HERETICAL MODELING OF LOW BIRTH WEIGHT IN NIGERIA

LITERATURE REVIEW

2.0 INTRODUCTION

This section reviewed related materials and studies on, child health, Birth weight, low birth weight and maternal socio-demographic characteristics; the identification of factors contributing to low birth is therefore of considerable importance. Maternal socio-demographic factors, nutritional factors, toxic exposures, and antenatal care have all been implicated in the occurrence of LBW.

2.1 INCIDENCE OF LOW BIRTH WEIGHT.

Low birth weight (LBW) is of serious concerns developing countries, including Nigeria. According to the World Health Organization (WHO) LBW is defined as birth weight that is less than 2,500g regardless of the gestational age (WHO, 2012). 'Normal birth weight' refers to weights between 2,500 grams and 4,000 grams (4Kg) at delivery, while 'overweight' is any weight above 4Kg (Gagan et al., 2012). LBW is further classified as very low birth weight (VLBW) if the birth weight lies between 1000g and <1500g, or Extreme Low Birth Weight (ELBW) if <1000g. As noted by Stoll and Kliegman, the reason for LBW could be the result of Preterm births or a baby born too small for gestational age (Stoll and Kliegman, 2004). There is a worldwide estimation of 13 million babies that are born before 37 completed weeks of gestation, and this is especially found in much higher proportion in middle and low income countries (Bilitign et al., 2018). According to the estimates of WHO about 25 million LBW babies are born each year, with about 5 million of them dying globally (Suryakantha, 2017). The level of LBW in developing countries (16.5%) is more than double the level in developed regions (7%), and there is a significant difference in the incidence of LBW across different regions. The WHO estimated that 16 million adolescent girls give birth each year (WHO, 2012). Babies born from these mothers account for 11% LBW

prevalence worldwide and 95% in developing countries. The category of babies are also more likely to have LBW, with greater risks of long-term effects. The estimate of LBW occurrence worldwide stands at 15.5% and this means that about 20.6 million of such infants are born each year, with 96.5% of them in developing countries (WHO, 2012).

In 2013, almost 22 million babies (16% of all babies) had LBW (UNICEF, 2004). Prevalence of LBW varies considerably across regions and within countries. However, it was estimated that 97% of LBW occurs in low- and middle-income countries, and especially among the most, vulnerable populations, including the poor in remote areas. Across regions, the prevalence of LBW is highest in South Asia, at 28%, followed by Sub-Saharan Africa, 13%, Latin America and the Caribbean, 9%, and 6% in East Asia and the Pacific (UNICEF, 2004). Regional estimates of LBW showed 28% in south Asia, 13% in sub-Saharan Africa and 9% in Latin America. It is worth noting that these rates are high, in spite of the fact that the data on LBW remain limited or unreliable, as many deliveries occur in homes or small health clinic and are not reported in official figures, which may result in an underestimation of the prevalence of LBW. Still, LBW is of great global concern, as some high-income countries including Spain, the United Kingdom of Great Britain, Northern Ireland and the United States of America are also faced with high rates. Currently, a high percentage of infants are not weighed at birth, especially in low-income countries, presenting a significant policy ‘challenge (WHO, 2012).

2.2 LOW BIRTH WEIGHT IN SUB-SAHARA AFRICA

In sub-Saharan Africa, LBW’s number is up to 14.3%, which is almost twice that of European countries. A study conducted in Congo demonstrated the rates of LBW children to be 164 per 1000 live births in Kama, and 270 per 1000 in Kipaka (Namiiro et al., 2012). In Jimma, southwestern of Ethiopia, a prevalence of 22.5% LBW around 145 newborn infants was reported. In Zimbabwe,

a study found a prevalence of 12.9% of LBW children (Tema, 2006). Because there is a high percentage' of LBW in Sub-Saharan Africa, it is important to assess the impact during the stages of growth of those children: Growth evaluation during the neonatal period is determined by the changes in anthropometric measurements and the body weight gain is a valuable guide to indicate an adequate growth. The change in the body weight during the neonatal period of LBW children is characterized by an initial loss of 8% to 15% in the first 7 days of life followed by a recovery that occurs around 10-21 postnatal day (Rugolo, 2005).

LBW is an important indicator of reproductive health and general health status of population. LBW could cause an impaired growth of an infant and it is associated with higher mortality rate, increased morbidity, impaired mental development and chronic adult disease (Pawar and Kumar, 2017). LBW is the result of either intrauterine growth restriction or premature bint: LBW is the main cause of fetal or neonatal morbidity and mortality. Later in life, it can be highly associated with-chronic diseases and inhibited growth and development including poor academic achievement (Bilitign et al., 2018). Multiple gestation, mothers' body composition during conception, maternal short stature, residing at high altitudes, "maternal nutrition during pregnancy including life style (substance or drug abuse) and medical disorders during pregnancy including hypertensive disorders were risk factors of LBW babies. Additionally, mothers with low socio-economic status are prone to infections from poor nutrition, thus birth weight will decrease (WHO, 2012).

2.3 THE INCIDENCE OF LOW BIRTH WEIGHT IN NIGERIA

In Nigeria, LBW accounts for about 14% of the 5.3 million annual deliveries and is a principal contributor to neonatal morbidity and mortality in developing countries (Uthman, 2007). Furthermore, low birth weight affects about 5-6 million children every year. The incidence was 12.1% in Jos, 11.4% in Ogun, and 16.9% in Maiduguri (Takai et al., 2014). A number of factors need to be investigated in order to lessen the prevalence of LBW in Nigeria. There are numerous maternal and fetal factors contributing to the LBW incident. LBW is strongly associated with maternal factors such as younger and older age, low socio-economic status, residence in the rural area, and illiteracy. Mothers aged under 17 and over 35 years are at risk of delivering LBW babies. Mothers in deprived socio-economic conditions frequently have LBW infants. There is ample evidence to show that maternal factors and risk behaviors during antenatal period play significant roles in the birth weight of babies. Pregnant mothers with unhealthy lifestyles that include activities such as smoking were found to be at high risk of delivering LBW babies (Assefa et al., 2012).

Antenatal care (ANC) visits are important for maternal and fetus health. ANC refers to pregnancy-related healthcare services provided by skilled health personnel during pregnancy that monitor. The well-being of both the mother and the unborn child is essential to the purposes of obtaining the best possible outcome and preventing any complications. The frequency of ANC visits and parity are significantly associated with birth outcomes such as birth weight. Pregnant mothers who attended less than four ANC visits double their risk of delivering LBW babies compared to those visiting four or more times. Also, studies found that the prevalence of LBW was high, up to 57% and 61.8%, among mothers who did not receive any ANC (Takai et al., 2014), Due to the irregularity of ANC visits, pregnant mothers do not comply with the advice or medications recommended by healthcare providers and subsequently will increase the incidence of LBW, The

quality of each ANC visit also should be emphasized in order to have an effective coverage of care (Agrawal et al., 2011). The factors affecting LBW in Nigeria have not been adequately investigated. Identifying the predictors of LBW and addressing the best prevention strategies will help to avert early the childhood morbidity and mortality resulting from LBW.

2.4 ESTIMATION STRATEGY FOR LOW BIRTH WEGHT

Birth weights below 3000g are considered sub-optimal, with the lower extreme end, below 2500g (5.5lb), having the most documented adverse health outcomes. On the upper end of the birth weight distribution, birth weights over 4000g are associated with increased maternal morbidity, complicated labor, and maternal death. Outcomes at the lower end of the birth weight scale, most likely reflect intrauterine growth deprivation or conditions leading to preterm delivery, while the upper end reflects unusual fetal growth (Rice and Thapar, 2010). Thus, there is an optimum birth weight range associated with trouble-free delivery, where neonatal survival is maximized and maternal death is minimized. Undeniably, the child's genetic makeup affects the birth weight. In addition, the intrauterine environment is a critical determinant, as demonstrated for example in studies where embryos have been: transferred to different mothers.

2.5 SOCIO-DEMOGRAPHIC FACTORS AND LOW BIRTH WEIGHT

The following factors, operating through these genetic and "environmental" channels, have been revealed to be related to the birth weight: the sex of child - for the same gestational age boys tend to be heavier than girls. Also the maternal age; maternal birth weight, maternal weight; maternal nutrition- cumulatively, during pregnancy; cigarette smoking; ethnicity; and socioeconomic

conditions operating partly through some of the factors already mentioned (Magee et al., 2004; Blanc and Wardlaw, 2005)

To elaborate on the latter effect, it has been shown in sub-Saharan Africa as well as other developing parts of the world, that poverty, low education, and women's lack of autonomy are related to limited or late initiation of obstetric care, irregular or incomplete immunization (e.g. against Tetanus infection), poor nutrition, and micronutrient supplementation during pregnancy (Magee et al., 2004). In addition, the length of the earlier birth intervals (those who have had many children are likely to have had them in short intervals) is important, A birth interval below two years tends to be a risk factor for a preterm or low birth weight delivery (Blanc and Wardlaw, 2005).

2.5.1 Age

Women in the reproductive age who are 35years and above are known to deliver low birth weight infants (Chiavarini et al., 2012). LBW disparities by maternal age are a complex related with socioeconomic disadvantage and current social and behavioral factors. It's been shown that LBW risk does not operate uniformly by maternal age (Dennis and Mollborn, 2013). The older group may also have more medical and obstetric complications (diabetes mellitus, chronic hypertension, poor presentation, pregnancy-induced hypertension, placenta praevia, multiple pregnancies, pre-term labor, fetal distress, retained Placenta, Postpartum hemorrhage and endometritis), and these may lead to adverse fetal outcomes such as low birth weight, low Apgar scores and congenital anomalies (Tabcharoen et al., 2009), Adolescents or teenage mothers (< 20 years of age) often have worse socioeconomic and reproductive conditions and perinatal outcomes when compared to other age groups such as those between 20-29 years. A study by Guimardes and colleagues in 2013

showed that among mothers with no prenatal care and who were at risk of low birth weight, adolescence was a risk factor for LBW only for mothers who did not have a partner (Guimaries et al., 2013).

This is consistent with the findings in the present study. Statistically significant increases in birth weight were found with increasing maternal ages especially for boys from below 20 years through to 39 years (Table 1). Some authors believe that younger mothers who are still growing may compete with the fetus for nutrients leading to a lower birth weight than expected (Haldre et al., 2007). On the other hand, older women may have previously undiagnosed medical disorders which might affect placental function and result in LBW (Heffner, 2004). It is also believed that the relative infertility in the older women might be responsible for its effect on fetal weight (Haldre et al., 2007). Restrepo-Mendez et al. believe that younger age does not influence birth weight; but rather that it is the socioeconomic challenges which young women are exposed to that are responsible for the effects seen and not the biological effect of maternal age. They however agreed that older age might play a role in the delivery of LBW but that more research needs to be done to determine the mechanism that age uses (Restrepo-Mendez et al., 2014). Furthermore, Goisis et al. in a recent Finnish study disagreed that maternal age is associated with incidence of LBW (Goisis et al., 2017). They believe that there are yet unobserved factors that are responsible for the high incidence of LBW in older women

2.5.2 Educational Level

The educational level of individuals in the family has a huge influence on the social welfare of members of the family. Therefore higher levels of education have relatively larger and increasing benefits (Rolleston, 2011). Less educated mothers, are known to have low birth weight infants

(Chiavarint et al., 2012). Infants of women with low/low intermediate education have significantly higher odds of a LBW than those of a higher education (Gisselmann, 2005). A study by Silvestrin et al (2013) to prove the hypothesis of similarity between the extreme degrees of social distribution, which is translated by maternal education level in relation to the proportion of low birth weight could not be confirmed. This indicates that the extremes of educational level have a significant influence on. LBW. Educational level is a key factor to improving birth outcomes (Sebayang et al., 2012).

2.5.3 Occupation

Some occupations have been known to have a negative effect on birth weights. Belonging to certain occupational groups during pregnancy could increase the risk of low birth weight and preterm birth. (Ronda et al., 2009). Studies by Ronda-et al. (2009) showed that the highest prevalence of preterm infants was found in mothers working in agriculture (10.8%) and the lowest in professional women (6.6%). The highest prevalence of low birth weight was observed in women working in the services sector (3.5%) and manual workers in industry and construction (3.4%). But the lowest prevalence of low birth weight was found in professional women (2.5%). Women working in agriculture had a higher risk of preterm birth/LBW than professional women (Ronda et al., 2009).

2.5.5 Social Class

Social class is a known factor that affects birth weight (Kehinde et al., 2013; Restrepo-Mendez et al., 2014). Higher social classes tend to be associated with heavier birth weights and vice versa. The findings in the present study seem to be at variance with this tendency. This may be due to the

fact that the cohort of the present study was that of booked patients with majority of the babies being born to the women of upper social classes. They attended antenatal care and most of the women were economically buoyant. The normally expected social class effect is the finding of lower birth weights in babies born to lower social class women. This is explained on the basis of poorer nutritional status of lower social class women together with their poorer attention to antenatal care requirements.

2.6 THEORETICAL FRAMEWORK

"Theory of Planned Behavior"

Theory of planned behavior suggests that a person's behavior is determined by his/her intention to perform the behavior and that this intention is, in turn, a function of his/her attitude toward the behavior and his/her subjective norm. The best predictor of behavior is, intention. Intention is the cognitive representation of a-person's readiness to perform a given behavior, and it is considered to be the immediate antecedent of behavior. This intention is determined by three things: their attitude toward the specific behavior, their subjective norms and their perceived behavioral control. The theory of planned behavior holds that only specific attitudes toward the behavior in question can be expected to predict that behavior. In addition to measuring attitudes toward the behavior, we also need to measure people's subjective norms — their beliefs about how people they care, about will, view the behavior in question. To predict someone's intentions, knowing these beliefs can be as important as knowing the person's attitudes. Finally, perceived behavioral control influences intentions. Perceived behavioral control refers to people's perceptions of their ability to perform a given behavior. These predictors lead to intention. A general rule, the more favorable the attitude and the subjective norm, and the greater the perceived control the stronger should the

person’s intention to perform the behavior in question. This would be used in examine the effect of maternal socio-demographic characteristics that had effect on the issue of low birth weight in terms of the rational behaviour in planning for the interval and. timing of births.

References

Agrawal, V., et-al. (2011). Prevalence and determinants of “low birth weight” among institutional deliveries. Annals of Nigerian Medicine, 5(2), 48.

Anat Pawar, Durgesh Kumar. (2017). Maternal factors associated with low birth weigth: a case control study in rural kerala. International journal of community medicine and public health. 4(10): 3794-3792

Assefa, N., Berhane, Y., Worku, A. (2012). Wealth status, middle upper arm, circumference (MUAC) and antenatal care (ANC) are determinants for low birth weight in Kersa, Ethiopia. PLosOne 7(6):e39957

Bilitign, N., Legesse, M., Akibu, M. (2018). A Review of Low Birth Weight in Ethiopia: Socio-

Blane, A. K. & Wardlaw, T, (2005). Monitoring low birth weight: An evaluation of international estimates and an updated estimation procedure. Bulletin of the World Health Organization 83(1)

Chiavarini, M., Bartolucci, F., Gili, A., Pieroni, L., & Minelli, L. (2012). Effects of individual and social factors on preterm birth and low birth weight: Empirical evidence from regional data in Italy, International Journal of Public Health, 57(2), 261-268.

Demographic and Obstetric Risk Factors, Glob J Res Rev Vol.5 No. (1): 4.

Dennis, J.A., Mollborn, S. (2013). Young maternal age and low birth weight risk: an exploration of a racial or ethnic disparities in the birth outcomes of mothers in the United States. Soc. Sci. J. 50(4): 625-634

Gagan, A., Sarta,j A., et al. (2012). Maternal Risk Factors Associated with Low Birth Weight

Gisselmann, M. D. (2005). Education, infant mortality, and low birth weight in Sweden 1973-1990: emergence of the low: birth weight paradox, Scandinavian Journal of Public Health, 33(1), 65-71

Goisis. A., Remes. H., Barclay. K., Martikainen. P., Myrskyla. M. (2017). Advanced Maternal Age and the Risk of Low Birth Weight and Preterm Delivery: a Within-Family Analysis Using Finnish Population Registers. Am J Epidemiol. 186(11):1219-1226.

Guimaries, A.N., Silva-Mato, A., Siqueira, F.M., Cyrino, R.M., Cota, L.O., Costa, F.O. (2012). Very low and low birth weight associated with maternal periodontitis. J Clin Periodontol. 39(11): 1024-31

Haldre K, Rahu K, Karro H, Rahu M. (2007). Is a poor pregnancy outcome related to young maternal age? A study of teenagers in Estonia during the period of major socio-economic changes (from 1992 to 2002) Eur J Obstet Gynecol Reprod Biol. 131:45-5

Heffner. L.J. (2004). Advanced maternal age -how old is too old? The N Engl J Med. 351:1927-1929.

Kehinde, O.A., Njokanma, O.F., Olanrewaju, D.M. (2013). Parental socioeconomic status and birth weight distribution of Nigerian term newborn babies Nig J Paed. 40(3):299-302

Magee, B.D., Hattis, D., & Kivel, N.M. (2004): Role of smoking in low with weight. Journal of

Namiiro, F.B., Mugalu, J., McAdams, R.M. et al. (2012). Poor birth weight recovery among low birth weight/preterm infants following hospital discharge in Kampala, Uganda. BMC Pregnancy Childbirth 12, 1

Neonates in a Tertiary care Hospital. Community Med Health Education, (2):177

Reproductive Medicine 49(1): 23-27.

Restrepo-Mendez, M.C., Lawlor, D.A., Horta, B.L., Matijasevich, A., Santos, I.S., Menezes, A.M.B. et al. (2014). The association of maternal age with birthweight and gestational age: a cross-cohort comparison. Paediatr Perinat Epidemiol. 29(1):31-40.

Rolleston, C. (2011). Educational access and poverty reduction: Thé case, of Ghana 1991-2006. International Journal of Educational Development, 31(4), 338-349.

Rugolo. L.M. (2005). Crescimento e desenvolvimento a longo prazo do premature extreme (growth and developmental outcomes of the extremely preterm infant). J. Pediatr. (Rio J). 81 (Supp 1)

Sebayang, S.K., Dibley, M.J., Kelly, P.J., Shankar, A.V., Shankar, A.H.; Summit study group. (2012). Determinants of low birth weight, small-for-gestational age and preterm birth in Lombok, Indonesia: analyses of the birthweight cohort of the SUMMIT trial. Trop Med Int Health. 12(8): 938-50

Silvestrin, S., Silva, C.H., Hirakata, V.N., Goldani, A.A., Silveire, P.P., Goldani, M.Z. (2013). Maternal education, level, and low birth weight: a meta-analysis. J Pediatr (Rio J) 89(4): 339-44

Suryakantha, A.H. (2017). Maternal and child health services. In. community medicine with recent advances. 4th edn. New Delhi: Jaypee brothers Medical Publishers; 614

Tabcharoen, C., Pinjaroen, S., Suwanrath, C., & Krisanapan, O. (2009). Pregnancy outcome after age 40 and risk of low birth weight. Journal of Obstetrics and Gynecology, 2(23), 112.

Takai, I.U., Mohammed, B., Audu, B.M. (2014). A prospective study of maternal risk factors for low birth weight babies in Maiduguri, Northeastern Nigeria. Nigerian Journal of Basic and Clinical Science. 11(2): 89-98

Tema, T. (2006). Prevalence and determinants of low birth weight in Jimma zone, southwest Ethiopia. East Afr. Med. J. 83(7): 366-71

UNICEF. Low Birth Weight: Country, Regional and Global Estimates. New York: UNICEF; 2004: 1-9

Uthma, O. (2007). Effect of low birth weight on infant mortality: Analysis using Weibull Hazard Model. The Journal of Epidemiology. 6(1)

World Health Organisation. Care of the preterm and low-birth-weight newborn. [Accessed on 20/07/21] https://www.who.int/maternal_child_adolescent/newborns/prematurity/en/