study was conducted from March 21 to April 14, 2016 in Arbaminch Hospital. All deliver records of the year 2015 was included. A total of 670 medical records was used to collect data by using checklist. Binary and multiple logistic regression was carried out adjusting for maternal characteristics using SPSS version 20. Chai square test was used for group comparison.

Result: the level early booking for ANC is 24.2%. The prevalence of late pregnancy complication, severe pre-eclampsia 16.1% 18 % anemia, 19.3 % , eclampsia 10.6% & LBW 24.2 %. Late commencing ANC associated with severe pre-eclampsia by (AOR=2.77, 95 % C.I:1.44-5.3), eclampsia (AOR=3.9, 95 % C.I:1.7-9.01), low birth weight (AOR=1.58, 95% C.I: 1.01-2.5), anemia (AOR=2.04, 95% C.I:1.2-3.5) & adverse fetal outcomes (AOR=4.4, 95 % C.I: 1.5-12.2).

Conclusion: Mean antenatal care is not providing its promises for the study area. Late pregnancy complications and adverse birth outcome were more common in late booked mothers than early booked for antenatal care. Further research is required to examine how timing of ANC care, incorporating primary data, effective biomedical interventions, influences outcomes in this setting.

Key words: Early ANC booking, late pregnancy complications, adverse pregnancy outcomes, Gestational age, Arbaminch.

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Acronyms and abbreviations

ANC	Antenatal Care
CSA	Central Statistics Agency
EDHS	Ethiopian Demographic and Health Survey
FMOH	Federal Ministry Of Health
HEW	Health Extension Worker
HGB	Hemoglobin
HIV/AIDS	Human Immune Deficiency Virus/Acquired Immune Deficiency Syndrome
HPN	Hypertension
ICD	International Code of Disease
IPTp	Intermittent Preventive Treatment for malaria during Pregnancy
ITN	Insecticide Treated bed Net
LBW	Low Birth Weight
LMIC	Low and Middle Income Countries
MDG	Millennium Development Goal
RBC	Red Blood Cell
STIs	Sexually Transmitted Infections
SSA	Sub-Saharan Africa
TT	Tetanus Toxoid
UA	Urine Analysis
WHO	World Health Organization

CHAPTER ONE: INTRODUCTION

1.1 Background of the study

Antenatal care (ANC) is a health service that has the potential to reduce the incidence of perinatal morbidity and mortality by treating medical conditions, identifying and reducing potential risks, and helping women to address behavioral factors that contribute to poor outcome. Prenatal care is more likely to be effective if women begin receiving care in the first trimester of pregnancy and continue to receive care throughout pregnancy, according to accepted standards of periodicity. While motherhood is often a positive and fulfilling experience; for many women it is associated with suffering, ill-health and even death. Globally, an estimated 289,000 mothers died in 2013 in pregnancy and child birth, with more than one life lost every 2 minute [1]. According to world health organization (WHO), in the developing world Over 30 million women suffer each year from serious obstetric complications as a result of inadequate or inappropriate care during pregnancy, delivery and the first few critical hours after birth[2].

Developing regions account for approximately 99% (302 000) of the global maternal deaths in 2015, with sub-Saharan Africa (SSA) alone accounting for roughly 66% (201 000) and Ethiopia accounts 420 maternal death per 100 000 live births[1].

Ten percent of women have high blood pressure during pregnancy, and preeclampsia complicates 2% to 8% of pregnancies. Overall, 10% to 15% of direct maternal deaths are associated with preeclampsia and eclampsia. WHO estimated the incidence of preeclampsia to be seven times higher in developing countries than developed countries[3]. The Ethiopian National Emergency Obstetric and Newborn Care (EMONC) showed that preeclampsia contributed for the complication of approximately 1% of all deliveries and 5% of all pregnancies. Moreover, 16% of direct maternal mortality and 10% of all maternal mortality (direct and in direct) was due to preeclampsia/eclampsia [4].

Globally, 2.7 million Children who die are Newborns, 60-80 % are premature and/or small for gestational age. Low birth weight (LBW) continues to be a significant public health problem globally. Overall, it is estimated that 15% to 20% of all births worldwide are LBW, representing more than 20 million births a year. Regional estimates of LBW include 28% in south Asia, 13% in SSA and 9% in Latin America., 11% in Ethiopia and 6% in SNNPR [10].

According to international still birth alliance an estimated 2.6 million stillbirths occur annually, of which 98% occur in low-income and middle-income countries and 75% in SSA and south Asia. Current World Stillbirth rate: 18.9 per 1000 births. In East Africa: Eritrea 21.2, Kenya 21.82, Sudan 23.86, Somalia 30.1 Uganda 24.79 and Ethiopia 25.62 per 1000 total births.

Early initiation of ANC and adequate follow-up visits facilitate early screening for HIV, syphilis, diabetes, hypertension and interventions which contribute to the prevention of unfavorable health outcomes. During their ANC visit, pregnant women also receive folic acid and ferrous sulphate supplements. Folic acid tablets help in the neural tube development of the baby whilst ferrous sulphate tablets supplement iron intake and prevent anemia. [5].

1.2 Problem statement

Although the proportion of women receiving antenatal care at least once during pregnancy was 83% globally for the period 2007–2014, In SSA, 69 % of pregnant women have at least one ANC visit. The figure dropped to around 44% for the recommended minimum of four visits or more majorities come late for ANC visit[1]. In Ethiopia 41% of pregnant women receive ANC of this 18% of women made their first ANC visit before the fourth month of pregnancy[6]. Two studies in Southern Ethiopia, shows early ANC booking as 17.4%[7], and 31.4 %[8]. Even though, early booking for ANC provides preventive access for mothers, complications from pregnancy and childbirth are a major cause of death among girls aged 15–19 in low and middle-income countries late booking for first ANC is common problem. For the year 2011, it is estimated that roughly 38% of pregnant women, corresponding to 32 million pregnant women experience anemia. Anemia that is amenable to iron supplementation in pregnant women globally 50% (47-53%), Africa region 44% (42-47%)[9]. Available meta-analyses suggest that iron supplementation would increase the mean blood hemoglobin concentration by 10.2 g/L (95% CI: 6.1—14.2) in pregnant women. Applying these shifts to estimated blood hemoglobin concentrations indicates that about 50% of anemia in women could be eliminated by iron supplementation. In low-income countries, 25% of LBW was attributable to maternal anemia during pregnancy [10].

In recent years the International Stillbirth Alliance has brought increased attention to stillbirths and called for renewed research on stillbirth prevention. Besides this Worldwide there are approximately 2.65 million third-trimester stillbirths and most of the burden (98%) is in low and middle income countries [23]. Antenatal conditions, such as HPN and anemia, have been found to be strong risk factors for intra-partum complications[11].

There is reason to believe that initiating ANC early helps to prevent stillbirths in term pregnancies by preventing labor complications through early referral to skilled birth attendants, and/or by detecting and managing maternal chronic conditions (such as hypertensive disorder) and infectious diseases (such as HIV or syphilis) and others infections (malaria, anemia) and nutritional education as well [12].

Pre-eclampsia/eclampsia (PE/E) is thought to account for about 15% of maternal mortality world-wide, 20–25% of fetal mortality, and with increased risk of asphyxia and preterm

delivery for as much as 25% of neonatal mortality. About 98% of maternal, fetal, and neonatal mortality related to PE/E occurs in low income countries, with much of that mortality in south Asia and SSA. A number of strategies have been advocated to reduce the risk of progression of PE/E as well as the risk of death from the condition. Diagnosis of preeclampsia with blood pressure and proteinuria determinations early in pregnancy and timely delivery through cesarean section or induction of labor are both important in reducing[13]. PE/E related maternal mortality MDG5, calls for the improvement in maternal health, with a target of reducing the MMR by three-quarters over the period 1990-2015. For this call the Federal Ministry of Health (FMOH) has applied a multi-pronged approach to reduce maternal and newborn morbidity and mortality by improving access to and strengthening facility-based maternal and newborn services. Many countries have implemented programs to expand access to interventions in order to reduce the level of unmet need for contraception, provide early antenatal care during pregnancy and ensure delivery by a skilled birth attendant[14].

The content of services received and the kinds of information given to women during their ANC visits are also important components of quality care. These services raise awareness of the danger signs during the pregnancy, delivery, and postnatal period, improve the health-seeking behavior of women, orient them to birth preparedness issues, and provide basic preventive and therapeutic care. [6].

Adverse pregnancy outcomes can be minimized or avoided altogether if ANC is received early in the pregnancy and continued through delivery. WHO recommends that a woman without complications should have at least four ANC visits, the first of which should take place during the first trimester. The key objective of maternal health care for pregnant women is to present themselves early for antenatal care in order to allow enough time for essential diagnosis and treatment regimens[15]. Study shows that low early ANC booking is because of ANC is viewed primarily as curative rather than preventive in the society.so that mothers with no complication or illness come too late for ANC and low educational status is another contributing factor [8]. Systematic review and meta-analysis of published literature showed a lower prevalence of any adverse outcome among women who received an intervention (to include screening and treatment) in the first and second trimesters of

pregnancy compared to the third trimester. The overall odds ratio for any adverse outcome was 2.24 (95% CI 1.28, 3.93)[16]. This study is intended to contribute comparative importance of early booking over late booking for antenatal care.

CHAPTER TWO: LITERATURE REVIEW

2.1. *Early Antenatal care booking*

The World Health Organization (WHO) recommends the first ANC visit occurring in the first trimester. Still mothers in visit ANC late during pregnancy[17].

Study in Tanzania shows that only 29% initiated ANC attendance within the first four months of pregnancy as recommended by WHO[18]. In Ethiopia according to EmDHS 18% of women made their first ANC visit before the fourth month of pregnancy[6]. Studies conducted in Mekele Town, Kembata Tembaro Zone, Arbaminch Town indicated that the proportion of first ANC within the recommended time (before or at 16 weeks of gestation) was found to be 32.7%, 31.4 %, 17.4% respectively[7, 8, 19]. Many studies in Ethiopia shows early ANC booking is still low.

2.2. Late pregnancy complication

Hypertensive disorders complicate 5 to 10 % of all pregnancies, and together they form one member of the deadly triad, along with hemorrhage and infection, that contribute greatly to maternal morbidity and mortality rates. In developed countries, 16 % of maternal deaths were due to hypertensive disorders. In Africa and Asia, hypertensive disorders accounted for 9% of maternal deaths, whereas, in Latin America and the Caribbean, the figure was over 25%.14 Hypertensive disorders of pregnancy are annually responsible for about 25,000 maternal deaths in Africa, 22,000 maternal deaths in Asia, and 150 maternal deaths in industrialized countries. [20]. Pre-eclampsia and eclampsia complicated 1.2% of all institutional deliveries, given the low institutional delivery rate, Incidence of 2%–8% of all deliveries in Ethiopia. The Government of Ethiopia has initiated an ambitious program to increase universal availability and accessibility of primary health care to the majority of the populace. There by providing quality prenatal care, with screening for hypertension and protein in urine, and institutional delivery care to women with obstetric complications, including those affected by pre-eclampsia and eclampsia [21].

The study conducted in Mettu Hospital shows that sever preeclampsia was the most common hypertensive disorder of pregnancy accounting 35.5%, followed by eclampsia which contributed 19%, mild preeclampsia 14.9%, HELLP syndrome 12.4%, gestational HTN 13.2%, and chronic HTN 4.1% and two patients were superimposed preeclampsia[22].

Study conducted in Nigeria indicated 27.6% of mothers found to be anemic at the time of antenatal booking[23].

Studies shows that anemia 53.9%; in Gilgel Gibe Dam area with minimum, maximum and mean Hematocrit values of 18%, 48% and 32.7%, respectively [24], in Boditti Health Center in Southern Ethiopia 61.6%[25], in Southeast Ethiopia 27.9%[26]. These Studies shows the level of pregnancy complication but there is lack of literatures which indicated the level of these complication among early ANC visitors and late ANC visitors.

2.3. Pregnancy outcome

Study in Uganda shows an overall proportion of adverse pregnancy outcomes of 10.8 % across all the surveys (abortion 8.4 % and stillbirth 2.4 %)[27]. This is crud outcome it did not show the difference among early ANC users and the late ANC users.

A study conducted in Jimma Zone shows that LBW of 22.5%.[28]. On the other hand a study done in Ayder Referral and Mekelle Zonal Hospitals indicated that in total, 35% and 54% of the neonates weighed <1,500 (very low birth weight (VLBW)) or <2,500 grams (low birth weight (LBW), respectively[29].

The study conducted in Mettu hospital shows the rate of LBW and VLBW were 24.8% and 3.3% respectively and there were 20 (18.5%) low APGAR score and preterm delivery 34 (28.1%) among 108 deliveries there were 2 early neonatal death and 13 (10.7%) abortion. The perinatal mortality rate 120.37 per thousand deliveries and 11 still births yielding the still birthrate of 10.185% 28 and 13% of the babies were born before 37 and 32 weeks, respectively. [22].

The study conducted in Gondar University Hospital shows the over prevalence of still birth was 7.1% and nearly one in seven births (14.3%) was found to be preterm birth[30].

According to 2011 EDHS, for every 1,000 live births about seven women (6.76) died during pregnancy in Ethiopia, during childbirth, or within two months of childbirth. The lifetime risk of maternal death (0.036) indicates that about 4 % of women died during pregnancy, during childbirth, or within two months of childbirth. Study in Bonke, Woreda, Gamo Gofa Zone, SNNPR shows a lifetime risk of 10.2% from pregnancy and childbirth with a corresponding maternal mortality ratio of 1667 (95% CI: 1564–1769) per 100,000 live births[31].

2.4. Association between ANC and pregnancy outcome

The study conducted in Matlab, Bangladesh shows that the adjusted odds of perinatal mortality was about 2-times higher (OR 1.91; 95% CI: 1.50, 2.42) among women who received ≤1 ANC compared to women who received ≥3 ANC visits [32]. Study in Libiya Benghazi revealed that women who were registered early had attended prenatal care more. Also maternal outcome was significantly related to early initiation of prenatal care as ($\chi 2$= 36.04, p=0.002) [33]. Similarly Study conducted in South Africa indicated that low birth weight is strongly associated with timing of antenatal care visit [53]. Other study conducted in Bale Zone indicated that the odds of LBW were higher among mothers who didn't attend antenatal care for current pregnancy as compared to mothers who attended ANC (AOR = 2.9; (95 % CI =1.23–6.94)[34]. It is expected that early initiation of ANC increase the number of visits.

Routine iron supplementation to pregnant women during pregnancy has been shown to improve biochemical indicators of iron status and to reduce the risk of low maternal hemoglobin at delivery and at 6 weeks postpartum[35].

The WHO currently recommends iron and folic acid supplementation to reduce the risk of iron deficiency anemia among pregnant women. Since many developing countries already have systems in place for the delivery of iron and folic acid supplements, micronutrient supplements could be provided at little additional cost[36].

The WHO lists the most common causes of neonatal mortality as infections, birth asphyxia, birth injuries, preterm births, and birth defects. It is worth noting that these mortality causes are conditions for which timely ultrasound imaging could be of immense help in early diagnosis and hence intervention, leading to the reduction of mortality rates among mothers

and their babies. It is also notable that most of these avoidable deaths (99%) occur in developing countries, where ultrasound imaging is currently underutilized, and financial constraints and late coming for first ANC have been cited as the main reasons. However, the usefulness of ultrasound imaging in preventing these needless deaths has not been fully exploited[37].

Perhaps mothers who initiated ANC early can get preventive intervention might be referred for better service before lethal complication. Numerous research gaps warrant studies to identify interventions that alter behaviors and remedy_nutritional deficiencies that place women at risk of stillbirth. ANC provides an important platform for distributing these interventions, including opportunities to_educate mothers about behavioral changes they can practice while pregnant to safeguard their and their future_children's health[38]. All the existing literatures indicted that there is low early ANC commencing and the pregnancy and child birth related complication are the major public health problems especially in low income country including Ethiopia. Means antenatal care is not providing its promises for the low income countries like Ethiopia.

Significance of the study

Prenatal care is perhaps the prototypic form of preventive medicine and, as such, it would be expected that such care would have an important place in the services provided by health care settings and it should be as early as recommended. ANC utilization, factors associated with late booking for ANC, level of late booking for prenatal services in Ethiopia and the like have been published, yet there appears to be no published comparative study of pregnancy out comes and late pregnancy complications, association of prenatal care between late bookers and early bookers done. This study assessed the comparative importance on late pregnancy complication and pregnancy outcomes of early booking for first antenatal care with late booking for first antenatal care. Thus enhance the health care planers to emphasize not only visiting ANC in number any when but also timing. It can also act as preliminary study for further prospective studies on comparative importance of ANC early booking over late booking. The study contribute its part in achieving the WHO Strategies toward Ending Preventable Maternal Mortality (EPMM), which establishes a supplementary national target that no country should have an MMR greater than 140 per

100 000 live births, and outlines a strategic framework for achieving these ambitious targets by 2030[39].

Conceptual frame work

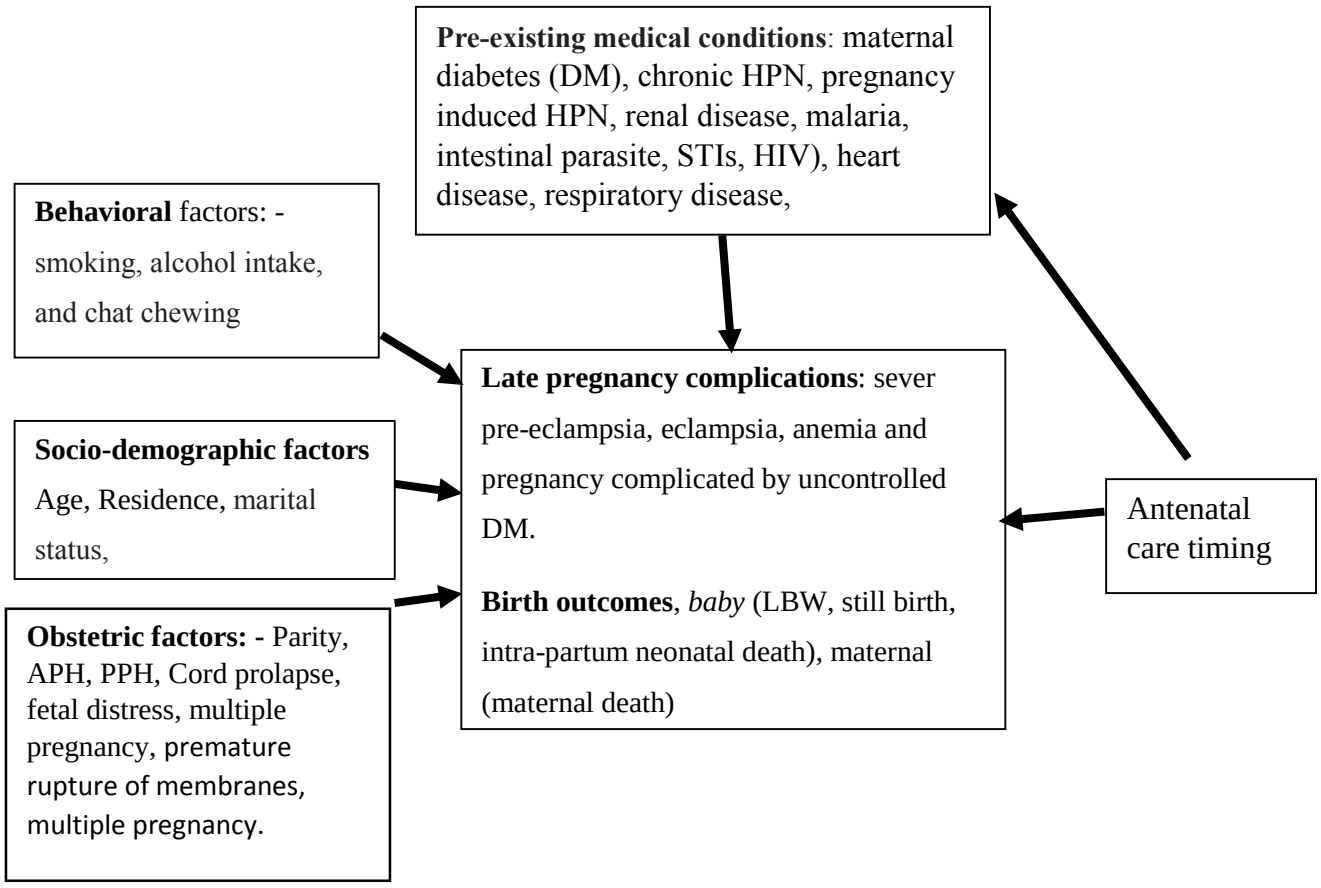

Figure 1 conceptual framework from different literature, May 21, 2016 [8, 25, 45, 52, and 53]

CHAPTER THREE: OBJECTIVE AND HYPOTHESIS

4.1. *General Objective of the study*

To determine the status of early antenatal care booking and its association with late pregnancy complications and pregnancy out comes in Arbaminch general hospital, Southern Ethiopia, 2016.

4.2. Specific objectives:-

- To assess the status of early antenatal care booking in the study setting.
- To assess the prevalence of late pregnancy complication and adverse pregnancy outcomes in the study setting.
- To compare late pregnancy complication and adverse pregnancy outcomes among early booked and late booked for antenatal care in the setting.
- To assess the association between early antenatal care booking and late pregnancy complication and pregnancy outcomes.

Research Hypothesis

The occurrence of adverse pregnancy outcomes is lower among early antenatal care bookers as compared to late bookers.

CHAPTER FOUR: METHOD AND MATERIAL

4.1. *Study area: -*

Arbaminch general hospital, established in 1969, Gamo Gofa zone, SNNPR, Ethiopia.

Arbaminch is a city in Gamo Gofa zone southern Ethiopia; Located about 500 kilometers south of Addis Ababa and 275 km south west of Hawassa, capital city of the Southern Regional State. At an elevation of 1285 meters above sea level. It is the largest town in Gamo Gofa Zone and the second town in SNNPR next to Hawassa. Based on the 2013 population projection from 2014-2017 by the CSA, this town has a total population of 142,908 of this 71,889 are males and 71,019 are females[40]. In the town there is one General hospital (Arbaminch general hospital) which provide health service the population of the town and the hospital as referral service for Gamo Gofa Zone. The total delivery report of the last year 2015. Arbaminch General Hospital, was found to be 2571 among this 1031 have ANC follow up in the hospital and give birth in the hospital.

4.2**.** *Study design: -*

Institution based comparative Cross-sectional study was conducted in Arbaminch general Hospital, Southern Ethiopia.

4.3. *Population:-*

4.3.1. Source population: - all records of mother who give birth in the hospital.

4.3.2. Study population**: -** all maternal delivery records in Arbaminch general Hospital of the year 2015.

4.4. Inclusion criteria: - All complete delivery records in Arbaminch general Hospital was included.

4.5. Sample size determination and Sampling Technique

4.5.1. Sample Size: -

All deliveries of the year with antenatal care records.

4.5.2. Sampling Technique

All delivery records of the 2015 year population was included. Total of 1031 delivery records with ANC follow up taken place in the hospital and give birth in the hospital were found, among this 670 records were complete records. And 670 records were included in the study.

4.6. Study Variables

4.6.1. *Exposure variables:* - timing of first ANC booking, *Socio demographic* f*actors* (Age, residence, Parity, weight, alcohol intake, smoking, and substance abuse), *Pre-existing medical conditions* (maternal diabetes (DM), chronic HPN, renal disease, malaria, STIs, HIV), *obstetrics factors, (*intra-partum hemorrhage, PROM).

4.6.*2. The outcome variables*: - *late pregnancy complications* (sever pre-eclampsia, eclampsia, anemia, pregnancy complicated by uncontrolled DM,), birth outcomes, *baby* (LBW, adverse fetal outcomes (still birth, intra-partum neonatal death), Mothers (maternal death,)

4.7. *Operational definition:*

Late booking: Mother who initiated antenatal care after 16 weeks of gestational age.

Early booking**:** Mother who initiated antenatal care before or at 16 weeks of gestational age.

Low birth weight (LBW) is birth weight below or equal to 2500 mg.

Late pregnancy complications: severe pre-eclampsia, eclampsia and anemia.

Pregnancy outcomes: LBW and adverse fetal outcomes (still birth and intra-partum neonatal death).

Adverse feta outcome*:* still birth and intra-partum neonatal death.

Complete charts: readable, contains both antenatal care service register and delivery report.

4.8. Recruitment, training of data collectors:

The data collection was carried out by four Diploma Nurses and the supervisor was one BSC Midwife. One day explanation how to use the tool, when to say that chart is incomplete and collect data was provided for data collectors. No language translation needed for being educated data collectors.

4.9. Data collection instrument and procedure:

Data was collected from March 21 to April 14, 2016 using checklist. The data was obtained from admission registration logbooks, delivery registration books and patient charts using reviewer administered technique. The checklist was adapted from Palo Alto Medical Foundation Pregnancy Questioner, Pregnancy Risk Assessment Monitoring System (PRAMS),Human Fertilization and Embryology Authority (pregnancy outcome form) and journal articles[41]. The checklist contains socio-demographic factors, obstetric factors,

and pre-existing and pregnancy related diseases, timing of ANC, birth outcomes, related questions.

4.10. Data processing & analysis:

Data was entered into EPI data version 3.1 and exported to SPSS version 20 software, Also data was cleaned, coded, and explored for outliers, missing values and analyzed using SPSS version 20 software. Chia square, bivariate and multiple logistic regression analysis was used. Chai square test was used for group comparison. Variable with p- value <=0.25 on bivariate logistic regression were entered to multiple logistic regression (backward LR) to see which variable predict the variation on the outcome variables (late pregnancy complications and adverse birth outcomes). Goodness of fit was choked by Hosmer and Lemshow, p- value above .05 was taken as fit good.

4.11. Data quality management:

Before data collection pre-testing of the tool was carried using 10 % (55) of the sample in AMJH. After pre-test modification was made on the questioner. After data collection, data was checked for completeness by the supervisor every day. Supervisors & the principal investigator made frequent checks on the data collection process to ensure the completeness of the gathered information.

4.12. Ethical consideration:

Ethical clearance was obtained from Jimma University, College of Health Science, and Institutional Review Board (IRB). Submitted to AMJH. Informed consent for participants not needed. This for using existing registered data from file.

CHAPTER FIVE: RESULT

In total, 2571 delivery records were registered in Arbaminch general hospital of the year 2015. Of this 1031 maternal delivery records of the mothers were with ANC follow up in the hospital and give birth in the hospital. From 1031 medical records 670 were found to be complete records (included in the study), the rest are incomplete. From the total 670 only 162 were commenced their first ANC before or at the recommended gestational age period at or before sixteen weeks while 508 were commenced antenatal care after sixteen weeks of gestation and the ratio of early ANC to late ANC booking is about 1:3 ratio.

Socio-demographic characteristics

Total of 670 medical records were included in the study. The mean (± SD) age of the mothers was 25.92 years (± 4.89), with minimum age 15 and maximum age 47, about half mothers were within 18-24 years of age group 323 (48.2 %). The majority of mothers were married 612 (91%) and more than half were from urban kebeles 369(55.5%). Majority of mothers were no habit of abusing substance 606 (90.6%).

Past Obstetrics history of the participant records

The parity characteristics of the mother shows that above half were multiparas about 373 (55.7%) while 297(44.3%), were primipara. Parity ranges from zero to seven, half of mother had parity one to three 412(61.5%) form the total. About thirteen percent had history of miscarriage 85 (12.7 %) while mothers with History of still birth were about 75 (11.2 %).

Personal medical history of the participant

From the total 96 (14.3%) of the mothers had history of heart disease, 79 (11.8 %) had history of respiratory disease. History Seizure, diabetes mellitus, and kidney disease 60(9%), 23 (3.4%) and 83 (12.4 %) respectively were among medical problems which pregnant mothers experienced.

Table 1 socio demographic past obstetrics and past medical condition of the participants in Arbaminch general hospital, May, 2016.

Variables		Frequency	Percentage
Marital status	Single	34	5
	Married	615	90
	Divorced	15	2.2
	Widowed	6	1
Residence	Urban	369	55.5
	Rural	301	44.9
Age of the mothers	15-24	323	48.2
	25-34	313	46.7
	Above 35	34	5.1
substance abuse*	Yes	64	9.55
	No	606	90.5
Miscarriage history	Yes	85	12.7
	No	585	87.3
History of still birth	Yes	75	11.2
	No	595	88.8
Parity	Primipara	297	44.3
	Multipara	373	55.7
Heart disease	Yes	96	14.3
	No	574	85.7
Respiratory disease	Yes	79	11.8
	No	591	88.2
Seizure or epilepsy	Yes	60	9
	No	610	91
diabetes	Yes	23	3.4
	No	647	96.6
Kidney disease	Yes	83	12.4
	No	587	87.6

*substance abuse: alcohol intake, smoking, chewing chat together.

ANC service

Timing of First ANC Attendance. Information on timing of first ANC was collected from the logbook or client's card. Accordingly from the total mothers who had ANC visits in the hospital last year, among all one hundred sixty two mothers (24.2%) commenced ANC early before 16 weeks of gestation and five hundred eight (75.8%) commenced their first ANC after 16 weeks of gestation. The mean (± SD) first ANC timing was 23.88 weeks (± 7.429), Timing of first ANC attendance ranges from ninth week to thirty sixth week during pregnancy. Only about 26(3.9%) mother visited ANC four and more times in number.

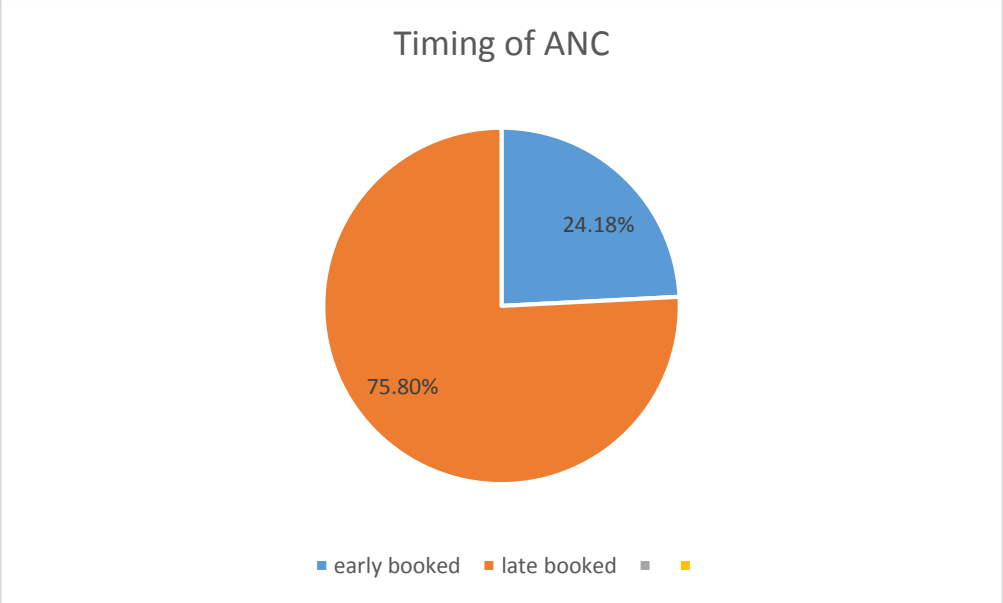

Figure 2 shows the first ANC early and late commencing among mothers in Arbaminch general hospital, May, 2016.

Hemoglobin concentration of the women, 135 (20.1 %), 352 (51%) and 193 (31.5%) were less than or equal to 7 mg/dl, less than or equal to 11mg/dl, and greater than 11mg/dl respectively. Proteinuria is one of the cardinal features of preeclampsia which is a common and potentially severe complication of pregnancy. Urine analysis (Proteinuria of 0.3 grams or A random urine protein determination of 30 mg/dL or 1+ on dipstick is suggestive) is one of the antenatal care services for mothers which is important diagnostic procedure for the identification of severe pre-eclampsia and eclampsia with the presence of high blood pressure. From the mothers 85(12.7%) were found to be positive for both protein and glucose, while 585 (87.3 %) were negative for both. Blood pressure measured at first ANC visit among all 95 (14.2%) were with high blood pressure defined by blood pressure greater or equal to 140/90 mmHg. Monitoring fetal growth is a standard component of antenatal care. Since abnormalities of fetal growth are associated with an increased risk of adverse outcome, this information often affects how the pregnancy and delivery will be managed. Ultrasound examination play curtail role in identifying these abnormalities and monitors fetal growth. For this matter in this study about 532 (79.4%) used ultrasonography imaging service. About 600 (89.6%) got at least one tetanus toxoid vaccine and 365 (54.5%) got iron and folic acid at least on dose during their ANC visit last year. folic acid supplementation is recommended since it reduces the risk of neural tube defects. An increase in calcium and iron is important for bone and red blood cell development.

Table 2 ANC service condition of the mothers in AMJH, 2016.

Variables		Frequency	Percentage
Gestational age at first antenatal visit	Early <=16 weeks	162	24.2
	Late >16 weeks	508	75.8
tetanus toxoid	yes	600	89.6
	No	70	10.4
Hemoglobin concentration at first ANC visit	<=7mg/dl	135	20.1
	<=11mg/dl	342	51
	>11mg/dl	193	31.5
iron and folic acid intake	yes	365	54.5
	No	289	43.7
Urine analysis	Positive for protein & glucose	85	12.7
	Negative for protein & glucose	585	87.3
Ultrasonography imaging	Yes	532	79.4
	No	136	20.3
Nutrition education	Yes	604	90.1
	No	66	9.9
high blood pressure140/90mmHg	yes	95	14.2
	No	575	85.8
HV test	Positive	10	1.5
	Negative	660	98.5
Sexually transmitted infections test (VDRL TEST)	Positive	31	4.6
	Negative	639	95.4

Late pregnancy complications

Hypertension is a common complication of pregnancy, occurring with a frequency of 10 to 15 percent of all pregnancy. This study indicated the prevalence of sever pre-eclampsia 108(16.1%) complicating late pregnancy of the pregnant women While eclampsia complicated about 71 (10.6 %) of the pregnancies. Anemia is the most common problem of the pregnant women which complicated late pregnancy 129(19.3%) total. Uncontrolled diabetes mellitus and uncontrolled hypertension were among complications from which women suffered.

Table 3 late pregnancy complications of mothers in AMJH, 2016.

Variables		Frequency	Percentage
Sever pre-eclampsia	Yes	108	16.1
	No	562	83.9
Anemia	Yes	129	19.3
	No	541	80.7
DM	Yes	10	1.5
	No	660	98.5
Uncontrolled HPN	Yes	12	1.8
	No	658	98.2
eclampsia	Yes	71	10.6
	No	599	89.4

Complications of labour delivery and birth outcome

Mother who experienced bleeding in antepartum, intra-partum and post -partum were about 28 (4.2%), 31 (4.6%) and 39 (5.8 %) respectively. Maternal death recorded in the study period were 6(0.9%). Adverse fetal outcomes which include both still born fetus and intra-partum neonatal death was 46(6.9%). Regarding to the other conditions data shows that malformation 8(1.2%), jaundice 31(4.6 %), APGAR score less than six is about 83(12.4%) and APGAR score above six 587(87.6%), about 28(4.4%) developed respiratory distress during. Regarding sex of the newborn 320(47.8%) male and 350(52.2) % female were born last year. Concerning birth weight of the babies, total of 163(24.3%) babies were born low birth from total births. The birth weight ranges from 1000 gm. to 4000 gm. With mean (± SD) 2963.13 birth weight (± 553.099).

Table 4 Complications of labour delivery and birth outcome *of the mothers and newborn in AMJH, 2016.*

Variables		Frequency	Percentage
PPH	yes	39	5.8
	No	631	94.2
Mother death	yes	6	0.9
	no	664	99.1
Adverse fetal outcome	Yes	46	6.9
	No	624	93.1
APGAR	<6	83	12.4
	>=6	587	87.6
BWT	LBW	163	24.3
	NBW	507	75.7
APH	Yes	28	4.2
	No	642	95.8
Jaundice	Yes	31	4.6
	No	639	95.4
Malformation	Yes	8	1.2
	No	662	98.8
Inter partum bleeding	yes	31	4.6
	No	639	95.4

Comparison of social demographic, past obstetrics history, past medical history and antenatal service factors between early (<=16 weeks of gestation) and late (> 16 weeks of gestation) booked for antenatal care.

Socio-demographic Characteristics

Booking for antenatal care had no significant differences for both populations with respect to age group, but age group 15-24 and age above 35 tend to commence antenatal care early and age group 25-34 tend to commence antenatal care late as the proportion shows. Majority, Single 32 (6.3 %), and married 468 (92.1%) women stated antenatal care late, while divorced 8 (4.9) and widowed 5 (3.1 %) women started antenatal care early. The difference between the two group was found significant association(X^2= 24.64, p<.001). Regarding residence 89 (54.9%) early booked and 280 (55.1%) late were from rural kebeles and 73(45.1%) early booked and 228 (44.9%) late booked were from urban kebeles. This difference not significant associated (x^2=.002, p value=.520) (table 5).

Past obstetrics history

From early booked for antenatal care 73 (45.1%) and 89 (54.9%) were primipara and multipara respectively, while from late booked for antenatal care 224 (44.1%) and 284 (55.9%) were primipara and multipara respectively. This difference had no association with the group (X^2=.047, p- value .450). Majority of mothers with bad past obstetric history tend to commence antenatal care early. Those mothers with still birth history and miscarriage history 37(22.8%) and 40 (24.7%) booked early for antenatal care while 38(7.5%) and 45 (8.9 %) were late booked respectively. The difference was significantly associated (x^2=29.148, p-value<.001) history of still birth, (x^2 = 27.798, p- value<.001) history of miscarriage) (table 5).

Past medical history and antenatal service

Majority of mothers with medical disease history tend to visit antenatal care early during their pregnancy. Among women with history of heart disease 45 (27.8 %) commenced their antenatal care early while 51 (10 %) of these women commenced late. Mother with seizure

26 (16%) and respiratory disease (23 (14.2%) booked early for antenatal whereas 34 (6.7%) of women with seizure and 56 (11%) of women with respiratory disease booked late. This difference is significantly associated for seizure with (X^2 =13.189, p- value <.001) but difference for respiratory disease is not significantly associated (X^2=1.19, p-value=.170). Similarly women with sexually transmitted infection commenced early antenatal care, the difference was significant (X^2=24.418, p- value <.001). Majority of women those started antenatal care late, commenced antenatal care after already developed anemia, with hemoglobin concentration less than or equal to eleven 373 (73.4%) while those who commenced early were not anemic 104 (64.2%). The difference was significantly associated (X^2=11.235, p- value=.004). As result mothers those commenced antenatal care late consumed more iron than those commenced early 64 (39.5%) among early booked and 301(60.7) among late booked, the difference significant with (X^2= 22.185, p<.001). information for nutrition during pregnancy was delivered relatively more among early booked and those who started antenatal care late were educated for nutrition less (table 5).

Table 5 comparison between early and late antenatal care booking in AMJH, 2016.

Factors		Gestational age category		X^2 test
		Early <=16 wks (n %)	Late >16 Wks (n %)	
Age of the mothers	15-24	86 (53.1)	237 (46.7)	2.465, p =.292
	25-34	67 (41.4)	246 (48.4)	
	>=35	9 (5.6)	25 (4.9)	
Marital status	Single	2(1.2)	32 (6.3)	24.641, p <.001
	Married	147 (90.7)	468(92.1)	
	Divorced	8 (4.9)	7 (1.4)	
	Widowed	5 (3.1)	1(0.2)	
Parity	Primipara	73 (45.1)	224 (44.1)	.047 p- .450
	Multipara	89 (54.9)	284(55.9)	
Residence	Rural	89 (54.9)	280 (55.1)	.002, p=.520
	Urban	73 (45.1)	228 (44.9)	
Miscarriage history	Yes	40 (24.7)	45 (8.9)	27.798, p=.000
	No	122 (75.3)	463 (91.1)	
Still birth history	Yes	37 (22.8)	38 (7.5)	29.148, p=.000
	No	125 (77.2)	470 (92.5)	
History of heart disease	Yes	45 (27.8)	51 (10)	31.485 p<.001
	No	117(91.4)	457 (88.8)	
Respiratory disease	Yes	23 (14.2)	56 (11)	1.19, p= .170
	No	139 (85.8)	452 (89)	
Seizure and epilepsy	Yes	26 (16)	34 (6.7)	13.189, <.001
	No	146 (90.1)	460 (90.6)	
Diabetes mellitus	Yes	10 (6.2)	13 (2.6)	4.84, p= .030
	No	152 (93.8)	495 (97.4)	
Kidney disease	Yes	33 (20.4)	50 (9.8)	12.543, p=.001
	No	129 (79.6)	458 (90.2)	
Urine analysis	Negative	15 (9.3)	70 (13.8)	2.266, p= .083
	Positive	147 (90.7)	438 (86.2)	
Sexually transmitted infections (VDRL) test	Positive	19(11.7)	12(2.4)	24.418 p<.001
	Negative	143(88.3)	496 (97.6)	
Hemoglobin concentration at first visit.	<=7 mg/dl	19 (11.7)	116 (22.8)	11.235,p =.004
	7-11mg/dl	85 (52.5)	257 (50.6)	
	>11mg/dl	58 (35.8)	135 (26.6)	
Tetanus toxoid vaccine	Yes	148 (91.4)	452 (89)	.745, p= .240
	No	14 (8.6)	56 (11)	
Nutrition information	Yes	154 (95.1)	450 (88.8)	5.806, p= .009
	No	8 (4.9)	58 (11.4)	
Iron and folic acid supplementation	Yes	64 (39.5)	301 (60.7)	22.176, p<.001
	No	98 (60.5)	195 (39.3)	

Comparison of late pregnancy complication between early booked and late booked mothers.

Majority of late pregnancy complication were found to be more common among late booked than those who booked early. Sever pre-eclampsia was 95(18.7%) among late booked while 13 (8%) among early booked. This difference is significantly associated with (X^2= 10.354, p= .001). Most mothers with eclampsia were from late booked 64(12.6%) and 7 (4.3%) were from early booked, the difference is associated (X^2=8.883, p=.001). Similarly anemia found to be more common among late booked than early booked mothers which was 110 (21.7%) among late booked and 19 (11.7%) among early booked significantly associated (X^2 =7.773, p=.001). In past medical history part above this study revealed that mothers with bad medical experience tend to commence antenatal care early, as result in late pregnancy complication, those with diabetes and hypertension were from early booked mothers. Chai square was not applied for uncontrolled hypertension and diabetes mellitus since these did not meet chai square assumptions (80% of the cells in the table should have expected frequencies greater than 5, and all cells should have expected frequencies greater than 1) (table 6).

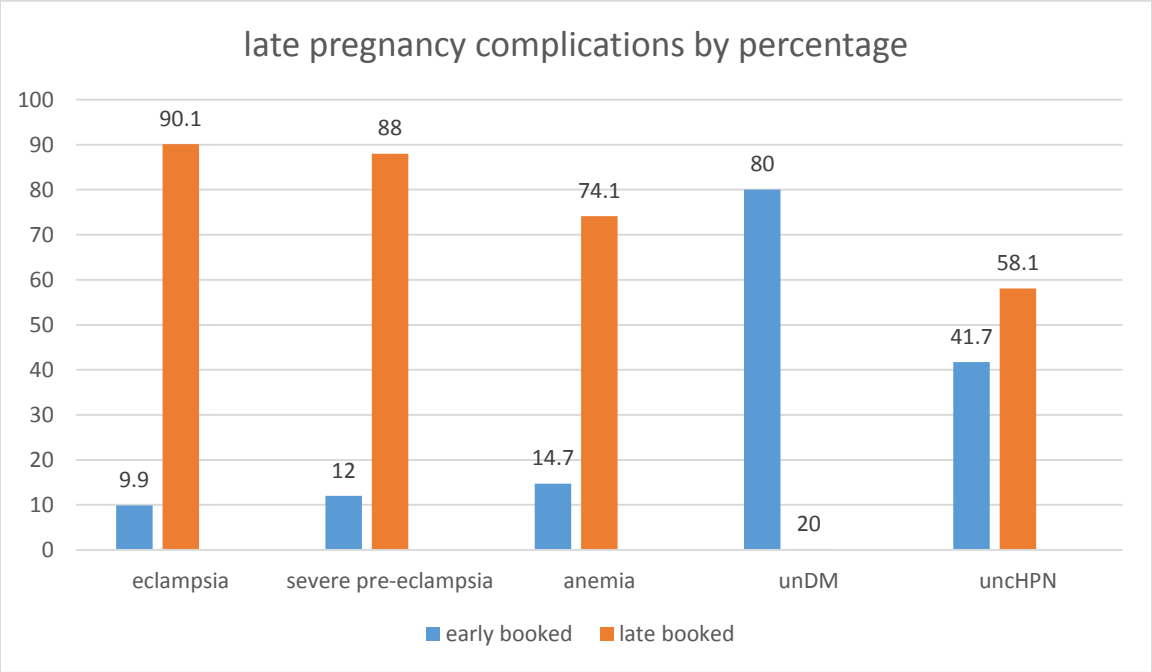

Figure 3 late pregnancy complication among late booked and early booked mothers for ANC in AMJH, 2016.

Comparison of pregnancy outcome between early booked and late booked mothers.

Higher frequency of adverse fetal outcomes (still birth and intra-partum neonatal death), low birth weight and APGAR less than six were reported among late booked mothers for antenatal care, the difference was statistically significant (X^2=4.77, p=.017, X^2=3.917, p=.029,X^2=12.543, p=.001) respectively. Chai square was not applied for maternal death since it does not meet chai square assumptions (80% of the cells in the table should have expected frequencies greater than 5, and all cells should have expected frequencies greater than 1)(table 6).

Table 6 pregnancy outcome comparison between early booked and late booked mothers in AMJH, 2016.

Factors		Post -partum hemorrhage		Adverse fetal outcome		Birth weight		APGAR score		Maternal death	
		Yes (n %)	No (n %)	yes	no	LBW	NBW	<6	>=6	yes	no
Gestational age at 1st ANC	Early	15 (38.5)	147 (23.3)	5 (10.9)	157 (25.2)	30 (18.5)	132 (26)	33 (39.8)	129 (24)	2 (33.3)	160 (24.1)
	Late	24 (61.5)	484 (76.7)	41 (89.1)	467 (74.8)	133 (81.6)	375 (74)	50(60.2)	458 (76)	4 (66.7)	504 (75.9)
X^2		4.608, p= .029		4.77 P=.017		3.917, p=.029		12.543, p= .001		NA	

NA: not applicable

Bivariate analysis for the outcome variables (severe pre-eclampsia, eclampsia, anemia, low birth weight, adverse fetal outcome (still birth and intra-partum neonatal death).

Table 7 bivariate analysis table for severe pre-eclampsia AMJH, 2016.

Variables		Severe pre eclampsia		COR 95 % C.I	p-value
		No (N %)	Yes (N %)		
Age	Below 25	335(59.6)	50(46.3)	1	
	Above 25	227(40.4)	58(53.7)	1.712(1.131, 2.59)	.011
Residence	Urban	311(55.3)	58(53.7)	1.06(.855,1.866)	.241
	rural	251(44.7)	50(46.3)	1	
Substance abuse	no	510(90.9)	97(89.8)	1	
	yes	51(9.1)	11(10.3)	1.13(.57, 2.25)	.72
Parity	Primipara	251(44.6)	46(42.6)	1	.343*
	multipara	311(55.4)	62(57.4)	1.08(.718, 1.649)	
History of miscarriage	yes	77(13.7)	8(7.4)	1.98(.929, 4.24)	.077
	no	485(86.3)	100(87.3)	1	
History of still birth	Yes	64(11.4)	11(10.2)	1.13(.67, 2.46)	.717*
	No	498(88.6)	97(89.8)	1	
Heart disease	Yes	85(15.1)	11(10.2)	1.57(.808, 3.0550	.183
	No	477(84.9)	97(89.8)	1	
Respiratory disease	no	496(88.3)	95(88)	1.03(.54,1.93)	.931*
	Yes	66(11.7)	13(12)	1	
Seizure	no	517(92)	93(86.1)	1.85(.99, 3.46)	.053
	Yes	45(8)	15(13.9)	1	
Kidney disease	yes	72(12.8)	11(10.2)	1.3(.66,2.534)	.449*
	no	490(87.2)	97(89.8)	1	
Timing of ANC	Early	149(26.5)	13(12)	1	.002
	late	413(73.5)	95(88)	2.636(1.434, 4.848)	
Hemoglobin concentration	<=7mg/dl	99(17.6)	36(33.3)	1.9(1.11, 3.266)	.020
	8-11mg/dl	301(53.6)	41(38)	.712(.430,1.178)	.186
	>11mg/dl	162(28.8)	31(28.7)	1	
Gestational age at delivery	>37	503(89.5)	80(74.1)	2.98(1.79, 4.959)	<.001
	<=37	59(10.5)	28(25.9)	1	
Iron supplement	No	248(45.1)	45(41.7)	1	.513*
	Yes	302(54.9)	63(58.3)	1.15(.75, 1.746)	
Nutrition education	Yes	506(90)	98(90.7)	.922(.45, 1.86)	.822*
	no	56(10)	10(9.3)	1	

Bivariate analysis table for anemia

Table 8 bivariate analysis table for anemia AMJH, 2016.

Variables		Anemia		COR 95 % C.I	p-value
		Yes (n %)	No (n %)		
Timing of ANC	Late	110(85.5)	398(73.6)	2.1(1.233, 3.51)	.006
	Early	19(14.7)	143(26.4)	1	
Age	Above 25	56(43.4)	229(42.3)	1.05(.71, 1.54	.823*
	Below 25	73(56.6)	312(57.7)	1	
Parity	primipara	62(48.1)	235(43.4)	1	.341*
	multipara	67(51.9)	306(56.6)	1.205(.82, 1.77)	
Substance abuse	yes	18(14)	44(8.1)	1.828(1.02, 3.3)	.044
	No	111(86.)	496(91.9)	1	
Residence	Urban	77(59.7)	292(54)	1.3(.855, 1.86)	.241
	Rural	52(40.3)	249(46)	1	
History of miscarriage	yes	17(13.2)	68(12.6)	1.056(.59, 1.867)	.852*
	No	112(86.8)	473(87.4)	1	
History of still birth	No	117(90.7)	478(88.4)	1	
	Yes	12(9.3)	63(11.6)	1.285(.67, 2.46)	.449*
History of heart disease	Yes	16(12.4)	80(14.8)	.816(.45, 1.45)	.488*
	No	113(87.6)	461(85.2)	1	
Respiratory disease	Yes	14(10.9)	65(12)	.89(.48, 1.65)	.713*
	No	115(89.1)	476(88)	1	
Seizure	yes	12(9.3)	48(8.9)	1.053(.54, 2.046)	.878*
	No	117(90.7)	493(91.1)	1	
High blood pressure >=140/90mmHg	yes	19(14.7)	76(14)	1.057(.613, 1.8)	.842*
	No	110(85.3)	465(86)	1	
Nutrition education	No	16(12.4)	50(9.2)	1	
	Yes	113(87.6)	491(90.8)	1.2(.76, 2.53)	.281
Iron supplement	Yes	85(66.9)	280(52.7)	1	.004
	No	42(33.1)	251(47.3)	1.82(1.21, 2.7)	
Tetanus toxoid vaccination	yes	114(88.4)	486(89.8)	1	.626*
	No	15(11.6)	55(10.2)	.86(.469, 1.5770)	
Ante-partum hemorrhage	Yes	10(7.8)	18(3.3)	2.44(1.099, 5.4)	.028
	No	119(92.2)	523(96.7)	1	
Prophylaxis for malaria	yes	104(80.6)	447(92.6)	.875(.54, 1.43)	.593*
	no	25(19.4)	94(17.4)	1	

Bivariate analysis table for Eclampsia

Table 9 bivariate analysis table for eclampsia AMJH, 2016.

Variables		Eclampsia		COR 95 % C.I	p-value
		Yes (n %)	No (n %)		
Timing of ANC	Late	64(90.1)	444(74.1)	3.2(1.43, 7.11)	.005
	Early	7(9.9)	155(25.9)		
Age	>25	42(59.2)	243(40.6)	2.12(1.3, 3.50	.003
	<=25	29(40.8)	356(59.4)	1	
Parity	multipara	35(48)	203(33.9)	1.89(1.2, 3.1)	.19
	primipara	36(52)	396(66.1)	1	
Gestational age at delivery	<=37	24(33.8)	63(10.50	1	<.001
	>37	47(66.2)	536(89.5)	4.34(2.5, 7.58)	
Substance abuse	Yes	8(11.3)	54(9)	1.3(.58, 2.8)	.54
	No	63(88.7)	544(91)	1	
Residence	urban	36(50.7)	333(55.6)	.822(.502, 1.344)	.434*
	rural	35(49.3)	266(44.4)	1	
History of miscarriage	Yes	5(7)	80(13.4)	.49(.19, 1.257)	.138
	No	66(93)	519(86.6)	1	
History of still birth	Yes	6(8.5)	69(11.5)	.709(.296, 1.698)	.44*
	no	65(91.5)	530(88.5)	1	
Heart disease	Yes	7(9.9)	89(14.9)	.64(.3, 1.4)	.26
	No	64(90.7)	510(85.1)	1	
Seizure	Yes	7(9.9)	53(8.8)	1.13(.49, 2.58)	.778
	No	64(90.1)	546(91.2)	1	
Kidney disease	yes	7(9.9)	76(12.7)	1	.495*
	no	64(90.1)	523(87.3)	.75(.33, 1.703)	
Nutrition education	yes	69(97.2)	535(89.3)	4.13(.98, 17.24)	.052
	No	2(2.8)	64(10.7)	1	
iron supplement	yes	36(50.7)	329(56)	.807(.49, 1.321)	.393*
	No	35(49.3)	258(44)	1	
Tetanus toxoid vaccination	Yes	63(88.7)	537(89.6)	.909(.416, 1.986)	.811*
	No	8(11.3)	62(10.4)	1	

Bivariate analysis table for low birth weight

Table 10 bivariate analysis table for Low birth weight AMJH, 2016.

Variables		Birth weight		COR 95% C.I	p-value
		NBW (n %)	LBW (n %)		
Timing of ANC	Early	132(26)	30(18.4)	1	
	Late	375(74)	133(81.6)	1.56(1, 2.43)	.049
Age	>25	241(47.5)	44(27)	1	
	<=25	266(52.5)	119(73)	2.45(1.66, 3.6)	<.001
Residence	Urban	281(55.4)	88(54)	1	
	Rural	226(44.6)	75(46)	1.06(.744, 1.5)	.74
Substance abuse	no	476(93.9)	142(87)	1	
	Yes	31(6.1)	21(12.9)	**2.3**(1.3, 4.1)	.034
Eclampsia	no	460(90.7)	139(85.3)	1	
	Yes	47(9.3)	24(14.)	1.69(.99, 2.86)	.051
Anemia	No	419(82.6)	122(74.8)	1	
	Yes	88(17.4)	41(25.2)	1.6(1.05, 2.44)	.029
Parity	Primipara	229(45.2)	68(41.7)	1	
	Multipara	278(54.8)	95(58.3)	1.15(.81, 1.65)	.44*
HBP>=140/90 mmHg	No	442(87.2)	133(81.6)	1	
	Yes	65(12.8)	30(18.4)	1.53(.955, 2.5)	.077
Prophylaxis for malaria	yes	418(82.4)	133(81.6)	1.1(.67, 1.67)	.805*
	No	89(17.6)	30(18.4)	1	
History of miscarriage	Yes	69(13.6)	16(9.8)	1.45(.8, 2.57)	.208
	No	438(86.4)	147(90.2)	1	
History of still birth	Yes	62(12.2)	13(8)	1.61(.86, 3.01)	.137
	No	445(87.8)	150(92)	1	
History of heart disease	Yes	73(14.4)	23(14.4)	1.02(.62, 1.69)	.93*
	no	434(85.6)	140(85.9)	1	
Kidney	Yes	67(13.2)	16(9.8)	1.4(.78, 2.5)	.254
	No	440(86.8)	147(90.2)	1	
Nutrition education	no	44(8.7)	22(13.5)	1	
	Yes	463(91.3)	141(86.50	.609(.35, 1.1)	.075
Iron supplements	Yes	274(54.8)	91(57.6)	.89(.62, 1.28)	.538
	No	226(45.2)	67(42.4)	1	
Ante-partum hemorrhage	No	486(95.9)	156(95.7)	1.04(.433, 2.5)	.933
	Yes	21(4.1)	7(4.3)	1	

Bivariate analysis table for adverse fetal outcome

Table 11 bivariate analysis table for adverse fetal outcomes (still birth and intra-partum neonatal death) AMJH, 2016.

Variables		Adverse fetal outcome		COR 95 % C.I	p-value
		No (n %)	Yes wq (n %)		
Timing of ANC	Early	157(25.2)	5(10.9)	1	
	Late	467(74.8)	41(89.1)	2.7(1.1, 7.1)	.036
Miscarriage history	No	548(87.8)	37(80.4)	1	
	Yes	76(12.2)	9(19.6)	1.75(.85, 3.7)	.151
Age	Above 25	267(42.8)	18(39.1)	1	.63
	Below 25	357(57.2)	28(60.9)	1.2(.63, 2.15)	
Residence	Rural	283(45.4)	18(39.1)	1.3(.7, 2.4)	.414
	Urban	341(54.6)	28(60.9)	1	
History of still birth	Yes	70(11.2)	5(10.9)	1.04(.4, 2.71)	.94
	No	554(88.8)	41(89.1)	1	
Heart disease	No	537(86.1)	37(80.4)	1.5(.7, 3.22)	.296
	Yes	87(13.9)	9(19.6)	1	
Respiratory disorder	Yes	75(12)	4(8.7)	1.43(.5, 4.11)	.501
	no	549(88)	42(91.3)	1	
Kidney disease	No	550(88.1)	37(80.4)	1.81(.84, 3.89)	.131
	Yes	74(11.9)	9(19.6)	1	
HBP>=140/90 mmhg	No	535(85.7)	40(87)	1.11(.45, 2.69)	.82
	Yes	89(14.3)	6(13)	1	
Parity	primipara	279(44.7)	18(39.1)	1	
	multipara	345(55.3)	28(60.9)	1.25(.68, 2.3)	.46
GA at delivery	>37 wks	544(87.2)	39(84.8)	1.22(.53, 2.8)	.641
	<=37 wks	80(12.8)	7(15.2)	1	
Malaria prophylaxis	Yes	515(82.5)	36(78.3)	1	
	No	109(17.5)	10(21.7)	1.312(.6, 2.7)	.466
Anemia	No	504(80.8)	37(80.4)	1.02(,48, 2.2)	.95
	Yes	120(19.2)	9(19.6)	1	
Iron supplements	No	276(45)	17(37.8)	1	
	Yes	337(55)	28(62.2)	.74(.39, 1.4)	.34
Nutrition education	no	60(9.6)	6(13)	1	
	Yes	564(90.4)	40(87)	.71(.289, 1.7)	.454

Logistic regression analysis.

Multiple logistic-regression analysis was used to evaluate the association between timing of antenatal care booking and severe pre-eclampsia, eclampsia, anemia, low birth weight and adverse fetal outcomes (still birth and intra-partum neonatal death). The estimates were adjusted for maternal age, parity, substance abuse (alcohol ingestion, chat chewing, and smoking), weight of the mothers, residence, history of still birth and miscarriage, iron supplementation during pregnancy, nutrition education, and medical disorders.

Early antenatal care booking (before 16 weeks of gestation) Prediction of maternal late pregnancy complication and pregnancy outcomes.

Sever pre-eclampsia

The variables found to be candidates in the binary logistic analysis for the final model. Therefore, a multiple logistic approach was applied to determine which factors best explained and predict sever pre-eclampsia together with antenatal care timing. Age of the mother, substance abuse, parity, history of miscarriage, history of seizure, history of DM, gestational age at first ANC, malaria prophylaxis, information on nutrition and danger sign, and gestational age at delivery were variables under binary regression become candidate for multiple logistic regression.

Mothers who had commenced antenatal care early were more likely to be protective to develop sever pre-eclampsia as compared with mothers who commenced antenatal care late during their pregnancy. Those who started antenatal care after sixteen weeks of gestation were about three times more likely to have severe pre-eclampsia as compared to mothers who started before sixteen weeks of gestation (AOR=2.77, 95 % C.I:1.44- 5.3, p-value=.002). Age above twenty five increase the risk of developing severe pre-eclampsia, mothers who were above twenty five years of age were nearly twice more likely to have severe pre-eclampsia as compared to mothers below twenty five years of age (AOR=1.6, 95 % C.I:1.09-2.55, p value=.018). For women with hypertension and pre-eclampsia, gestational age at delivery above 37 weeks increased the risk of developing sever pre-eclampsia, as this study shows mothers with pre-eclampsia and hypertension, mothers with gestational age above 37 weeks were found to be more nearly four times more likely to develop severe pre-eclampsia as compared to mother who delivered before 37 weeks of

gestation (AOR=3.75, 95 % C.I:2.2-6.4), p value <.001). Multipara women were found more likely to suffer from severe pre-eclampsia as compared to women who is primipara, the difference was not statistically significant (AOR=1.35, 95 % C.I:1.03-2.4, p value=.07) [Hosmer-Lemeshow test for the final model p-value=.633].

Table 12: final Logistic regression model for early antenatal care booking associated with late pregnancy complication (sever pre-eclampsia) in AMJH, 2016.

Factors		Sever pre-eclampsia		COR 95 % C.I	AOR 95% C.I	p-value
		No n (%)	Yes n (%)			
Timing of ANC	Early(162)	149(26.5)	13(12)	1	1	.002
	Late(508)	413(73.5)	95(88)	2.636(1.5, 5)	2.77(1.44,5.3)	
Age	Below 25	335(59.6)	50(46.3)	1	1	.018
	Above 25	227(40.4)	58(53.7)	1.7(1.13, 2.5)	1.6(1.09,2.525)	
Parity	primipara	251(44.6)	46(42.6)	1	1	.07*
	multipara	311(55.4)	62(57.4)	1.08(.72, 1.65)	1.35(1.03, 2.4)	
Gestational age at delivery	>37	503(89.5)	80(74.1)	2.98(1.798, 4.959)	3.7(2.2, 6.4)	<.0001
	<=37	59(10.5)	28(25.9)	1	1	

**Not significant, COR: crud odds ratio, AOR adjusted odds ratio:*

Anemia

Residence, diabetes mellitus history, kidney disease, malaria prophylaxis, iron and folic intake, substance abuse, ante-partum hemorrhage, parity, timing of antenatal care booking under bivariate logistic regression were candidate for multiple logistic regression analysis. Mothers who commenced antenatal care late were found to be two times more likely to be anemic, as compared to mother who commenced early. Taking iron and folic acid during pregnancy begging before sixteen weeks of gestation decrease risk of developing anemia at late pregnancy as compared to mothers who begin taking iron and folic acid after sixteen weeks of gestation. The association was found. (AOR: 1.8, 95% C.I: 1.2-2.73, p value=0.005). Mothers with substance addiction were more likely to develop anemia as compared to those with habit of substance abuse but the difference was not significant (AOR=1.8, 95 % C.I: 1.54-3.1, p- value=.087) [Hosmer-Lemeshow test for the final model p-value=.818].

Table 13: final model for early antenatal care booking associated with late pregnancy complication (anemia at late pregnancy) in AMJH, 2016.

Factors		Anemia		COR 95 % C.I	AOR 95 % C.I	p-value
		Yes (n %)	No (n %)			
Timing of ANC	late	110(85.5)	398(73.6)	2.1(1.23, 3.51)	2.04(1.2, 3.5)	.010
	Early	19(14.7)	143(26.4)	1	1	
Iron& folic acid intake	yes	85(66.9)	280(52.7)	1	1	
	no	42(33.1)	251(47.3)	1.82(1.21,2.7)	1.67(1.1, 2.7)	.015
Substance abuse	Yes	18(14)	44(8.1)	1.83(1.02, 3.3)	1.52(1.3, 2.7)	.087*
	No	111(86.)	496(91.9)	1	1	
Residence	Urban	77(59.7)	292(54)	1.3(.85, 1.86)	1.8(1.54, 3.1)	.27*
	Rural	52(40.3)	249(46)	1	1	
Ante-partum hemorrhage	Yes	10(7.8)	18(3.3)	2.4(1.1, 5.43)	3.12(1.35,7.2)	.008
	No	119(92.2)	523(96.7)	1	1	
Parity	primipara	62(48.1)	235(43.4)	1	1	
	multipara	67(51.9)	306(56.6)	1.21(.8, 1.77)	1.2(.8, 1.78)	.37*

*not significant, AOR: adjusted odds ratio, COR: crud odds ratio, C.I: confidence interval.

Eclampsia

Variables (gestational age at first antenatal care, age of the mother, parity, residence, gestational age at delivery and history of miscarriage) were found to be significantly associated in the binary logistic analysis. Therefore, a multiple approach was applied to determine which factors best explained and predict eclampsia along with early booking for antenatal care. The outcome of the final multiple logistic regression models indicated that timing of antenatal care booking, age of the mother, and gestational age at delivery, only show significant association in the final model even though variables which did not association remained in the model. Mothers commenced their antenatal care early before sixteen weeks of gestation were less likely to develop eclampsia than late booked for antenatal care (AOR=3.9, 95 % C.I:1.7-9.01, p- value= .001). Women with age above twenty five were twice more likely to develop eclampsia as compared to women below twenty five years of age (AOR=2.01, 95 % C.I:1.2-3.4, p- value=.009). Mother with pre-eclampsia and hypertension at term and post term pregnancy were five times more likely to develop eclampsia as compared to mother who give birth before term among those with hypertension and pre-eclampsia (AOR =4.9,95 % C.I:2.7-8.8, p value <.001) [Hosmer and Lemeshow test for final model p-value=.777 for the final model].

Table 14: final Logistic regression model for eclampsia among mother give birth in AMJH, 2016.

Factors		eclampsia		COR 95% C.I	AOR 95 % C.I	p-value
		Yes (n %)	No (n %)			
Timing of ANC	Late	64(90.1)	444(74.1)	3.2(1.43, 7.13)	3.9(1.7,9.01)	.001
	Early	7(9.9)	155(25.9)	1	1	
Age category	>25	42(59.2)	243(40.6)	2.12(1.02, 3.5)	2.01(1.2, 3.4)	.009
	<=25	29(40.8)	356(59.4)	1	1	
Parity category	multipara	35(48)	203(33.9)	1.89(1.2, 3.1)	1.34(.76, 2.4)	.19*
	primipara	36(52)	396(66.1)	1	1	
Gestational age at delivery	<=37	24(33.8)	63(10.5)	1	1	<.001
	>37	47(66.2)	536(89.5)	4.34(2.5, 7.58)	4.9(2.7,8.8)	

*****not significant, AOR: adjusted odds ratio, COR: crud odds ratio, C.I: confidence interval

Low birth weight

Gestational age at first antenatal care, age of the mothers, substance abuse, eclampsia, anemia, respiratory disease, history of miscarriage, history o still birth and history of kidney disease become candidate for multiple logistic model.

In this case women who commenced antenatal care late after sixteen weeks of gestation twice more likely to give low birth weight baby as compared to women who commenced antenatal care before sixteen weeks of gestation the difference was statistically significantly associated fetal outcome of being low birth weight (AOR = 1.58, 95% CI: 1.2-2.5, p-value= .004. The odds of giving low birth weight newborn is more likely among substance abusing mothers as compared to non-substance abuse mothers. Rural women were more likely to give baby low birth weight as compared to urban women but the difference was not statistically significant. Anemia and hypertensive disorder revealed association on bivariate but not significantly associated on multiple logistic regression analysis (AOR=1.3, 95 % C.I: .65-2.7, p-value=.44 and AOR=1.5, 95 % C.I:.96-2.8, p-value=.070) respectively [Hosmer and Lemeshow test for final model p-value=.603].

Table 15: final model Low birth weight among mothers in AMJH, May 19, 2016.

Factors		birth weight		COR 95 % C.I	AOR 95 % C.I	p-value
		Normal (n %)	LBW (n %)			
Timing of ANC	Early	132(26)	30(18.4)	1	1	.004
	Late	375(74)	133(81.6)	1.56(1.1, 2.4)	1.58(1.01, 2.5)	
Age	>25	241(47.5)	44 (27)	1	1	<.001
	<=25	266(52.5)	119(73)	2.4(1.6, 3.6)	2.6(1.78, 4)	
Residence	urban	281(55.4)	88(54)	1	1	.84*
	rural	226(44.6)	75(46)	1.6 (.7, 1.5)	1.04(.71, 1.5)	
Substance abuse	No	476(93.9)	142(87)	1	1	.009
	yes	31(6.1)	21(12.9)	2.3(1.3, 4.1)	1.77(.99, 3.2)	
Eclampsia	No	460(90.7)	139(85.3)	1	1	.44*
	Yes	47(9.3)	24(14.7)	1.69(.99, 2.8)	1.32(.65, 2.7)	
Anemia	No	419(82.6)	122(74.8)	1	1	.070*
	Yes	88(17.4)	41(25.2)	1.6(1.05, 2.4)	1.5(.96, 2.8)	

*not significant, AOR: adjusted odds ratio, COR: crud odds ratio, C.I: confidence interval

Adverse fetal outcome (still birth, intra-partum neonatal death)

Variables found to be candidates in the binary logistic analysis for the final model. Therefore, a multiple logistic approach was applied to determine which factors best explained and predict adverse fetal outcomes together with timing of antenatal care booking. Early booking for antenatal care, age of the mother, parity of the mothers, residence, prophylaxis for malaria, heart disease, tetanus toxoid vaccination, uterine rupture during labour, substance abuse, hemoglobin concentration at first ANC visit, taking iron and folic acid during pregnancy and history of miscarriage in the previous pregnancies were the variables. Variables in the table 11 remain in the final model. There was significant difference between two groups; early booked for antenatal care and late booked regarding adverse fetal outcomes. Women who commenced antenatal care after sixteen weeks of gestation are four times more likely to experience still birth and intra-partum neonatal death (AOR=4.4, 95 % C.I:1.5-12.2, p- value=.005). Mothers those had past obstetrics history of miscarriage were found nearly three times more likely to develop adverse fetal outcome as

compared to those with no history of miscarriage (AOR=2.77, 95 % C.I:1.23-6.3, p-value=.015). Heart disease is among medical conditions of the mothers, women with this condition were found to have adverse fetal outcomes twice more likely as compared to women free of this condition (AOR=2.2, 95 %C.I:.99-5.5, p-value=.052). The association for this condition is weak as the confidence interval ranges including one but the difference was found significant. Malaria is the medical condition which most mothers suffer while they are pregnant, prophylaxis in malarias area for women at antenatal care is one service among the service this study indicated that those women who did not take the prophylaxis were found to be three times more likely to experience adverse fetal outcomes as compared to mothers who took the prophylaxis (AOR=3.1, 95 % C.I:1.1-8.8, p- value=.034) [Hosmer and Lemeshow test for final model p-value=.652].

Table 16 multiple logistic regression for adverse fetal outcome in AMJH, 2016.

Factors		Adverse fetal outcome		COR 95 % C.I	AOR 95 % C.I	p-value
		No (N %)	yes (N %)			
Timing of first ANC	Early<=16wks	157(25.2)	5(10.9)	1	1	.005
	Late >16wks	467(74.8)	41(89.1)	2.7(1.1, 7.1)	4.4(1.5, 12.2)	
Miscarriage history	No	548(87.8)	37(80.4)	1	1	.015
	yes	76(12.2)	9(19.6)	1.75(.85,3.7)	2.77(1.3, 6.3)	
Heart disease	no	537(86.1)	37(80.4)	1	1	.052
	Yes	87(13.9)	9(19.6)	1.5(.7, 3.22)	2.2(.99, 5.1)	
Malaria prophylaxis	yes	515(82.5)	36(78.3)	1	1	.034
	no	109(17.5)	10(21.7)	1.312(.63 2.7)	3.1(1.1, 8.8)	

AOR: adjusted odds ratio, COR: crud odds ratio, C.I: confidence interval.

Table 17 multiple logistic regression model for associating of antenatal care timing with late pregnancy complication and adverse pregnancy outcomes AMJH, 2016

	n/N(%)	**COR 95 % C.I**	**AOR 95% CI**
Severe pre-eclampsia			
Early (<=16wks)	13/670 (1.94)	1	1
Late (>16wks)	95/670 (14.2)	2.636 (1.5, 5)	2.77 (1.44,5.3)
Anemia			
Early (<=16wks)	19/670 (2.84)	1	1
Late (>16wks)	85/670 (12.86)	2.1 (1.23, 3.51)	2.04 (1.2, 3.5)
eclampsia			
Early (<=16wks)	7/670 (1.05)	1	1
Late (>16wks)	64/670 (9.55)	3.2 (1.43, 7.13)	3.9 (1.7,9.01)
Low birth weight			
Early (<=16wks)	30/670 (4.50)	1	1
Late (>16wks)	133/670 (19.85)	1.56 (1.1, 2.4)	1.58 (1.01, 2.5)
Adverse fetal outcome			
Early (<=16wks)	5/670 (0.75)	1	1
Late (>16wks)	41/670 (6.12)	2.7 (1.1, 7.1)	4.4 (1.5, 12.2)

CHAPTER SIX: DISCUSSION

Early booking for antenatal care and its association with late pregnancy complication and pregnancy outcomes, comparative crossectional study between early booked and late booked for antenatal care was carried out in Arbaminch general hospital. Geographic regions of the Ethiopia reflect various level of early antenatal care booking according to WHO recommendation. This study shows the level of early antenatal care booking 24.2% which is similar to the studies; in Mekele Town, Kembata Tembaro Zone, According to Ethiopian Demographic and health survey 2014, 18% of women made their first ANC visit before the fourth month of pregnancy, Arbaminch Town reported that the proportion of first ANC within the recommended time (before or at 16 weeks of gestation) was 32.7%, 31.4 %, 17.4% respectively [7, 8, 19]. But difference is seen with study conducted in Arbaminch town this may be due to methodological difference (since the former study was community based study there might be difference regarding ANC seeking behavior, awareness difference, as participants of this are those who commenced ANC, they might have awareness or have developed good health care seeking behavior). Antenatal visits are important for the health of both infant and mother. Health care providers can educate mothers on important health issues, such as diet and nutrition, exercise, immunizations, weight gain and abstaining from drugs and alcohol as well as monitor for health-compromising conditions and help them prepare for the new emotional challenges of caring for an infant. Mother who receive late defining as beginning in third trimester of pregnancy are more likely to have babies with health problems. However, this study and others similar studies indicated that in Ethiopia antenatal timing is too late which imply that mothers are not obtaining benefit of early booking.

Late pregnancy complication

The level of hypertensive disorders, current study revealed out of 670 mothers, sever pre-eclampsia 108(16.1%), eclampsia 71(10.6%). This is smaller than study reported in Mettu Hospital which revealed sever preeclampsia 35.5%, and eclampsia 19 [22], study in Mettu hospital was among pregnancy complications which may made these complications dominant, this might be the reason for being high. But higher than studies in Dessie referral

hospital sever pre-eclampsia was 8.4%[42], in Jimma University Hospital, Ethiopia (7.6%) [43] this difference might be relatively larger sample used in the current study, and in India, *Pre-eclampsia and eclampsia (25.33%)[44]*, this difference might be life style difference between the study populations.

In the current study anemia was 129(19.3%). But nearly in line with study in Tikur Ambesa hospital 21. 3%[45]. But is smaller than studies reported in Boditti Health Center in Southern Ethiopia 61.6%[25], in Gilgel Gibe Dam area 53.9%; [24], in Southeast Ethiopia 27.9%[26], in Nigeria 27.6% [23], in Eastern Sudan Kassala hospital (41.8%)[46]. On the other hand the finding of this study is higher than study in India *(2.89%[44].* This discrepancies may be reporting problems as this study used medical records and may be due to a difference in socio-economic and educational status between the study populations in these study areas.

Birth outcomes

In present study the level of low birth weight was found to be 163(24.3%) total deliveries. This finding is in line with findings reported in Jimma zone 22.5%, Mettu hospital 24.8%., West Bengal (28.8%), [22, 28] [47, 48] but lower than Study reported in Eastern Sudan 31.5%[46], may be due to social-economic difference and higher than studies in Tigray region 14.6% (only live birth in postnatal unit, in this case intra-partum died LBW newborn might not be included or small sample size used for Tigray study (380)) [49], Study in Gondar University Hospital 11.2% (only one month data might be the reason for this difference) [50]. This high discrepancy is mainly due to the methodological variations since these studies were conducted for one month and among live births, intra-partum neonatal deaths not included.

In this the prevalence of still is 19(2.8%) from the total of 670 births. Which agree with study done in Uganda 2.4 %[51]. This result is smaller than study reported in Gondar University Hospital which shows 7.1% [30]. This difference is may be due to reporting problem as the data used in this study is from delivery report or as this study only used data of mothers with antenatal care service, but the Gonder one used data of all deliveries or this might show that antenatal care service benefited the mothers.

Comparison early booked VS late booked for antenatal care

Women with bad past obstetrics history, advanced age (above 35 years) and medical problem (anemia, kidney disease, heart disease, respiratory disease and the like) tend to commence antenatal care early as compared to those without the conditions above. This finding is consistent with study in Kambata Tambaro Zone [12]. It known that as age of the mother increase chronic conditions begin to rise, the too experience abortion and miscarriage at the age lapse than those who are young and primiparas. Study indicated that women delay to seek antenatal care if they did not experience discomfort or illness related to their pregnancy. Single mothers, teenagers, with no medical problem, with no bad past obstetrics history and rural women booked late, lack of awareness regarding the importance of early attendance, unplanned or pregnancy out of marriage and no identified illness or health problem during their pregnancy (absence of problem during pregnancy) might be the reason for booking late.

Higher parity was generally a barrier to adequate use of ANC [12]. High parity should not be taken as similar as advanced age since mother with safe reproductive age group may be multipara or grand multipara. This study revealed that women with one parity and above were more likely to register lately compared to those who have no parity in turn commencing antenatal care late is found to highly associated with anemia. This agree with studies conducted in Kenya and Addis Ababa which revealed that parity increases the experience of timely booking decreases were six times more likely anemic as compared to first and four times more likely anemic as compared to second trimester[26]. Similarly study in Nigeria revealed that anemia is more common in second and third trimester as compared to first, others started early were found to be less likely anemic according to this study [24]. Prevention, screening and treatment for infections prevent maternal and infant morbidity. Moreover, iron and folate supplementation reduce anemia, specialized treatment of severe pre-eclampsia reduce case fatality and findings suggest that ANC can improve nutritional behaviors [25]. In current study parity did not show significant association but study in Turkey revealed that multipara women are at high risk to develop anemia, in this study late commenced ANC were multipara women and they consumed high iron and folic acid based on their hemoglobin concentration this might be the reason.

In current study, higher level of **adverse fetal outcomes** (still birth, and low birth weight), and APGAR less than six were reported among late booked mothers for antenatal care. Prevention, screening and treatment for infections prevent fetal loss, preterm delivery, and LBW [25].

The level of still birth between two groups different but not statistically significant which is 14(2.8%) among late booked and 5(3.1%) among early booked. Early booked mothers revealed higher still birth than late booked. The level varies among early booked and late booked groups. Study in South Africa, claim that 24% of stillbirths and neonatal deaths in South Africa could be prevented every year if families took action to prevent them by using early ANC[53]. study in Bangladesh found that mothers who started ANC in the first trimester decreased the risk of perinatal death[54]. Reductions in still birth mortality can be achieved through ANC by increasing detection and management of hypertensive disease, fetal growth restriction and gestational diabetes as well as referring women to appropriate and skilled care for delivery when caesarean sections or inductions would be appropriate. Additionally, health care providers can advise mothers on the prevention of malaria during pregnancy, prescribe folic acid supplements, test and treat syphilis], and encourage the use of balanced protein energy supplements , which are all said to improve stillbirth outcomes. Moreover, screening for congenital abnormalities as a part of ANC may help to reduce rates [42].

In this study, **low birth weight is** 30(18.5) among early booked and 133(26.2%) among late booked for antenatal care. This difference significantly associated with the fetal outcome being low birth weight. LBW is associated with timing of ANC, this finding agree with result reported in South Africa[52] and study in bale zone hospital, which indicated that commencing antenatal care after second trimester is associated with LBW [35]. This finding also agree with study from Brazil, the early initiation of ANC enables adequate number of visits which in turn enables access to diagnostic and therapeutic methods for several pathologies that have serious repercussions on newborn and maternal health[55]. ANC consists of many items, and there is a chain of events related to a basic prerequisite, that is, the early initiation of follow-up by the pregnant woman, which would enable monitoring of the proposed actions. The proposed actions will lead to high quality ANC, and as a result,

pregnancies with good outcomes. The actions can be disease prevention actions, dietary information provided during antenatal care, iron and folic acid supplementation, malaria prophylaxis provision, and satisfaction resulted from knowing their fetal wellbeing and themselves. Therefore, the great challenge to be overcome by ANC providers is to make available the set of activities proposed for all women in a timely fashion, so that good outcomes are reached with a reduction in the rate of LBW. A study of health care facilities in Chicago demonstrated that a majority of women utilizing ANC at these facilities had less than 80% of the recommended content during ANC as result of late booking. The same study also demonstrated that less adherence to recommended content was associated with LBW [39].

This study is the only study to investigate how delays in first ANC visit influences the occurrence of late pregnancy complication and pregnancy outcome. Importantly, this study points to a methodological concern that arises when trying to operationalize ‘adequate’ ANC. While current study would seem to indicate that the timing of the first ANC visit does matter for late pregnancy complication and pregnancy outcome. A more plausible scenario is that timing matters, but needs to be taken in conjunction with the number of ANC visits and content of care.

This study indicated that adverse pregnancy outcomes and late pregnancy complication were higher among late booked mothers for antenatal care as compared to mothers who booked early for antenatal care. Early booking is a factor associated with late pregnancy and pregnancy outcome. Taking iron and folic acid, and information on nutrition during antenatal care were factors associated with late pregnancy complication and pregnancy outcomes.

Strength of the study

The response rate for the study was high.

Limitation of the study

Cross-sectional study design was used in this study. This type of study design shows the exposure and outcome at the same point in time, but it cannot formulate the cause and effect relationship from this study design.

Gestational age, some were based on clinical estimation which may vary from actual gestational age.

Three to one ratio of comparison group is somewhat weak than one to one.

As this study utilized secondary data, cards lack some variables. Hence, these variables were excluded from the study, which could have yielded better results. There are also few variables such as other socio demographic characteristic such as maternal education level, and height, mothers MUAC, smoking status of parents, occupation and drug ingestion that may have influence for LBW infants cannot be included in this study due to lacking of data. Exploring social determinants using population based study design would open up gaps in knowledge in this area as it would made the study possess soundly justification.

CHAPTER SEVEN: CONCLUSIONS AND RECOMMENDATIONS

- Early booking was still not as per intention /target of WHO. Majority of pregnant mothers commenced antenatal care late.
- Means antenatal care is not providing its promises for the mothers in the study area.
- Late pregnancy complications and adverse birth outcome were more common in late booked mothers than early booked for antenatal care.
- Antenatal care, beginning as early as possible and including a good number of prenatal visits, appears to be of great importance to decrease late pregnancy complication and adverse pregnancy outcomes.
- Despite the association found in the study, this study cannot conclude that late pregnancy complication and adverse pregnancy outcomes would be prevented only by timing of antenatal care.
- The results could be used to develop monitoring measures and evaluation programs of health care assistance during pregnancy, at delivery and to newborns, focusing on a reduction in pregnancy complication and adverse pregnancy outcome rates.
- The study results have implications for researchers investigating the advantage of early ANC as a determinant of late pregnancy complication and birth outcomes.

Recommendation

Based on the findings

For health care planners: -

- Incorporating provision of continuous health education on importance of early antenatal care visits with respect to possible benefits at health facility and community level as routine health service.
- Endorsing all necessary provision for undertaking this service.
- For Gamo Gofa Zone health department:-
- Mobilizing community, resource and health care workers, for continues and sustainable health promotion in early antenatal initiation aspects. Hence mothers can get plenty of time and service if they start antenatal care early.
- For Arbaminch general hospital:-

- Should promoting early booking for antenatal care service, providing all necessary service for those who commenced early. Should think for outreach programs with health extension workers.

Further studies on the evaluation of timing of ANC experienced by women associated with better evaluation of barriers to ANC timing could bring some improvement on this issue.

Future research should aim to test a combination of indicators for 'adequate' ANC usage. Finally, ANC messages promoted by the government and other public health professionals in Ethiopia (since only 18% women initiated ANC before sixteen weeks of gestation [6] should encourage clinicians to enrich their content of care and implement established effective interventions during ANC, rather than only focusing on early ANC entry.

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ANNEX

Questioner

Identification:

1. Questionnaire number _____
2. Chart number _____
3. Data abstractor code _____

Section A: Socio-demographic characteristics.

1. Mother's age (years) _____
2. Marital status: 1. Single [ ] 2. Married [ ] 3. Divorced [ ] 4. widowed [ ]
3. Does she smoke cigarette: 1. Yes [ ] 2. No [ ]
4. Is she drinking alcoholic beverages: 1. Yes [ ] 2. No [ ]
5. Other substance abuse specify _____
6. Residence: 1. urban [ ] 2. rural [ ]

Section B: Obstetrics/medical History

1. Last menstrual period (LNMP): 1.Yes [ ] 2. No [ ]
2. Total number of pregnancies including miscarriages (Parity) _____
3. Is she has any miscarriages (spontaneous abortion): 1. Yes [ ] 2. No [ ]
4. If yes for #3 how many times _____if no skip this question.
5. How old was the pregnancy when she had the miscarriage? _____
6. Is she had any delivery of a death baby (still birth) or a child that died in the first month of life: 1. Yes [ ] 2. No [ ] (Please s specify)
7. How old is her last baby at birth (weeks) _____
8. Personal medical history of?

1, Heart disease	1. Yes 2. No
2, Breathing or respiratory problems:	1. Yes 2. No
3, Seizure or Epilepsy:	1. Yes 2. No
4.Diabetes	1. Yes 2. No
5.Kidney disease:	1. Yes 2. No
6.Anemia:	1. Yes 2. No
7.malaria:	1. Yes 2. no
9. Others	_____

Section C: Index Pregnancy ANC information

1. Date of first antenatal visit_____
2. Gestation age in weeks at first ANC visit_____
3. Expected date of delivery_____
4. Any problem with this pregnancy: 1. Yes [ ] 2. No [ ]
5. If yes #4 states the problem._____If No for #4 skip this question.
6. Any illness in this pregnancy: 1. Yes [ ] 2. No [ ]
7. If yes #6describe the illness. _____If No for #6 skip this question.

Measurements and laboratory tests

1. Maternal weight (kg) _____

ANC services

Services	Results
1.Blood pressure	_____mmHg
2.Hemoglobin concentration	1<=7mg/dl 2. <=11mg/dl 3. >11mg/dl
3.HIV test	1.reactive[ ] 2.on reactive [ ]
4.VDRL/TORCH	1. Positive [ ] 2. Negative [ ]
5.Urine analysis	Glucose 1. +ve [ ] 2. –ve[] Protein1. +ve [ ] 2. -ve [ ]
6.Blood film	1. Negative 2. Vivax 3. Falicifarioum 4. Others
7.ABO Blood Type &RH	RH^+ [ ], 2. RH^-[ ],
8.Sonography	1 yes [ ] 2 no [ ]
9.Other specify	

10. Stool examination [ ] finding _____
11. Number of ANC visits_____
12. Information on dangers signs and symptoms in pregnancy given: 1. Yes [ ] 2. No [ ]
13. If yes #12what danger sign specify_____
14. Diet and nutrition education: 1. Yes [ ] 2. No [ ]
15. Planning and preparing for delivery advised: 1. Yes [ ] 2.No [ ]
16. Infant immunization information given: 1. Yes [ ] 2. No [ ]
17. Family planning education given: 1. Yes [ ] 2. No [ ]

18. Intermittent preventive treatment for malaria provided: 1. Yes [ ] 2. No [ ]

19. Tetanus toxoid: 1. Yes [ ] 2. No [ ] if yes how much: 1. 1dose [ ] 2. 2 dose [ ]

20. Folic acid/iron tablets: 1. Yes [ ] 2. No [ ] if yes specify dose _____

Late pregnancy complications:

.21sever pre-eclampsia	Yes 2. No
22. Anemia	Yes 2. No
23. APH	Yes 2. No
24. Eclamsia	Yes 2. No
25. Uncontrolled DM	Yes 2. No
26. Uncontrolled hypertension	Yes 2. No

Section D: labour and delivery

1. Date of delivery _____

2. After delivery how much day the mother stayed in the health setting: 1. 1 day [] 2. >1 day [].

Delivery conducted by:	Midwife [ ] 2. Nurse 3. Doctors [ ] 4. Others(EOS) [ ],

4. Gestation age at delivery _____

5. Onset of labour:

Spontaneous	Yes 2. No
Induced	Yes 2. No
Presentation:	Cephalic [ ] 2. Breech 3. Other_____

Mode of delivery:

SVD	Yes 2. No
Caesarean section If the mother had a C-Section, forceps delivery, or vacuum extraction, what were the indications for that procedure?	Yes 2. No _____
Assisted vaginal delivery	Yes 2. No

12. Complications in labour, delivery and early post –partum: 1. Yes [ ] 2. No [ ]. If yes, #12 specify_____if no #12 skip this question.

14. APH:	1. Yes 2. No [ ]
15. Perineal tear:	1. Yes 2. No [ ]
16. Obstructed labour:	1. Yes 2. No [ ]

17.Eclampsia:	1. Yes 2. No [ ]
18. Ruptured uterus:	1. Yes [ ] 2. No
19. Retained placenta:	1. Yes 2. No [ ]
20. PPH:	1. Yes 2. No [ ]
21. Anemia:	1. Yes 2. No [ ]
22. sever preeclampsia:	1. Yes 2. No [ ]
23. cord prolapsed:	1. Yes 2. No [ ]
24. Multiple gestation:	1. Yes 2. No [ ]
25. PROM:	1. Yes 2. No [ ]
26. Other complication:	_____

Maternal outcome after delivery:

27. Death:	Yes 2. No
28. Bleeding:	Yes 2. No
29. intra-partum hemorrhage:	Yes 2. No
30. Others:	_____

Fetal outcome after delivery:

31. Alive:	Yes 2. No
32. Stillbirth:	Yes 2. No
33. birth weight:	_____
34. intra-partum neonatal death:	Yes 2. No
35. Fetal distress:	Yes 2. No
36. Miconium aspirations:	Yes 2. No
37. APGAR score:	<_6 2. >=6
38.Visible malformation:_____	Yes 2. No
39. Jaundice	Yes 2. No
40. SGA [Birth wt) _____ gm. ❒ G.A. _____ wks.	1. Yes 2. No
41. LGA ❒ BirthWt _____ gm.	Yes 2. No

❒ G.A. _____ wks. ❒ Other (*specify*)	
42. Premature	Yes 2. No
43. birth injury	Yes 2. No
44. RDS	Yes 2. No
45. Postdate	Yes 2. No
46. Others:	_____
47. Sex of baby:	1. Male [ ] 2. Female [ ]
48. Age at Discharge (in hours from delivery)	_____
49. Transferred to NICU:	Yes 2. No
50. Home with parents	Yes 2. No

52. If the infant was alive at discharge, was a discharge plan documented in the infant's records?

1. Yes 2. No

53. Fetal Heart Rate

a. What was the fetal heart rate pattern during the last hour before delivery? *(Check all that apply)*

Rate/Pattern

1. Normal (120-160/min.)
2. Bradycardia (<120/min.) 3. Tachycardia (>160/min.) 4. Loss of baseline variability 4, late decelerations 5. Variable decelerations

b. If the heart rate was not normal, what intervention(s) is documented: _____

54. Were any neonatal resuscitation measures required/attempted in the delivery room: 1. Yes 2 No, *if yes, check all that applied*?

1. Physical stimulation
2. Bag & Mask
3. ET Suction
4. Intubation.
5. Respiratory meds
6. Extra cardiac massage
7. Cardiac medications
8. Other *(specify)*

Study area map

Figure 4 Study area Arbaminch general hospital, southern nation nationalities and peoples region, Ethiopia 2016 [3].