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THE EFFECTS OF MATERNAL AGE AND PARITY ON BIRTH WEIGHT OF A NEWBORN AMONG MOTHERS WITH TERM AND SINGLETON DELIVERY IN TIKUR ANBESSA SPECIALIZED HOSPITAL, ADDIS ABABA, ETHIOPIA

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The effects of maternal age and parity on birth weight of newborn among mothers with term and singleton delivery in Tikur Anbessa specialized university hospital, Addis Ababa Ethiopia

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LIST OF ABBREVIATIONS AND ACRONYMS

BW…….. Birth weight

CI……..Confidence interval

CS…….Ciserian section

GA…….....Gestational age

LBW…….Low birth weight

LNMP……...Last normal menstruation period

MBW……Mean birth weight

MP……Multi-parous

NP……Nulliparous

OBY/GYNE…...Obstetrics and Gynecology

OR……..Odds Ratio

P…….Parity

PG……..Primi-gravida

SGA……...Small for Gestational age

SVD……..Spontaneous vertex delivery

TASH……Tikur Anbessa specialized hospital

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ABSTRACT

Background: Birth weight is the single most important factor determining survival, healthy growth and development of a newborn. An estimated sixteen percent of all babies born globally had low birth weight. Parity and maternal age have been shown to increase the risk of adverse neonatal outcomes, such as intra-uterine growth restriction (IUGR), prematurity, low birth weight and mortality.

Objective of the study: The study was aimed at investigating the effects of maternal age and parity on birth weight of a term and singleton delivery.

Materials and Methods: Institution based retrospective cross sectional study design was employed. The study was conducted in Tikur Anbessa specialized Hospital (TASH), Addis Ababa, Ethiopia. Four thousand five hundred ninety mothers (4590) with term and singleton delivery in the period of June, 2015 to May, 2017 were included with their respective age at the time of delivery, gestational age (GA), parity, mode of delivery presentation during gestation, ANC follow-up, source of referral and birth weight of the child.

Data was analyzed using SPSS version 23 statistical packages; binary logistic regression was carried out to determine the effect of maternal age and parity with respect tolow birth weight.

Result: Grand multiparous women (parity≥5) had an adjusted odds ratio (AOR) of 3.89at 95% confidence interval (CI =2.19, 6.93), which implies that their risk of giving low birth weight baby is 3.89 times greater than multiparous women (p=2-4). Nulliparous women (p=0) had anAOR of 0.23(at 95% CI= 0.19, 0.38), which reveals that they have no risk of having low birth weight baby compared to multiparous women. Primiparous (p=1) had an AOR of 0.22(95% CI, 0.16, 0.30), this shows that they have norisk of giving low birth weight baby as compared with multiparous women. The current study finding described that maternal age at 40s and above hadan AOR of 1.96(95%CI=1.22, 3.20), which implies that their risk of delivering low birth weight is 1.96 times greater than age groups of 30-34. However, other age groups were not significantly associated with low birth weight. The mean birth weight of newborns of study participants was 3075.41gm $\pm$569.58(mean$\pm$SD).

Conclusion: Risk of giving low birth weight baby was higher in grand multiparouswomen compared withmultiparous women. In contrast, primiparous and Nulliparous women have no risk of delivering low birth weight baby compared with multiparous women.

Mothers with age 40s and above were associated with higher risk of delivering low birth weight newborn compared to age group of30-34.

Key words: parity, birth weight, maternal age, low birth weight, grand multiparous

1. INTRODUCTION

1.1 Background

Birth weight is the body weight of a baby at birth. In both developed and developing countries, birth weight is probably the single most important factor that affects neonatal mortality, in addition to being a significant determinant of post-neonatal mortalityand morbidity of infant and childhood. Thus, birth weight has long been a subject of clinical and epidemiological investigations and a target for public health intervention. In particular, considerable attention has been focused on the causal determinants of birth weight, and especially of low birth weight (LBW), in order to identify potentially modifiable factors (1).

From 1960 birth weight has been classified as low birth weight (<2500 grams), very low birth weight (VLBW; <1500 grams), extremely low birth weight (ELBW; <1000 grams), or macrosomia (>4000 grams (2).

Advanced maternal age and Parity have been shown to increase the risk of adverse neonatal outcomes, such as intrauterine growth restriction (IUGR), low birth weight, prematurity, and mortality (3).

Advanced maternal age, defined as the mother being aged 35 years or above at the time of birth, is considered a major risk factor for negative pregnancy and perinatal outcomes in both low and high-income countries (4).

Penrose (1934), Collman and Stoller (1962) showed that maternal age plays a significant role than the birth order on the incidence of Down's syndrome. Stillbirths in general increase in frequency in mothers aged over 40 years (5).

Maternal parity is a well-recognized predictor of infant birth weight, with the lowest birth weights observed among infants born to Nulliparous women. However, few epidemiological studies have addressed the biological reason behind such association. Lowerbirth weights among first born infants may be a direct consequence of physiological conditions associated with Nulliparity. It has been hypothesized that the first pregnancy primes the body and with each

subsequent pregnancy the body is more efficient. Nulliparity may confer risk through complications during childbirth such as obstructed labor whereas high parity has been linked to increased risk of hypertension, placenta previa, and uterine rupture. Several studies have hypothesized that in youngmothers, maternal- fetal competition for nutrients and/or the mother's incomplete physical growth might contribute to adverse neonatal outcomes. Older women experience an increase in the incidence of congenital abnormalities as well as maternal morbidities such as hypertension and gestational diabetes (3).

Many other maternal and environmental factors are known to affect birth weight and many such factors also vary across a woman's reproductive lifespan (6).

Besides, biological factors such as gestational age (GA), maternal anthropometry, weight and height, education, sex of delivered child, and lifestyle factors like dietary habits, tobacco or caffeine consumption can also influence birth weight. Studies have also shown socioeconomic factors like maternal education and household income as important factors affecting birth weight, women with low education, poverty, and poor nutritional status are coexistent in rural part of India and therefore they are at increased risk of adverse reproductive outcomes including Lbw (low birth weight) and preterm birth (7).

Low birth weight babies are more likely to have disabilities informs of developmental delay, poor growth and mental disabilities (2).

Low Birth Weight (LBW) is a birth weight less than 2500 gm (WHO, 1984) and perinatal mortality are important public health problems in developing countries. The LBW is a consequence of either preterm (<37 weeks of gestation) delivery or intrauterine growth retardation (IUGR) or of both (WHO, 1984). In addition to short-term consequences, such as high infant mortality and childhood growth failure among survivors, growth retardation is a major public health problem worldwide. Fetuses who suffer from growth retardation have higher perinatal morbidity and mortality, and are at an increased risk of sudden infant death syndrome. During childhood they are more likely to have poor cognitive development and neurological impairment (8).

The causes of LBW are multifactorial; it is associated with sex of fetus, maternal hemoglobin level during pregnancy, hard manual labour, maternal nutrition , economic condition, maternal height, antenatal care, parents education, 1990, maternal weight, tobacco consumption, place of residence, season of the year, ethnicity , and most importantly maternal age and parity (9).

1.2 Statement of the problem

The relationship between maternal age and parity with birth weight has been studied from the remote past by many workers in India and abroad. The opinions of authors regarding the relationship of the maternal age, parity and birth weight are conflicting. This may be due to failure to separate the factors of age and birth order which are correlated or to the small amount of data on the higher birth order, or to differences in the inherited factors and the socio-economic background of the samples (10).

Both mother's age at delivery and parity are associated with infant birth weight. Women < 20 years and>30years of age have a higher LBW rate than women 20-29years of age. The LBW rate is higher for first births than second and third births, then increases as the birth order increases beyond four. Advanced maternal age and the proportion of first-born infants in women >30 years of age may have contributed to the increase in the LBW rate. There was also a steady increase in the rate of multiple births, from 1.3% in 1995 to 2.2% in 2005. The increase in the multiple birth rate may also have contributed to the increase in the preterm birth and LBW rates (11).

Advanced maternal age is associated with increased risk of low birth weight (LBW) and preterm delivery among both Primi-gravida and multiparas. LBW children have more respiratory, cognitive, and neurological problems than those born with normal birth weight. Preterm babies have higher risks of heart defects, lung disorders, cerebral palsy, and delayed development (4).

On the other hand, several studies have hypothesized that in young mothers, maternal- fetal competition for nutrients and/or the mother's incomplete physical growth might contribute to adverse neonatal outcomes. On the other hand teenage mothers have an increased risk of having low-birth-weight babies, premature babies, and babies who die during the first year of life 3,4 ; they thus have a disproportionate share of all adverse outcomes of pregnancy (12).

Shami and Sultana (1980) investigated that maternal age has negative effects on male stillbirths and significant positive effects on female stillbirths. They showed that birth order has highly significant positive effects on male stillbirths. James (1963), Warburton and Fraser (1964) examined that the incidence of abortions increases with the increase in maternal age. Shami and Sultana (1980) reported that maternal age has significant negative effects on abortion (5).

Maternal parity is also a well-recognized predictor of infant birth weight, with the lowest birth weights observed among infants born to Nulliparous women (8).

Low birth weight remains the most important determinant of perinatal mortality and impaired later development worldwide (13).

Low birth weight (LBW) (<2500 g) is the strongest determinant of infant morbidity and mortality in India. The World Health Organization estimated that17% of the babies born worldwide are LBW, with marked differences between the incidence in developing (19%) and developed countries (7%). As per national family healthsurvey-3 (NFHS-3) report, proportions of LBW babies were slightly higher in rural (23%) than for urban population(19%) with regional disparity as low as 8% in Mizoram to 33% in Haryana and 23.4% in Madhya Pradesh (25% in Indore (7).

Although the fetal death rate has declined over the past 30 years among women of all ages, it is unknown whether particular characteristics of the mother, such as age, still affect the risk of fetal death. We undertook a study to determine whether older age, having a first child (Nulliparity), or other characteristics of the mother are risk factors for morbidity and mortality of a fetus by affects birth weight of a baby (14).

1.3 Significance of the study

Birth weight is strongly associated with infant mortality, developmental problems in childhood, and the risk of various diseases in adulthood, including diabetes, hypertension, and cardiovascular conditions.

Knowledge of factors affecting the birth weight of a baby is vital to prevent unwanted developmental and health related complications.

The study might fill the gap of opinions of authors regarding the relationship of birth weight with maternal age and parity which remained conflicting till now a day.

There was no adequate study on determinant factors of birth weight particularly parity and maternal age in our country.

Finally, the result will be important to take early possible measures to prevent high risk outcomes and to bring ideas supporting the national health policy of Ethiopia related to the issue.

2. LITERATURE REVIEW

Birth weight is the single most important factor determining survival, healthy growth and development of a newborn. Worldwide, in 2013, nearly 22 million newborns, an estimated 16 percent of all babies born globally that year – had low birth weight i.e. below 2500 gm (15).

Of the 127 million infants born in the world in 1982,20 million (16%) were estimated to weigh less than 2500 g, and over 90% of these infants were bornin developing countries, a function not only of the higher birth rate in these countries but also of their much higher prevalence of LBW. The lowest birth weights were reported for Asia, with mean values ranging from about 2700-2800gm in the Indian subcontinent to 3200-3300gm in China and Japan, and corresponding LBW rates of 30-40% and 5-6%, respectively. In West Africa, the range ofmean birth weight was 2800-3000 g with a LBWrate of 10-20%, while in North Africa; the correspondingvalues were 3200-3300 g and 5-15%. The range of mean birth weights was 2900-3100 g with a LBW rate of 10-18% in Central America and 3100-3300 g and 9-12% in South America respectively. The highest birth weights were reported for North America and western Europe (mean birth weight, 3300-3500 g; LBW rates, 4-8%) (1).

In India the incidence of low birth weight (LBW) was 21.5 percent according to the NFHS - 3 surveys. In the study, maternal age was not found to be significantly associated with low birth weight and Proportion of LBW was comparatively higher among babies born to mothers who were below 20 years of age (60.46%), illiterate (50.0%), engaged in unskilled work (52.32%), belonging to low socioeconomic class (61.54%), living ina 3-generational family (39.62%) and Muslim by religion (36.06%). Maternal education, maternal occupation, socioeconomic status and type offamily were found to be significantly associated with LBW (15).

The rate of LBW decreased with the increasing age of mothers after 18 years. The rate of LBW increased slightly after the age of 28 years. It shows that the young mothers (age < 19 years) delivered a higher rate of LBW baby than those mothers aged 19 years onwards. The mean birth weight was higher in the age group of 24-28 years whereas lower mean birth weight was observed in the age group of less than 19. It can be seen that the rate of LBW decreased with increasing parity. The highest difference in mean birthweight was observed between first and third parity (16).

Older teenage mothers had lower, but still significant risks of having premature infants or infants with low birth weights (12).

Advanced maternal age was not associated with an increase in the probability of LBW and preterm delivery suggests that there are unobserved factors that are related to both the probability of giving birth at older ages and the probability of LBW and preterm delivery (4).

According to one study done in USA; Nulliparous/age 18-<35 years shows Increased odds for SGA and neonatal mortality. Parity≥3/age 18-<35 years shows preterm, neonatal, and infant mortality for, and for parity ≥3/≥35 years preterm and neonatal mortality. Nulliparous women <18 years of age have the highest odds of adverse neonatal outcomes. Higher odds of adverse outcomes are also seen among parity ≥3 / age ≥35 mothers (3).

Among singleton births in 1995, the rates for the first and second babies of mothers 20 - 29 years of age, the third babies of mothers 25-29 years of age, and the second and third babies of mothers 30-34 years of age were near to or lower than 2.57% (the LBW rate among all singleton births in 1995), while the rates for the remainder of the age-parity groups were much higher than 2.57% (11).

According to research done in India it concluded that, holding age constant, the average birth weight tends to increase with parity, but the relationship between birthweight and maternal age is weaker than the former one. The latter relationship is also rather more difficult to show. On the whole, the results obtained give a common tie between the maternal age, parity and the mean birth weight. The increase of standard deviation of birth weight with the mean is clearly visible. Though these data are too few for this sort of study, there is an indication that the influence of parity and mother's age affects the birth weight of the offspring (10).

Other studies done in India in 2006 states that it is now universally acknowledged that maternal age is an important factor influencing the incidence of LBW. Moreover, the rate of LBW decreases significantly with the increasing age of mother after 18 years of age. In the study teenage mothers (< 20 years) had 1.5 times more risk of delivering LBW babies compared with mothers aged 20 years and above. The rate of LBW infant was seen to decrease significantly with increasing parity (9).

A study done in India; Department of Obstetrics and Gynecology, Index Medical College and Research Centre, Indore, Madhya Pradesh, concludes that Gestational age and parity were themajor risk factors influencing the birth weight of the baby. With increase in parity, the birth weight of the baby improves, however that does not necessarily mean one needs to havemore children. However, the studydid not show any significant relationship between maternal age and birth weight (7).

The high incidence of Low Birth Weight (LBW) among Nulliparous women was seen in one study undertaken in Nigeria the rate of LBW was observed to decrease significantly with increasing parity. This could be attributed to poor maternal nutritional status [low Body Mass Index (BMI)] at conception, inadequate gestational weight gains due to poor dietary intake and short maternal stature due to mother's own childhood under nutrition (17).

Conversely, other study findings in Pakistan suggest maternal age 24-27 years as the optimum age in which female infants show an increase in birth weight in successive birth ranks (up to 6th birth order). In case of male infants favorable maternal age is between 28-31 years where increase in birth weight in successive births is seen up to 7^{th} birth order. However, birth order indicates highly significant positive influence ($P<0.001$) on male birth weights, but insignificant effect on female birth weights (5).

The results of the study in Iran in 2013 showed that first and fourth births had generally lower birth weight than both second and third births in all maternal ages also, male gender, maternal age 40-44, second and third births had significantly positive effects on birth weight (18).

A prospective study examined the effect of maternal age, parity, and gestational age on the size of the newborn and assessed the birth weight, length, and head circumference of live births in Addis Ababa, Ethiopia. Birth sizes of a total of 4206 consecutive live births from the four referral hospitals from July 1996 to January 1997 were measured. The mean birth weight of the 4047 singleton live births was 3065 +or- 465 g, with a modal group of 3000-4000 g; 9.1% were of low birth weight. Moreover, the incidence of low birth weight was found to be significantly higher for female neonates, younger maternal age, primiparas, and preterm live births. Multivariate analysis showed that gestational age and sex of the newborn, respectively, had significant effects on birth weight, length, and head circumference of the newborns controlling

for the other variables, while parity and age of the mother had significant effects only on the birth weight of the newborns (19).

Based on a study conducted in 2016 in Gonder referral hospital, Ethiopia shows 810 consecutive hospital births were recorded. The mean birth weight of 373 full term singleton neonates was 3003g (SD=600). The incidence of low birth weight (birth weight < 2 500 g) and very low birth weight (birth weight < 1 500 g) was 15.4% and 2.6% respectively. The mean birth weight and percentage of low birth weight were significantly different in both sexes ($p < 0.0001$). The birth weight increases as parity and length of gestation increase. As maternal age and maternal height increase, so do the birth weights of their neonates in this study. Total house hold income, maternal education and antenatal care use were not found to influence the mean birth weight in this study (20). A study done in Jimma (southwest Ethiopia) revealed that maternal age was not significantly affect the birth weight of a new born. In addition to this a population comparison study undertaken in Japan showed that maternal age was not associated with birth weight of a newborn (21,22). A retrospective study conducted in Jimma, South west Ethiopia Mbw was 3183gm±25 (23).

Mean birth weight was significantly lower for neonates born to grand multiparous women compared with multiparous women (3237±568 g vs. 3424±621g; P=0.000) (24).

In the study at Jimma, south west Ethiopia in 2015, low birth weight measured in 14 (11.8%) newbornsof grand multiparous and 12 (5%) of low parity babies. Preterm delivery has complicated 19 (19%) and 14(6.1%) of grandmultiparous and low parity deliveries respectively (25).

According to a study conducted in 60 sub-Saharan countries in 2013,an odds of having a child with low birth weight were manifested at extremely high parities - nine or more children.

The proportion of children with low birth weight in the fixed effects sub-samples was much higher than in the whole sample, where it ranged from 8 percent to 14 percent depending on the definition applied (26).

In the study at Japan in 2017, Japanese pregnancies, birth weight was associated with gestational week at delivery, gestational weight gain, pre-pregnancy body mass index, sex, parity, and maternal age ($P<0.05$). In particular, the risk of low birth weight increased with advanced maternal age (odds ratio=1.97), insufficient gestational week at delivery (odds ratio=9.00) (27).

3. OBJECTIVES

3.1 General objectives

- To assess the effects of parity and maternal age on the birth weight of a newborn among mothers with singleton and term delivery in Tikur Anbessa specialized hospital, Addis Ababa, Ethiopia.

3.2 Specific objectives

- To identify effect of parity on birth weight of a baby
- To determine the effect of maternal age on birth weight of a baby
- To assess the mean birth weights of term and singleton newborns delivered in Tikur Anbessa specialized hospital.

4. MATERIALS AND METHODS

4.1 Study area

The study was conducted in Tikur Anbessa Specialized Hospital; Obstetrics and Gynecology ward, Addis Ababa, Ethiopia. The ward hasante partum, intra-partum and postpartum services for obstetrics patients. The delivery ward has six laboring beds, one neonatal resuscitation room which has radiant heater, oxygen and suction machine. It has an average monthly delivery of 300-400.

Addis Ababa the capital city of the Federal Democratic Republic of Ethiopia, is located at Centre of a country, it is the home of African Union, Economic Commission for Africa and international organizations. Addis Ababa has an aggregate population density of 4,847.8 persons per square kilometer. The city has ten sub city and 116 woredas. There are 51 hospitals of which 6 are owned by Addis Ababa City Administration Health Bureau, 4 by Federal Ministry of Health, 1 by Addis Ababa University, 3 by Non-governmental organization, 3 by Defense Force and Police and 34 by private owners.

4.2 Study period

The study was conducted retrospectively from April, 2018 to July, 2018.

4.3 Study design

Institution based retrospective cross-sectional study was conducted based on the hospital's medical chart of mothers with term and singleton delivery in the Obstetrics and Gynecology ward within the study period.

4.4 Source population

All mothers delivered in Tikur Anbessa specialized hospital in Obstetrics and Gynecology ward from June, 2015to May, 2017.

4.4.1 Study population

Mothers with singleton and term delivery in Tikur Anbessa specialized hospital in the Obstetrics and Gynecologyward from June, 2015 to May, 2017.

4.5 Sample size determination

The study included all available delivery data recorded from June, 2015 to May, 2017 of mothers with term and singleton delivery.

4.6 Sampling procedure

From a total of eleven governmental hospitals in Addis Ababa, Tikur Anbessa Specialized Hospital was selected by its patient load, serving as a teaching and referral hospital. The medical record numbers (MRNs) of all mothers delivered from June, 2015 to May, 2017 were sought. Finally mothers with term and singleton deliveries were selected then variables like maternal age,parity,mode of delivery, fetal presentation of fetus before delivery, ANC follow-up data were extracted from the main excel record by using inclusion & exclusion criteria.

4.7 Inclusion and Exclusion criteria

4.7.1 **Inclusion criteria**

- All mothers with term and singleton delivery who had a data record in the hospital during the study period.

4.7.2 **Exclusion criteria**

- Mothers who had medical chronic diseases like HIV/AIDS,DM(diabetes mellitus), cardiac diseases, hypertension or eclampsia, Anemia, CLD(chronic liver disease), CKD(chronic kidney disease)etc.
- Mothers who gave birth of a baby with grossly visible congenital anomaly
- Mothers who gave still birth
- Mothers & newborn died during delivery
- Mothers with incomplete records

4.8 Data Collection Tool and Procedures

Data was collected by using a well-structured Checklist, which was adapted from previous literatures using medical registration number (MRN) &identification number (ID No.) as a baseline. Case record of mothers with singleton and term delivery fromthe medical records number were read and the necessary details were have been sought in terms of age, mode of delivery, G.A, parity, birth weight of a baby and medical conditions of a mothers.

Finally, based on the inclusion and exclusion criteria of the study, MRNs, which had all variables for the study, were selected. Then all variables were collected from the main excel information.

4.9 Study variables

4.9.1 **Dependent variables**

- Birth weight of a baby.

4.9.2 **Independent variables**

- Maternal age
- Parity

4.10 Operational Definition and Definition of terms

- **Singleton baby delivered mother**: Mothers giving birth of one baby
- **Birth weight**: Is the body weight of a baby at its birth
- **Gestational age**: Is a measure of the age of a pregnancy which is taken from the woman's last menstrual period (LMP), or the corresponding age of the gestation as estimated by a more accurate method if available.
- **Term gestation**: A gestational age of a fetus between 37-42 complete weeks.
- **Parity:** Is defined as the number of times that a women has given birth toa fetus with a gestational age of 28 weeks or more, regardless of whether the child was born alive or was stillborn
- **Gravidity**: Is defined as the number of times that a woman has been pregnant
- **Nulliparous:** A woman has not given birth previously (regardless of outcome).
- A **Primi-gravida:** A woman is in her first pregnancy.
- A **primi-parous: A** woman has given birth once. The term 'primip' is often used interchangeably with Primi-gravida, although technically incorrect, as a woman does not become primiparous until she has delivered her baby.
- A **multigravida:** A woman who has been pregnant more than once.
- A **multiparous:** A woman has given birth more than once.
- A **grand multiparous**: A woman who has already delivered five or more infants who have achieved a gestational age of 28 weeks or more.
- A **grand multigravida: A** woman who has been pregnant five times or more.
- A **great grand multipara:** A women who has delivered seven or more infants beyond 28 weeks of gestation.
- **Low birth weight**: Is defined by the World Health Organization as a birth weight of an infant of 2,499 g or less, regardless of gestational age.

4.11 Data quality control

To maintain data quality properly designed data collection materials were developed and checked by senior professional. Necessary supervisions were done during data collection period and repeated data clearance was done before analysis.

4.12 Data analysis and Interpretation

The data was checked after each data collection for its completeness. The data were entered into EPI data manager and analyzed using IBM SPSS Statistics version 23. The results were summarized in the form of proportions and frequency tables for categorical variables. Continuous variables like birth weight were summarized using means, median, mode and standard deviation. P-values were computed for categorical variables usingbinary logistic regressiontests. $p<0.05$ were considered as statically significant. Binary logistic regression analysis was carried out to distinguish the effects of independent variables (maternal age and parity) on dependent variable (birth weight).

4.13 Ethical consideration

Ethical clearance was being obtained from Department Research Ethics Review Committee (DRERC), Institutional Review Board (IRB), Addis Ababa University, department of Anatomy. The letter of ethical clearance & letter of cooperation was brought to Tikur Anbessa specialized hospital obstetrics and gynecology department to get consent for data collection.

4.14 Dissemination of results

After completion of this research, the results of the study will be submitted and presented to Anatomy Department, Addis Ababa University.

In addition, the final result of this thesis will be disseminated to Addis Ababa regional health bureau, Federal ministry of health, Tikur Anbessa specialized hospital, Addis Ababa and other responsible bodies. Beside to this, the findings of the study will be disseminated through publications and presentation in scientific conferences and workshops.

5. RESULT

5.1 Maternal socio-demographic characteristics

Out of 4590 participants, 184(4%), 1160(25.3%), 1740(37.9%), 952(20.7%), 418(9.1%) and 136(3%) were below age of 20, 20-24,25-29, 30-34,35-39 and 40 above respectively. In addition 184(4%) were below 20 years of age while, 136(3%) were above 40 years of age asillustrated on figure 1 below. The mean age of participants was 27.48 ±5.352 (mean ± SD).

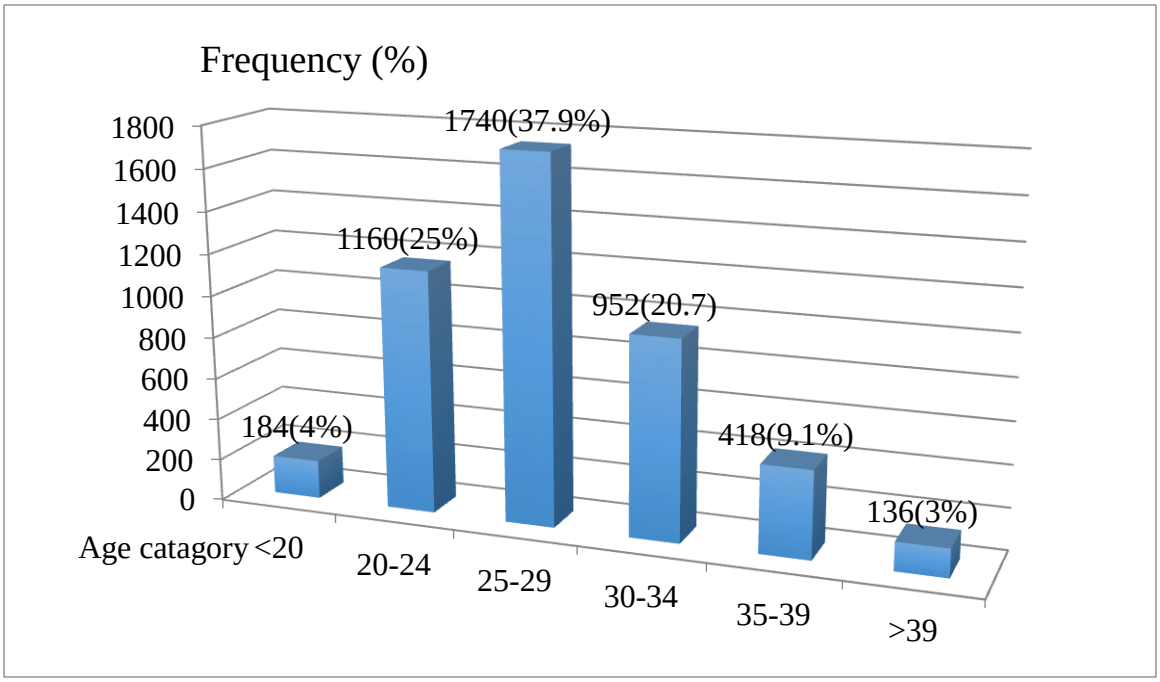

Figure 1: Frequency of age category of mothers with term and singleton delivery in Tikur Anbessa Specialized hospital (TASH).

The study included all mothers from parity 0 (nulliparous women) to parity 9. Out of 4590 participants, 2441(53.2%), 1144(24.9%), 910(19.8%), 95(2.1%) were Nulliparous, primiparous, multiparous and grand multiparous respectively. Besides more than half of all study participants (53.2%) were nulliparous whereas, 95(2.1%) of all participants were grand multiparous women as shown on figure 2 below.

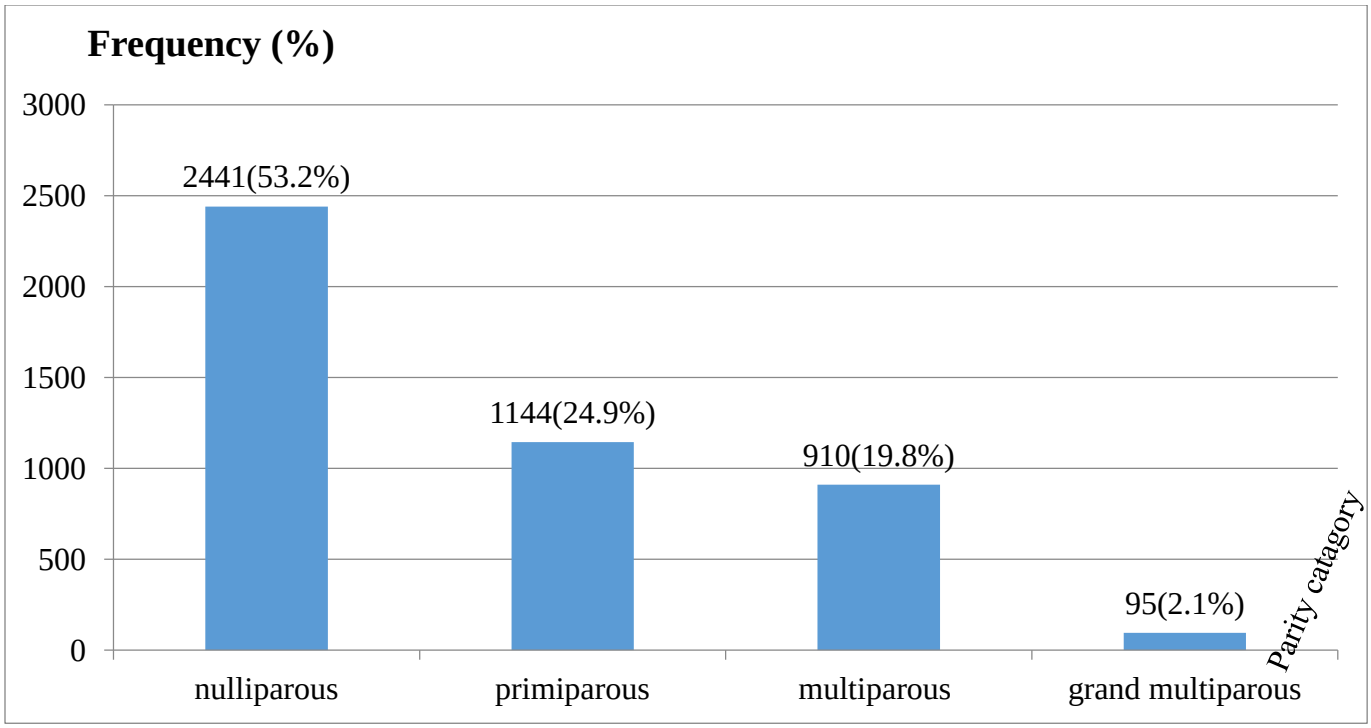

Figure 2: Frequency of age category of mothers with term and singleton delivery in Tikur Anbessa Specialized hospital (TASH).

Among 4590 termand singleton deliveries majority (94%) of the participants were SVD (spontaneous vaginal delivery) in mode of delivery. On the other hand, 68.7% of all deliveries were vertex in presentation.

Out of all participants 68.5% mothers were referred from health facilities other than Tikur Anbessa Specialized Hospital. Majority (98.5%) of mothers had had ANC follow-up as illustrated on table1 below.

Table 1: Mode of delivery, ANC status and presentation of mothers with term and singleton delivery in Tikur Anbessa specialized referral hospital (TASH).

Mode of delivery	**Frequency**	**Percentage**
SVD (spontaneous vaginal delivery)	3154	68.7%
C/s(Ciserian section)	1421	31.%
Instrumental(forceps, vacuum etc.)	15	0.3%
Total	4590	100%
Fetal presentation		
Vertex	4313	94.%
Breach	227	4.9%
Face	28	0.6%
Shoulder	9	0.2%
Brow	13	0.3%
Total	4590	100%
ANC follow-up		
Yes	4519	98.5%
No	71	1.5%
Total	4590	100%

5.2 Descriptive statistics of birth weight

Mean birth weight was 3075.41 ±569.58(SD) grams with mean gestational age39.77±1.28 weeks (mean±SD). According to Figure1 below, low birth weight babies (<2500gm.) accounted13.4% whereas high birth weight(>4000gm.) and normal birth weight(2500gm-4000gm) were 3.3% & 83.3% respectively.

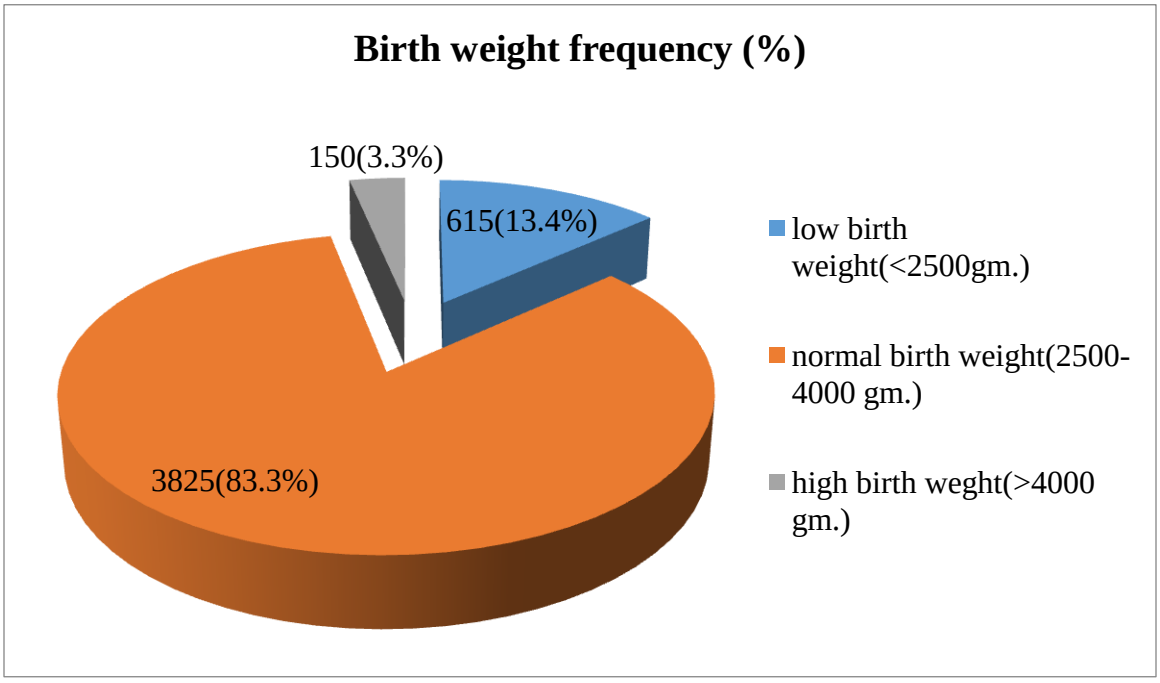

Figure 3: Frequency and percentage of birth weight categories of newborn of mothers with term & singleton deliveries in TASH.

5.3 Descriptive statistics of parity & age with respect to mean birth weight

Table 2 below revealed that more than half (53.2%) of all mothers with term and singleton delivery were Nulliparous (parity=0), 24% of them were primiparous, 19.8% were multiparous; grand multiparous accounted of only 2.1%.

The mean birth weight was higher in primiparous than Nulliparous, however, it was gradually become decreased after parity= 1(primiparous) down to grand multiparous (parity 5 or more). The change of mean birth weight was high from parity 2-4(multiparous) to parity 5 or more (grand multiparous).

Approximately 37.9% of mothers were within 25-29 age group but only 3% of mothers with termandsingleton deliveries were age≥40.

Table 2 showed that the mean birth weight was decreased as we go down from age ≤19 to age 20-24 then becomes increased at age 25-29. Finally it becomes decreased from age 25-29 down to age ≥40. The change was high from age 35-39 to 40 or more.

Table 2: Mean birth weight by parity and maternal age for the effects of maternal age and parity on birth weight of newborn of mothers with term & singleton deliveries in TASH.

Parity	Frequency	Mean bw±standard deviation	Median Bw (birth weight)	Mode of Bw
0 (Nulliparous)	2441(53.2%)	3155.2±512.1	3200	3000
1 (primiparous)	1144(24.9%)	3170.7±491.4	3200	3200
2-4 (multiparous)	910(19.8%)	2833.8±646.8	2900	3000
≥5(grand multiparous)	95(2.1%)	2191.6±647.6	1900	1800
Maternal age(years)				
≤19	184(4%)	3159.1±518.8	3200	3500
20-24	1160(25.3%)	3144.1±514.8	3100	3000
25-29	1740(37.9%)	3168.1±506.2	3200	3200
30-34	952(20.7%)	3004.2±589.9	3000	3000
35-39	418(9.1%)	2844.7±664.3	3000	3000
>=40	136(3%)	2397.8±673.5	2250	1900

Figure 4 below showed that the lowest mean birth weight was recorded in grand multiparous women whereas; the highest record was seen in primiparous women, which was nearly as same as Nulliparous women.

So, mean birth weight was lowest in grand multiparous (p=5 or more) women unlike Nulliparous, primiparous and multiparous women.

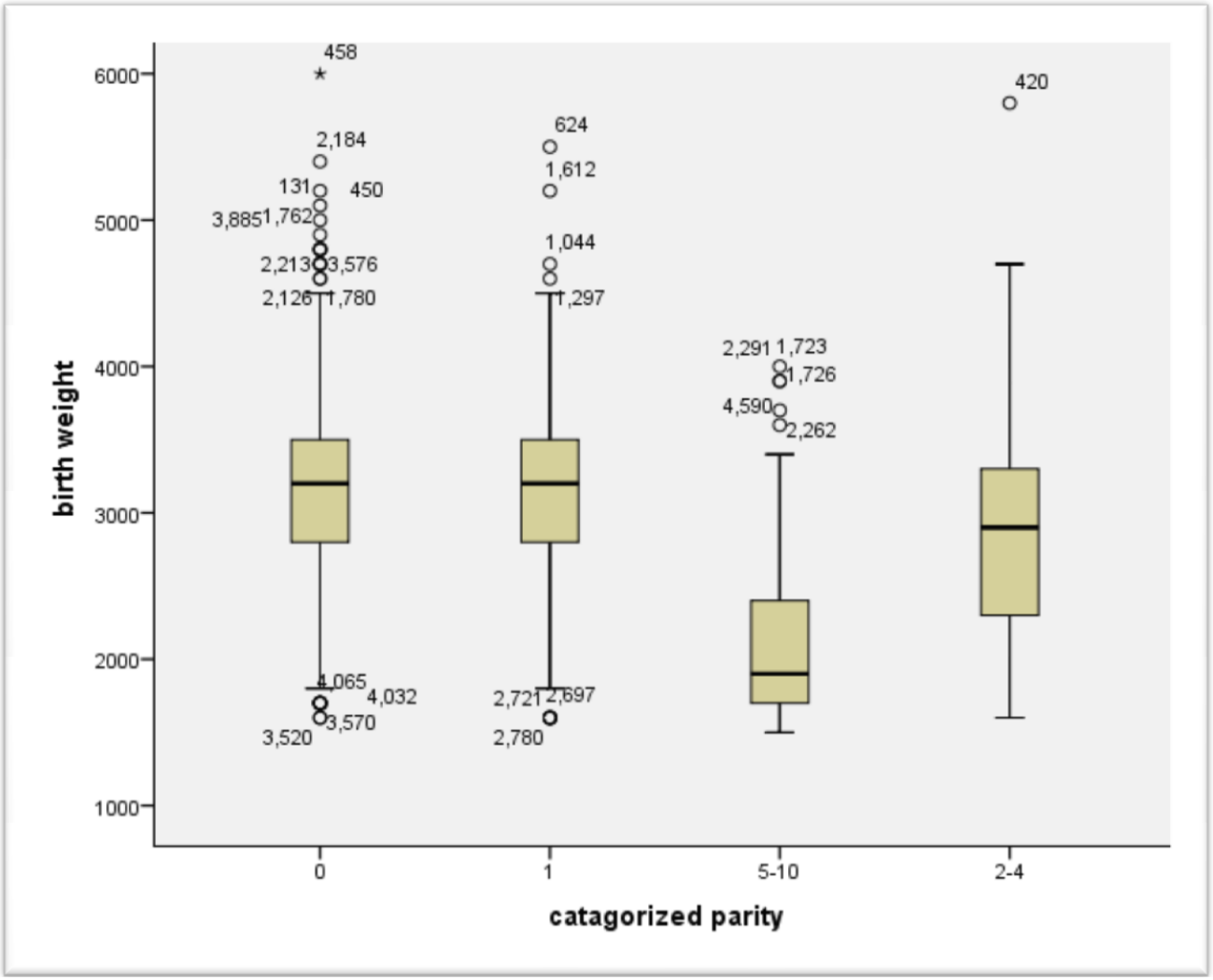

Figure 4: Box plot of birth weight distribution by parity of mothers with term & singleton delivery in TASH.

5.4 Effects of parity and maternal age on low birth weight

Table3 below explained that independent variables such as parity categories (0, 1, 2-4 & 5 or more) and age categories (≤19, 20-24, 25-29.30-34, 35-39 & ≥40) were analyzed by binary logistic regression model to see their significance with low birth weight. Age groups 30-34 & parity 2-4(multiparous) were taken as a reference.

The independent variables (covariates) in the Binary logistic regression model were tested for their significance with low birth weight; those covariates with p-value≤0.05 at 95% CI (**) such as Parity 0, 1, 2-4 (ref.) and 5 or more and maternal age≥40 were considered as significant with low birth weight. However, the remaining age groups were not.

Nulliparous women (p=0) had an AOR=0.23(at 95% CI= 0.19, 0.38), implied that they have no risk of having low birth weight baby compared to multiparous; implied that Nulliparous were unlikely to have low birth weight newborn.

Primiparous (p=1) had approximately an AOR=0.22(at 95% CI, 0.16, 0.30)), implied that they have no risk of giving low birth weight baby compared with multiparous. So, primiparous were unlikely to have low birth weight newborn.

However grand multiparous women (p≥5) had an odds ratio of (AOR= 3.89) at 95% CI= 2.19,6.93 interpreted as they have had 3.89 times more risk of giving low birth weighed baby compared with multiparous(p=2-4).

On the other hand, mothers with age 40 and above had an AOR=1.9(with 95% CI= 1.215, 3.15) times greater risk of delivering a baby with low birth weight compared with age group of 30-34.

Table 3: Odds ratios of mothers with term & singleton delivery in TASH.

Variables	Low birth weight	Binary logistic regression	
Parity	Frequency (%)	P Value	AOR(95%C.I)
0	2441(53.2%)	.000	**0.267(0.19,0.37)****
1	1144(24.9%)	.000	**0.218(0.16,0.30) ****
2-4	910(19.8%)	.000	Ref.
5 or more	95(2.1%)	.000	**3.89(2.19,6.93) ****
Maternal age (years)			
≤19	184(4%)	**0.765**	1.08(0.63,1.86)
20-24	1160(25.3%)	**0.718**	1.07(0.75,1.523)
25-29	1740(37.9%)	.299	0.84(0.623,1.157)
30-34	952(20.7%)	0.000	Ref
35-39	418(9.1%)	0.052	1.30(0.997,1.699)
≥40	136(3%)	**0.006**	**1.96(1.215,3.15)****

Parity and maternal age with mark (**) were parity and age groups which were significant with low birth weight in binary logistic regression at p≤0.05 at 95% CI. Ref. (references).

6. DISCUSSION

This study was intended to investigate the effect of maternal age and parity on birth weight of a new born of four thousand five hundred ninety (4590) mothers with term and singleton delivery.

The finding of the current studyshowed that grand multiparous (p=5 or more) women with term & singleton delivery had 3.89 times more risk of delivering low birth weight baby than multiparous. Nulliparous and primiparous women were unlikely to deliver low birth weight baby compared with multiparous women. This current finding was consistent with a prospective study conducted in Iran in 2013, which included 858 mothers with term singleton delivery showed that birth weight increased appreciably from first to second births (p=0.042) and decreased from second to fourth and above births significantly (p=0.031). A study carried out in Jimma University in 2015 showed that low birth weight was higher among grandmultiparous compare to low parity groups. In addition a health survey study of sub Saharan countries revealed a pattern of increasing risk of low birth weight deliveries at extremely high parities (18, 25,26). These similarities may be due to the fact that large sample size of all these studies and grand multiparous women are highly associated with adverse fatal outcomes.

In contrary to the present finding, a study of 378 term pregnant women conducted in India at Guwahati hospital showed that there was a high risk of a baby being underweight in primiparous than other parity groups(2). A meta-analysis study from 14 cohorts studies which was done in USA revealed that nulliparous compared with women who were parity 2 or more had the highest odds ratio(risk) of having baby with LBW (pooled adjusted OR: 1.80) (3). In addition to this prospective cohort study conducted in Cambridge University hospital which included 1335 term and singleton deliveries explained that infants of primiparous were lighter than multiparous.A cross-sectional study conducted in India Kolkata included 331 singleton delivered children found that primiparous (p=1) women had two times risk of delivering low birth weight baby compared with parity =2 and, four times risk of giving LBW baby compared to parity 3rd and above (9,16).These differences might be due to the fact that there are genetic variations among population;the sample size used in this study was large, environmental factors (altitude, diet).

The present study finding revealed that maternal age of 40s and above was associated with a 1.96 times greater risk of having low birth weight baby compared with age group of 30-34. However, other age groups were not significantly associated with low birth weight.

In agreement with the present finding, a retrospective study of 2551 mothers which was done in Japan in 2017 suggested that, pregnant women of ≥40 years old group were at a1.97-fold higher risk of delivering LBW infants compared to the reference group (30– 34 years(27). Similarly a prospective study conducted in Iran in 2013, which included 858 mothers with term and singleton delivery described that maternal age of 40-44 accounted large decrements in birth weight of singleton term deliveries. Besides to this a study conducted in Gonder referral hospital also confirmed that birth weight become decreased as maternal age become advance (18, 20). In addition to this a study undertaken in Tikur Anbessa Specialized Hospital in Addis Ababa revealed that Pregnant mothers of age 35 and above were also found to have an odds ratio (OR) of 3.2 times highest risk for low birth weightthan other age groups (19). These similarities were due to the fact that age groups under these studies were similar.

In contrary to the current study finding, on effect of maternal age on birth weight, a study done in Jimma (southwest Ethiopia) revealed that maternal age was not significantly affect the birth weight of a new born. In addition to this a population comparison study undertaken in Japan showed that maternal age was not associated with birth weight of a newborn (21,22). A retrospective study done in India Kolkata included 331 singleton delivered children also showed that, young mothers (<19 years) had 3 times (OR=2.91,95% CI,1.53,5,65;p<0.001) risk of giving low birth weighing baby compared to other age groups (9). These differences might be due to inadequate sample size of the studies compared to the current research.

According to the present study finding, the mean birth weight was $3075.41\text{gm} \pm 569.58$ (mean$\pm$SD).This study finding was lesser than a retrospective study conducted in Jimma, South west Ethiopia which was 3183gm$\pm$25 and a cross-sectional prospective study done in metu Karl hospital, South west Ethiopia which included 1832 singleton births in which a mean birth weight was(MBW=3147) (22, 23).

On the other hand, the current study finding of mean birth weight was higher than a prospective descriptive research done in Gonder referral hospital, northern Ethiopia which included 373 singleton term neonates which was approximately (MBW=3003 gm±600, and a prospective study done in 1999 in Tikur Anbessa specialized hospital showed that mean birth weight was 3065±465 (19,20). These birth weight gaps might be due to genetic and environmental factors (altitude, nutrition) personal habits like chewing chat, cigarette smoking etc.

7. CONCLUSION

Risk of giving low birth weight babies was higher in grand multiparous (Parity= 5 or more) compared with multiparous. In contrast, primiparous and nulliparous women have no risk of delivering low birth weight newborns.

Maternal ages of 40 and above have greaterrisk of having low birth weight newborns compared to age group of 30-34. The rest of age groups were not associated with risk of having low birth weight newborns.

8. LIMITATIONS OF THE STUDY

- ✓ Other variables affecting birth weight weren't included under the study (like nutritional status, ethnicity, sex of new born, economic status, altitude etc)
- ✓ Since the data was secondary, it might be prone to measurement (systemic) error.
- ✓ Poor documentation of data

9. RECOMMENDATION

- The effect of maternal age and party on birth weight needs broad multi-sector and nationwide study.
- All health professional and other stakeholders are recommended tomanage data properly.
- Further studyshould be done on term low birth weight.

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ANNEX 1: **CHECKLIST**

1: Maternal Socio-Demographic characteristics.

Age ……

Pregnancy conditions

1. Gravidity…….2. Parity…..3. Term of pregnancy…….

Mode of delivery

1. SVD2.CS 3.Forceps/instrumental4.Vacuum

Fetal presentation

1. Vaginal vertex 2. Face 3.Breach 4.Brow

5. Shoulder

2: ANC follow-up

ANC follow-up at TASH 1.Yes 2. No

ANC follow-up other than TASH 1.Yes 2. No

3**: Birth weight in grams** …….