



Review Article

The Role of Ante-Natal Care in Preventing Preterm Birth and Low Birth Weight Babies

Gladys Aye Uranta*, Beatrice M. Ohaeri, Iyanuoluwa Oreofe Ojo, and Oluwatotin Babarimisa

Faculty of Nursing, Department of Maternal and Child Health Nursing,
University of Ibadan, Nigeria

*Corresponding author: gladysuranta50@gmail.com

Abstract

Worldwide, preterm birth and low birth weight are major causes of morbidity and mortality among newborns. These ailments raise the chance of developing chronic diseases later in life and can cause long-term health issues. Antenatal care (ANC) is acknowledged as an essential approach for keeping an eye on a pregnancy, spotting possible issues, and offering treatments that lower the risk of low birth weight and preterm delivery. Even though ANC has been shown to be important, more research is needed to understand how it is implemented and how beneficial it is for various groups and locations. The goal of this study is to highlight the importance of comprehensive antenatal care (ANC) in reducing the risks of low birth weight and preterm delivery, especially in environments with limited resources. This study focuses on the kind, timing, and frequency of antenatal care visits in order to assess the effect of this treatment on avoiding low birth weight and premature birth. A thorough analysis of the body of research was done, examining studies that looked into the connection between ANC and pregnancy outcomes. To evaluate the efficacy of various ANC therapies, data were taken from peer-reviewed studies and combined with other findings. The results highlight how crucial early and consistent ANC is for avoiding unfavorable pregnancy outcomes. Timely interventions associated with high-quality antenatal care (ANC) are crucial in lowering the rate of preterm birth and low birth weight, which in turn improves newborn health outcomes. The study emphasizes the necessity of laws that guarantee access to high-quality ANC services, especially in communities that are underprivileged.

Keywords: Preterm birth, Ante-natal care, low birth weight, interventions, neonatal health

This work is licensed under a [Creative Commons Attribution 4.0 Unported License](https://creativecommons.org/licenses/by/4.0/)

ISSN: 3043-6087. Science and Education Development Inst., Nigeria

Citation: Uranta, G.A., Ohaeri, B.M., Ojo, I.O., and Babarimisa, O. (2024). The Role of Ante-Natal Care in Preventing Preterm Birth and Low Birth Weight Babies. *Continental J. Applied Science*, 19(3), 18-41. Doi: 10.5281/zenodo.13939687

Introduction

This study highlights the significance of early detection, risk assessment, and prompt action to promote a healthy pregnancy and assure a happy outcome for both mother and child. It also analyzes the critical role that prenatal care plays in preventing preterm birth and low birth weight newborns. We will explore the various facets of prenatal care and identify the critical tactics and factors that medical providers use to reduce the risk of preterm birth and low birth weight, which ultimately improves the quality of care for mothers and infants.

Antenatal care (ANC) is the term for the competent medical attention given by qualified experts to adolescent girls and pregnant women during their pregnancy. Risk identification, illness prevention and management related to risk identification, disease prevention and management related to pregnancy and other problems that may occur concurrently, are all crucial components of ANC (Shaheen et al., 2020). While it is generally agreed upon that ANC should be customized for each patient, there are no clear guidelines for the techniques needed to ensure good pregnancy outcomes, especially in impoverished nations such as Nigeria where resources are often limited. Prenatal care, also known as antenatal care, is crucial to guaranteeing the health and welfare of the developing fetus as well as the expectant mother. Preventing preterm birth and the related risk of low birth weight is one of the main goals of prenatal care. A baby that weighs less than 2.5 kg is considered low birth weight according to the World Health Organization (WHO). An estimated 20 million births annually are estimated to have low birth weight (LBW), accounting for 15 to 20% of all newborns born globally. Low birth weight and preterm birth, which are defined as when a baby is delivered before 37 weeks of gestation, can both present serious risks to the health and development of the newborn.

Healthcare professionals have a crucial window of opportunity throughout the antenatal period to identify and manage any risk factors that could lead to low birth weight and preterm birth. A variety of treatments are included in comprehensive prenatal care, such

This work is licensed under a [Creative Commons Attribution 4.0 Unported License](https://creativecommons.org/licenses/by/4.0/)

ISSN: 3043-6087. Science and Education Development Inst., Nigeria

as routine physical examinations, national guidelines, and educational programs, with the goal of identifying and addressing variables that may compromise the fetus's optimal growth. Worldwide, the most common cause of death for children under five is complications from preterm birth. A wide range of health difficulties, such as neurological impairments, breathing problems, and developmental abnormalities, are frequently experienced by survivors. Low birth weight increases susceptibility during the neonatal period and increases the risk of chronic diseases later in life. It is frequently a result of preterm birth or intrauterine growth restriction. Preterm birth and low birth weight are associated with a number of risk factors, such as maternal age, multiple pregnancies (twins or more), medical disorders (hypertension, diabetes), infections, and socioeconomic disparities in the mother's health. The intricate interactions between lifestyle, environmental, and genetic factors highlight the necessity of a thorough strategy to recognize and manage these risks throughout pregnancy.

The time leading up to conception and the start of labor is known as the prenatal period, and it is a crucial window of opportunity to affect fetal development. The fetus is growing and developing quickly at this time, and exposure to unfavorable environments may have long-term consequences. Early and regular prenatal care is essential for identifying and reducing potential risks to the health of the fetus because the first trimester in particular is critical for organogenesis. Despite the fact that a large number of articles on the subject have been published in journals and periodicals worldwide, there is still a lack of information available. This review article will provide further insight into the subject. Thus, the focus of this review study is on how prenatal care helps avoid low birth weight and premature birth. Thus, the purpose of this research is to assess how prenatal care, with particular attention to the type, time, and frequency of ANC visits, can prevent preterm birth and low birth weight newborns.

The objectives are:

1. To analyze the relationship between the quality of ANC and the incidence of preterm birth and low birth weight.
2. To identify key interventions within ANC that contribute to reducing the risk of preterm birth and low birth weight.
3. To explore the barriers to accessing quality ANC, particularly in resource-limited settings.

This work is licensed under a [Creative Commons Attribution 4.0 Unported License](https://creativecommons.org/licenses/by/4.0/)

ISSN: 3043-6087. Science and Education Development Inst., Nigeria

Literature Review

Strengthening the antenatal care program is recommended as one of the public health interventions to lower the population's burden of preterm births, according to Pervin et al. (2020). The evidence that is currently available, though, is not conclusive. The purpose of their study was to assess the relationship between preterm birth and antenatal care visits (ANC visits), as well as investigate the potential role of ANC usage in reducing preterm birth after the start of the Maternal, Neonatal and Child Health (MNCH) project in Matlab, Bangladesh. A population-based cohort study was carried out in Chandpur's Matlab subdistrict. The data used for the analysis was gathered between 2005 and 2009. An MNCH initiative that reinforced the existing ANC services was started in the area in 2007. The analysis comprised 12,980 live births with their moms that occurred during the study period. To assess the relationships, they used generalized estimating equation models and logistic regression. Preterm birth was measured. The findings demonstrated a dose-dependent relationship between the frequency of ANC visits and preterm delivery (p for linear trend <0.001). Women who got ≤ 1 ANC had adjusted odds of preterm birth that were 2.4 times higher (OR 2.37, 95% CI 2.07 to 2.70) than women who received ≥ 3 ANC. Comparing the time after (2008 to 2009) the start of the MNCH project to the period before (2005 to 2006), we found a substantial decrease in the rates of preterm births (OR 0.69, 95% CI 0.61 to 0.77). This MNCH project's reported effect on preterm birth was significantly reduced when ANC visits were taken into account (OR 0.88, 95% CI 0.77 to 0.99; Sobel test of mediation, $p < 0.001$). In summary, ANC visits were linked to a lower incidence of premature births. In nations with high prevalence of preterm births, strengthening ANC services ought to be given top priority in order to lower the burden of premature births on the general populace.

According to Engdaw et al. (2023), risk identification is a crucial part of antenatal care (ANC), as is the prevention and treatment of illnesses linked to pregnancy or other problems that may arise concurrently. Observational follow-up and cross-sectional studies were carried out in compliance with the Preferred Reporting Items for Systematic reviews and Meta-Analyses criteria regarding the impact of prenatal treatment on low birth weight in Africa. We looked through five electronic bibliographic databases, including Google Scholar, PubMed, Scopus, Cochrane Library, and Hinari Direct, to find published research that was written in English up until May 2022. The quality of each included study was evaluated, and the risk of bias evaluation instruments created by the Joanna Briggs Institute for cross-sectional and observational follow-up research were utilized. There were seven publications in all, and 66,690 kids took part in the research.

This work is licensed under a [Creative Commons Attribution 4.0 Unported License](https://creativecommons.org/licenses/by/4.0/)

ISSN: 3043-6087. Science and Education Development Inst., Nigeria

Seven studies satisfied the selection criteria, according to the results. Four out of the seven research that made up the study found a correlation between low birth weight and prenatal care. In the random-effects model, the pooled odd ratio for low birth weight was 0.46 (95% CI: 0.39, 0.53). For low birth weight, the combined odds ratios for pregnant women who received no prenatal care follow-up and those who did received antenatal care follow-up were 0.21 (95% CI: 0.19, 0.22) and 0.21 (95% CI: 0.19, 0.22), respectively. In conclusion, the likelihood of having a baby of a normal weight was higher for women who attended at least one prenatal care appointment than for their peers. Providing mothers with low socioeconomic level with adequate prenatal care and high-quality healthcare services should be the main emphasis of interventions aimed at reducing low birth weight in Africa.

Preterm birth can be prevented in part by receiving adequate prenatal care. Using instruments like the Adequacy of Prenatal Care Use index, the evaluation of antenatal care is typically predicated on the quantity of visits rather than the nature of care (Beeckman et al., 2013). In contrast to focusing solely on the number of visits, their article examined the relationship between certain prenatal care components and the risk of premature birth. The Brussels Metropolitan Region hosted a prospective cohort research. A total of 333 women were sequentially enrolled at the start of their prenatal care journey and monitored all the way to delivery. Structured interviews were used to capture details on the schedule and subject matter of each visit. The Content and Timing of care in pregnancy (CTP) was a novel tool designed to measure the antenatal care trajectory. The Adequacy of Prenatal Care Use and CTP model's odds ratios (OR), both adjusted and uncorrected, for preterm birth were computed. The findings demonstrated that there was no correlation between preterm birth and the number of visits. The timing and nature of care, however, were found to be significantly correlated with preterm birth. The risk was lower for women in the CTP "sufficient" (OR 0.30; 95% CI 0.09–0.94) and "appropriate" (OR 0.21; 95% CI 0.06–0.68) categories than for those in the CTP lowest ('inadequate') group. The study found that the new CTP method, which measures the content and timeliness of prenatal treatment, provides a more accurate way to estimate the risk of preterm birth than does counting the number of prenatal visits.

Group prenatal care lowers the risks of low birth weight and preterm birth for expectant mothers, according to research from Yale School of Public Health (Lewis et al., 2019). In a study done in partnership with Vanderbilt University Medical Center, researchers looked at nearly 9,000 pregnant women and discovered that group prenatal care from Centering Pregnancy or Expect With Me was superior to typical one-on-one care.

This work is licensed under a [Creative Commons Attribution 4.0 Unported License](https://creativecommons.org/licenses/by/4.0/)

ISSN: 3043–6087. Science and Education Development Inst., Nigeria

Researchers discovered that compared to women receiving standard one-on-one treatment, group prenatal care patients had a 37 percent reduced risk of preterm birth and a 38 percent lower chance of low birth weight infant. Increased participation in the group visits also led to benefits that were more noticeable. Compared to their counterparts receiving traditional care, women who attended five or more group prenatal care appointments had a 68 percent lower risk of preterm birth and a 66 percent lower risk of low birth weight baby.

Birth weight is a reflection of the fetal period's development and the environment during gestation. Low birth weight (LBW) and the quality and appropriateness of prenatal care (ANC) may be related (Kpordoxah et al., 2023). This study examined the association between ANC adequacy and LBW in the Brazilian Unified Health System. From 2004 to 2008, a case-control research was carried out in Botucatu, São Paulo, Brazil. Data were gathered from primary sources (pregnant women's official medical records) and secondary sources (the Live Birth Certificate). There were two groups in the research population, each containing 860 babies. Infants weighing less than 2,500 grams made up the case group, and live infants weighing more than or equal to 2,500 grams made up the control group. Three metrics were used to determine whether ANC was adequate: 3. Adequacy of ANC laboratory studies and exams summary measure in accordance with specifications set by the Ministry of Health in the Program for Prenatal and Birth Care Humanization; 2. Modified Kessner Index; and 1. Adequacy of the number of ANC visits adjusted to gestational age. The results of the analysis showed that LBW was related to both the summary measure of ANC laboratory studies and exams (OR = 4.13, 95% CI 1.36-12.51) and the number of ANC visits adjusted to gestational age (OR = 1.78, 95% CI 1.32-2.34). The LBW group had 64.4% of appropriate prenatal visits, with no group differences, according to the modified Kessner Index. The study's findings supported the link between an increased risk of low birth weight babies and insufficient antenatal care, laboratory testing, and examinations. The modified Kessner Index, a gauge of ANC sufficiency, did not show any correlation with LBW. This result demonstrated the poor coverage indices for fundamental activities that are already tightly regulated in Brazil's health system. Even though the study demonstrated a correlation, they are unable to draw the conclusion that LBW could only be avoided with a sufficient ANC because LBW has multiple, complex etiological components. With an emphasis on lower LBW rates, the results could be utilized to develop monitoring strategies and assess programs of health care assistance during pregnancy, at delivery, and for newborns.

Birth weight is a reflection of the fetal period's development and the environment during gestation. Antenatal care (ANC) quality and appropriateness may be related to low birth weight (LBW) (Caira-Chuquineyra, 2023). Their study's goal was to examine the association between ANC adequacy and LBW in Brazil's Unified Health System. From 2004 to 2008, a case-control research was carried out in Botucatu, São Paulo, Brazil. Data were gathered from primary sources (pregnant women's official medical records) and secondary sources (the Live Birth Certificate). There were two groups in the research population, each containing 860 babies. Infants weighing less than 2,500 grams made up the case group, and live infants weighing more than or equal to 2,500 grams made up the control group. Three metrics were used to determine whether ANC was adequate: 3. Adequacy of ANC laboratory studies and exams summary measure in accordance with specifications set by the Ministry of Health in the Program for Prenatal and Birth Care Humanization; 2. Modified Kessner Index; and 1. Adequacy of the number of ANC visits adjusted to gestational age. The number of ANC visits adjusted to gestational age (OR = 1.78, 95% CI 1.32-2.34) and the summary measure of ANC laboratory investigations and exams (OR = 4.13, 95% CI 1.36-12.51) were also related to LBW, according to the analyses. The LBW group had 64.4% of appropriate prenatal visits, with no group differences, according to the modified Kessner Index. Their findings support the link between higher risk of LBW babies and insufficient ANC visits, laboratory testing, and examinations. The modified Kessner Index, a gauge of ANC adequacy, did not show any correlation with LBW. This result demonstrated the poor coverage indices for fundamental activities that are already tightly regulated in Brazil's health system. Even though the study demonstrated a correlation, we cannot draw the conclusion that LBW could only be avoided with a sufficient ANC because LBW has multiple, complex etiological variables. With an emphasis on lower LBW rates, the results could be utilized to develop monitoring strategies and assess programs of health care assistance during pregnancy, at delivery, and for newborns.

Methods of Review

Using databases (PubMed, Scopus, the Cochrane Library, and Hinari Direct) and search engines (Google Scholar), a comprehensive search of the literature was conducted. The first search was carried out by academics with a great deal of experience conducting systematic reviews, and GTE separately reviewed titles, abstracts, and full texts. If there was a disagreement, it was to be resolved by another reviewer. LBW, ANC (effect, prenatal care, antenatal care, infant, low birth weight, and low-birth-weight infant), and Africa were the original search terms. A mix of LBW-related keywords, research design-

This work is licensed under a [Creative Commons Attribution 4.0 Unported License](#)

ISSN: 3043-6087. Science and Education Development Inst., Nigeria

related terms (prevalence, epidemiology, cross-sectional study, observation follow-up study), title, title/abstract, or medical subject heading were developed for the search approach. Grey literature and full-text article reference lists were also searched on Google to find pertinent material.

Roles of Ante-Natal Care

Approximately one million of the estimated 15 million preterm babies born worldwide each year pass away within 28 days of their birth as a result of difficulties from being born too young (Chawanpaiboon et al., 2019; Lawn et al., 2010). Preterm birth prevention and the negative health effects it is associated with continue to be global public health priorities. Pregnancy is seen as a crucial time to influence a mother's, fetus', and newborn's future health and wellbeing (WHO, 2016). In order to enable prompt management of morbidities during pregnancy, antenatal care (ANC) assists in identifying high-risk mothers (WHO, 2016). Preterm birth is still a significant global public health issue. Pervin et al. (2020) found a dose-dependent relationship between the frequency of ANC visits and preterm birth. Preterm birth rates were lower in the women who attended more ANC visits. They have shown for the first time that a significant amount of the reported 31% reduction in the probabilities of preterm birth burden following the start of the MNCH project, which aided in the strengthening of ANC services in the area, appears to be mediated by high ANC service consumption. Increasing the use of ANC was likely to have a direct impact on reducing preterm births, as opposed to the sociodemographic or specific reproductive health characteristics that were analyzed. The results of the study highlight the possibility that ANC services could significantly lower the number of premature births at population level. Additionally, it affects the modification of detrimental behaviors linked to unfavorable consequences for the health of mothers and newborns, such as the prevalence of preterm births (Fernandez et al., 2016). One public health strategy to lower the burden of preterm births at the population level is to strengthen the ANC program. The evidence that is currently available, though, is not conclusive.

Roles of Antenatal Care in Risk Identification

Using prenatal care services as a foundation, the maternal and fetal health are systematically assessed. Early pregnancy problems and risk factors can be identified by healthcare practitioners through routine screenings, check-ups, and diagnostic procedures. Keeping an eye on maternal health markers like blood pressure, weight growth, and medical history can help identify issues that could lead to low birth weight

This work is licensed under a [Creative Commons Attribution 4.0 Unported License](#)

ISSN: 3043-6087. Science and Education Development Inst., Nigeria

and premature birth early. Opportunities for focused interventions and preventive actions are provided by antenatal care (Gamberini et al., 2022).

Early infection detection contributes to the overall goal of preventing preterm birth. Nutritional counsel, lifestyle adjustments, and medical management of pre-existing diseases can assist maximize mother health and reduce antenatal treatment depending on obstetric history, such as known uterine or cervical anomalies or prior preterm births, pre-existing problems such chronic diseases, or characteristics of the presenting pregnancy, such as diabetes, multiple gestations, hemorrhage, hypertensive disorders of pregnancy, etc. Additionally, young teenagers are more vulnerable.

Antenatal care services for prevention of preterm birth

To improve the chances of a healthy birth, pregnant women must get effective and culturally sensitive care (World Health Report, 2005). According to Berhan and Berhan (2014), antenatal care is a framework for providing services that allows all pregnant women to get a package of interventions at various points throughout their pregnancy that can extend a healthy pregnancy and enhance the health of both the mother and the fetus. The following basic services, when provided during prenatal care, may help lower the rate of preterm births: identifying women who are at high risk of preterm birth; treating and screening for STDs, including HIV; identifying and correcting malnutrition; providing nutrition counseling, including advice on multiple micronutrient supplements; counseling on birth preparation and complication readiness for the detection of early labor and other risk factors; and providing behavioral and social support interventions, like quitting smoking programs, to prevent violence against women. A woman can be reached during pregnancy and childbirth through a number of channels with interventions targeted at improving her health and the health of her unborn child, as well as lowering her risk of a premature birth. The range of services offered to manage preterm labor, antenatal care for all pregnant women and women at high risk of preterm birth, and workplace, professional, and other supportive policies that support safe motherhood and universal access to care before, during, and after pregnancy are some of these mechanisms (Requejo et al., 2013).

The relationship between the quality of ANC and the incidence of preterm birth and low birth weight

Low birth weight (LBW) is a significant factor influencing infant morbidity and mortality, according to Uwimana et al. (2023). Antenatal care (ANC) for expectant mothers should

This work is licensed under a [Creative Commons Attribution 4.0 Unported License](https://creativecommons.org/licenses/by/4.0/)

ISSN: 3043-6087. Science and Education Development Inst., Nigeria

include a range of therapies that are essential to achieving optimal birth weight. Women may not have received all advised prenatal care based just on ANC visits. There is, however, little proof in Rwanda that ANC quality and LBW are related. Thus, the goal of their research was to evaluate the relationship between high-quality ANC and low birth weight (LBW), as well as the factors that influence LBW and the ways in which high-quality ANC influences LBW in pregnant Rwandan women.

Population, health, and nutrition data are gathered by cross-sectional, nationally representative household surveys called the Demographic and Health Surveys (DHS). Three waves of the Rwanda Demographic and Health Surveys—2010, 2014–5, and 2019–20—were used in the study. This study included 16,144 women, ages 15 to 49, who gave birth to living children in the five years before to each survey. To choose the participants, a stratified two-stage sampling technique was employed. Choosing clusters (villages) from a list of every cluster in the nation is the first step. Choosing homes inside each cluster is the second step. In order to evaluate the relationship between the outcome and independent factors, a survey that was multiple-level cluster adjusted as well as a bivariate and multivariable logistic regression were utilized to generate adjusted odds ratios (aOR) and 95% confidence intervals. Over the course of the three survey years, there was a minor increase in the use of high-quality ANCs, while LBW saw a gradual reduction. Of the 5813 mothers surveyed in 2010, 201 (3.45%) had high-quality ANC, and 180 (3.10%) of the 5813 babies were LBW. In 2015, of the 5404 mothers, 492 (9.11%) had high-quality ANC, and 151 (2.79%) of the 5404 babies were LBW. In the 2020 survey year, of the 5203 mothers, 776 (14.92%) had high-quality ANC, and 139 (2.67%) of the 5206 babies were LBW. When compared to low-quality ANC, high-quality ANC had a negative correlation with LBW at a borderline limit in multivariable analysis (aOR:0.67;95%CI:0.43, 1.05). In comparison to first orders newborns, higher birth orders were negatively linked with LBW (aOR:0.63;95%CI:0.49,0.82 and aOR:0.44;95%CI:0.32,0.61 for 2nd -3rd and 4th and above, respectively). Compared to newborns from poor homes, those from wealthy households had a lower likelihood of experiencing LBW (aOR:0.71;95%CI:0.55,0.91). Compared to male babies, female newborns had a higher incidence of LBW (aOR:1.43;95% CI:1.18, 1.73). The results validate the basic significance of a superior ANC for low-birth weight individuals. With an emphasis on LBW reduction, the findings could be used to evaluate pregnancy health aid programs and create monitoring systems.

According to published studies, there may be a relationship between ANC attendance and (Tafere et al., 2018; Zhou et al., 2019). Although a new model presented in 2016

This work is licensed under a [Creative Commons Attribution 4.0 Unported License](https://creativecommons.org/licenses/by/4.0/)

ISSN: 3043-6087. Science and Education Development Inst., Nigeria

suggests that the minimum contact must be at least eight, the WHO suggested that ANC visits during pregnancy time be at least four (Lattof et al., 2020). Strong data suggests that missing ANC appointments or fewer visits than advised increases the risk of LBW by four times (Lattof et al., 2020). The fact that ANC offers a means of administering a range of medicines to expectant mothers that enhance maternal and fetal health outcomes lends credence to this perspective (Asundep et al., 2013).

According to Tayebi et al. (2014), low birth weight (LBW) was linked to missing five to eight prenatal visits, not receiving prenatal care during the first trimester, and not having access to certain ANC supplies. Apart from that, there is controversy regarding the impact of ANC therapy on the health outcomes of mothers and newborns (Engdaw et al., 2023). Although ANC visits by themselves have not yet been shown to enhance birth outcomes, various healthcare initiatives have been shown to lower perinatal mortality and lower newborn mortality in comparison to ANC visits (Engdaw et al., 2023).

According to a survey published in 2005, foreign-born women made up half of all migrants living in Italy, and more than 65 percent of these women were of reproductive age (Cantarutti et al., 2024). According to a WHO report, migrant women are more likely than non-migrant women to experience prenatal and perinatal adverse events and problems, as well as complications for both mothers and children (WHO, 2018). Reduced use of prenatal care (ANC), as well as characteristics linked to age, ethnicity, place of origin, sociodemographics, and socioeconomic status, are strongly associated with poorer pregnancy outcomes, including PTB (Cantarutti et al., 2024). Language problems, living conditions, poverty, illiteracy, economic hardships, and cultural differences are some of the reasons why immigrant women frequently encounter difficulties while attempting to use the healthcare system (Awoleke and Olofinbiyi, 2020). However, more research is needed to determine the precise nature of the connection between migration and PTB.

According to Nagatani et al. (2023), prenatal care (ANC) is crucial in preventing low birthweight (LBW). Although the Lao People's Democratic Republic (Lao PDR) government has pledged to increase ANC usage, the early ANC has not received much attention. The current study evaluated the impact on LBW in the nation of postponed and reduced ANC visits. Salavan Provincial Hospital did a retrospective cohort analysis. All expectant women who gave birth at the hospital between August 1, 2016, and July 31, 2017, were study participants. Information was gathered from medical records. We used logistic regression analysis to measure the correlation between ANC visits and LBW.

This work is licensed under a [Creative Commons Attribution 4.0 Unported License](#)

ISSN: 3043-6087. Science and Education Development Inst., Nigeria

They also looked into the following factors: < 4 ANC visits, or the first ANC visit following the first trimester, which are linked to insufficient ANC visits. 2808.7 g was the average birth weight (standard deviation: SD 455.6). Of the 1804 individuals, 147 (8.2%) had insufficient ANC visits, and 350 (19.4%) had babies with LBW. Those who had at least four ANC visits and the first ANC visit after the second trimester, those who had at least four ANC visits, and those who had no ANC visits had higher odds ratios (ORs) of LBW in multivariate analyses compared to participants who had adequate ANC visits: 3.77 (95% confidence interval: CI = 1.66–8.57), 2.39 (95% CI = 1.18–4.83), and 2.22 (95% CI = 1.08–4.56), respectively. After controlling for variables, the likelihood of receiving insufficient ANC visits was linked to younger mother age (OR 1.42; 95% CI 1.07–1.89), government subsidization (OR 2.69; 95% CI 1.97–3.68), and ethnic minority status (OR 1.88; 95% CI 1.50–2.34). In Lao PDR, ANC was frequently started early and was linked to a decrease in LBW. Encouraging women of reproductive age to get enough ANC at the right time may reduce low birth weight and improve the short- and long-term health outcomes of newborns. Women from lower socioeconomic strata and members of ethnic minorities will require extra care.

The impact of comprehensive coverage and content of antenatal care (ANC) on the incidence of low birth weight (LBW) was evaluated by Arsyi et al. (2022) in four ASEAN member countries. Frequency of ANC visits and the seven service components (blood pressure measurement, iron supplementation, tetanus toxoid immunization, explanations of pregnancy complications, urine sample test, blood sample test, and weight measurement) were used as indicators of the full coverage and content of ANC services. If there were more than four ANC visits and all seven components were provided, the overall coverage and substance of ANC services were rated as high. Data from the Demographic Health Surveys of the four ASEAN nations under consideration were used to perform multivariable logistic regression with complex survey designs between 2014 and 2017. The Philippines (13.8%) had a greater percentage of LBW newborns than Indonesia (6.7%), Cambodia (6.7%), or Myanmar (7.5%). A high degree of comprehensive coverage and content of ANC services was linked to a 1.30 times lower incidence of LBW than poor ANC services (adjusted odds ratio [aOR], 1.30; 95% confidence interval [CI], 1.11 to 1.52). In addition, after controlling for mothers' health-related behaviors, socioeconomic and demographic characteristics, and other factors, the risk of LBW was higher in the Philippines than in other nations (aOR, 2.25; 95% CI, 2.01 to 2.51). In conclusion, there was a strong correlation found between the frequency of LBW in Indonesia, Cambodia, and Myanmar and the full coverage and substance of ANC

services. The Philippines showed a greater risk of LBW with inadequate ANC, but did not exhibit statistically significant results for this link.

The key interventions within ANC that contribute to reducing the risk of preterm birth and low birth weight.

Every year, 15 million babies are thought to be born prematurely (Blencowe et al., 2012). More than 15% of deaths in children under the age of five are caused by preterm delivery problems (Liu et al., 2015), and survivors frequently experience long-term effects on their growth, mental health, and overall well-being (Teune et al., 2011; Moster et al., 2008). The most advantageous interventions are those that target particular care for preterm neonates and those that enhance newborn outcomes when preterm birth is unavoidable (tertiary interventions).

In an effort to improve preterm birth outcomes, the World Health Organization (WHO) today published new recommendations on interventions for pregnant women in whom preterm birth is imminent. These recommendations include antenatal corticosteroids, tocolytics, magnesium sulfate, antibiotics, and mode of delivery; for preterm neonates, the recommendations include thermal care, continuous positive airway pressure (CPAP), surfactant administration, and oxygen therapy (Hentschel et al., 2020). WHO admits that there is still work to be done in order to improve the outcomes of preterm newborns. In order to correctly determine gestational age, identify early indicators of preterm labor, deliver timely and efficient infant care, and employ interventions in a way that minimizes harm, health personnel and health systems must be well-equipped. The guidelines draw attention to important gaps in the available data, especially when it comes to the use of tocolytics and prenatal corticosteroids in settings with low resources. There is an urgent need for more trials of these therapies.

It has been amply shown that having access to high-quality prenatal care lowers perinatal mortality, making it a top priority. According to data from Ghana, having high-quality prenatal care reduced the chance of stillbirth by half because it made it possible to treat and prevent malaria, test for anemia, manage helminth infections, and monitor blood pressure. Furthermore, it made syphilis diagnosis and treatment easier as well as the Prevention of Mother to Child Transmission of HIV (PMTCT). It also made it possible to give nutritional supplements and give women the chance to learn about health-improving techniques and how to recognize pregnancy danger indicators. According to modeling, 45% of stillbirths might be prevented if prenatal care included ten basic

This work is licensed under a [Creative Commons Attribution 4.0 Unported License](#)

ISSN: 3043-6087. Science and Education Development Inst., Nigeria

treatments. Increasing efforts have been made in many LMICs to encourage women to give birth in health facilities so that early complication recognition and life-saving measures can be provided as part of strategies to minimize both perinatal and maternal mortality.

On the other hand, facility-based distribution has been linked, in many cases, to paradoxically worse results than house delivery. This is complex and partly explains the higher probability of selecting high-risk cases for facility delivery. A cohort study of 4442 women in Ethiopia discovered that women who had intrapartum problems were twice more likely to give birth at a medical facility than women who did not; this finding helps to explain why there was no decline in stillbirths among facility births. This is not the only moderating element, though, and the standard of obstetric care that is offered is probably going to play a major role.

According to Wastnedge et al. (2021), reducing preterm births is complicated and requires a commitment at the national level to enhance the health and wellbeing of mothers. Optimising nutritional intake is a crucial intervention in low- and middle-income countries (LMICs) as it has a strong evidence base. Additionally, various nutritional supplements have been shown to reduce the incidence of preterm births. These findings have been reported by Haider and Bhutta (2017) and Heidkamp et al. (2017). However, population-level strategies to enhance women's health must be implemented concurrently with women's rights activism. Globally, intimate partner violence is a threat to women's wellbeing, and many are left unable to make informed decisions regarding their reproductive health due to a lack of female empowerment. Enhancing female and therefore maternal health requires expanding access to family planning, abortion, and contraception (Wastnedge et al., 2021).

The Barriers to Accessing Quality ANC, Particularly In Resource-Limited Settings

According to McCauley et al. (2022), antenatal care (ANC) is a vital platform for diagnosing and treating conditions that, if untreated, can result in maternal and perinatal morbidity and mortality. Better birth outcomes result from having access to high-quality ANC, which also protects women who face various forms of disadvantage and put them at higher risk of unfavorable birth outcomes (Rayment-Jones et al., 2021). Thus, ensuring equitable access to high quality ANC is one way of addressing some of the complex social

determinants of health experienced by women and infants with low economic resources (Penman et al., 2023).

Identifying and managing a range of risk factors, such as maternal smoking, obesity, poor diet, stress, and depression, is crucial during prenatal care consultations. These risk factors have been linked to poor outcomes for the physical and psychosocial development of the fetus and later child (Penman et al., 2023). A number of these risk factors are more prevalent in women who are experiencing disadvantage (Australian Institute of Health and Welfare, 2020). Given the complex nature of disadvantage, we define it broadly as any financial, cultural, ethnic, legal, educational, social, or health circumstances that lessen the likelihood of an individual enjoying a high quality of life (Goldfeld et al., 2018). Given the complex nature of disadvantage, we define it broadly as any financial, cultural, ethnic, legal, educational, social, or health circumstance that reduces the likelihood of an individual experiencing a good quality of life (Goldfeld et al., 2018). Antenatal care consultations offer crucial opportunities to identify and manage a variety of risk factors, such as maternal smoking, obesity, poor diet, stress, and depression, that are associated with poor foetal and later child physical and psychosocial development outcomes Penman et al., 2023.

The Australian Institute of Health and Welfare (2020) has identified that many risk factors are more common among women who experience disadvantage. In recognition of the complexity of disadvantage, we define it broadly as any financial, cultural, ethnic, legal, educational, social, or health circumstances that reduce the likelihood of an individual experiencing a good quality of life. Antenatal care consultations offer critical opportunities to identify and manage a variety of risk factors, such as maternal smoking, obesity, poor diet, stress, and depression, that are associated with poor foetal and later child physical and psychosocial development outcomes (Penman et al., 2023). A number of risk factors are more prevalent in women who are experiencing disadvantage (Australian Institute of Health and Welfare, 2020), which recognizes the complex nature of disadvantage and defines it broadly as any financial, cultural, ethnic, legal, educational, social, or health circumstances that lower the likelihood of an individual experiencing a good quality of life. Antenatal care consultations offer crucial opportunities to identify and manage a variety of risk factors, such as maternal smoking, obesity, poor diet, stress, and depression, that are associated with poor foetal and later child physical and psychosocial development outcomes (Penman et al., 2023).

Identifying and managing a range of risk factors, such as maternal smoking, obesity, poor diet, stress, and depression, is crucial during prenatal care consultations. These risk factors have been linked to poor outcomes for the physical and psychosocial development of the fetus and later child (Penman et al., 2023). A number of these risk factors are more

prevalent in women who are experiencing disadvantage (Australian Institute of Health and Welfare, 2020). Given the complex nature of disadvantage, we define it broadly as any financial, cultural, ethnic, legal, educational, social, or health circumstances that lessen the likelihood of an individual enjoying a high quality of life (Goldfeld et al., 2018). Given the complex nature of disadvantage, we define it broadly as any financial, cultural, ethnic, legal, educational, social, or health circumstance that reduces the likelihood of an individual experiencing a good quality of life (Goldfeld et al., 2018). Antenatal care consultations offer crucial opportunities to identify and manage a variety of risk factors, such as maternal smoking, obesity, poor diet, stress, and depression, that are associated with poor foetal and later child physical and psychosocial development outcomes (Penman et al., 2023). Poverty, unemployment, homelessness, unstable housing, living in a rural or isolated area, social isolation, lack of education, familial violence, diversity in culture and language, and physical or mental disease or disability are a few examples of these conditions. Making certain that women from underprivileged homes receive early and consistent ANC offers a vital chance to address current health inequalities.

Studies examining the experiences of underprivileged women in obtaining and using antenatal care reveal a variety of intricate obstacles that have been classified in different ways (McLeish & Redshaw, 2019; Bellerose et al., 2022). Obstacles that are psychological or personal include bad feelings, the reasons behind a mother's actions, and awareness of pregnancy or ANC services. Additional obstacles pertain to problems concerning the delivery of antenatal care (such as clinic or hospital environments and protocols, medical professionals, and the wider healthcare system), or more general social-contextual elements (such as societal concerns, cultural norms, linguistic disparities, and financial situations) (McLeish & Redshaw, 2019; Bellerose et al., 2022). Women evaluate and balance "personal issues and circumstances within their social context, and in the context of the care provision they anticipate and encounter," as noted in one assessment, before deciding to utilize ANC.

Although there are many similarities between these nations and Australia, there are also significant differences in the healthcare systems, especially in North America, which could lead to distinct obstacles for women seeking ANC. Qualitative research that focuses

This work is licensed under a [Creative Commons Attribution 4.0 Unported License](https://creativecommons.org/licenses/by/4.0/)

ISSN: 3043-6087. Science and Education Development Inst., Nigeria

on the obstacles to ANC attendance that Australian women face is therefore necessary. Still, there aren't enough data in this field. Although these nations and Australia share many similarities, the healthcare systems in these countries—especially in North America—are significantly different, which could lead to women facing various obstacles to ANC. Thus, qualitative study concentrating on the obstacles to ANC attendance faced by Australian women is required. But there aren't many data points in this field.

Conclusion

Preterm birth and low birth weight babies can be avoided with the help of early and consistent prenatal care. Appropriate timing and frequency of visits, along with high-quality ANC services, greatly lower the risk of unfavorable pregnancy outcomes. This emphasizes the necessity of policies and initiatives to improve ANC quality and access, particularly in marginalized areas.

Recommendations

For aspiring parents, the pregnancy phase is an exciting time. It is a window of opportunity during which a woman can be reached using a range of techniques with interventions meant to improve the health of her unborn child and lower her risk of premature birth. Routine prenatal care is a crucial mechanism, wherein a woman is provided with a customized variety of effective services at various points during her pregnancy, based on her unique risk profile. The message is clear: In order to effectively address the growing problem of preterm birth, we must all work together to make it possible for women everywhere to receive the care they need during pregnancy, labor, and delivery. She can also benefit from supportive police policies that increase her access to quality care and shield her from potentially harmful exposure.

Ensuring fair delivery of these interventions through creative and economical techniques must be a top priority for the government and its partners. In order to create the evidence basis necessary for the creation of successful preventative and treatment programs, basic research and discovery science must be supported concurrently. Collaborative partnerships between institutions and nations will be necessary for this. Resources must be set aside to translate the evidence into improved screening and diagnostic methods as well as additional interventions targeted at preserving the lives of expectant mothers and their babies. Now is the perfect opportunity to implement this action plan.

This work is licensed under a [Creative Commons Attribution 4.0 Unported License](#)

ISSN: 3043-6087. Science and Education Development Inst., Nigeria

References

- Arsyi, M., Besral, B., Herdayati, M., and Phalkey, R. (2022). Antenatal Care Services and Incidence of Low Birth Weight: A Comparison of Demographic and Health Surveys in 4 ASEAN Countries. *J Prev Med Public Health*. 55:559-567. <https://doi.org/10.3961/jpmph.22.316>
- Asundep NN, Carson AP, Turpin CA, Tameru B, Agidi AT, Zhang K, Jolly PE. (2013). Determinants of access to antenatal care and birth outcomes in Kumasi, Ghana. *J. Epidemiol Glob Health*. 3(4):279-88. doi: 10.1016/j.jegh.2013.09.004.
- Australian Institute of Health and Welfare. (2020). *Australia's health 2020: data insights*. Canberra: AIHW. doi:10.25816/5f05371c539f3
- Awoleke JO, Olofinbiyi BA. (2020). Poor prenatal service utilization and pregnancy outcome in a tertiary health facility in Southwest Nigeria. *Pan Afr Med J*. 6;35:28. doi: 10.11604/pamj.2020.35.28.20426.
- Beeckman D, Clays E, Van Hecke A et al (2013) A multifaceted tailored strategy to implement an electronic clinical decision support system for pressure ulcer prevention in nursing homes: A two-armed randomized controlled trial. *Int J Nurs Stud* 50(4): 475–86
- Beeckman K, L F, Downe S, Putman K. (2023). The relationship between antenatal care and preterm birth: the importance of content of care. *Eur J Public Health*. 23(3): 366-371. 10.1093/eurpub/cks123
- Bellerose, M., Rodriguez, M., & Vivier, P. (2022). A systematic review of the qualitative literature on barriers to high-quality prenatal and postpartum care among low-income women. *Health Services Research*, **57**, 775–785. <https://doi.org/10.1111/1475-6773.14008>
- Berghella V. (2012). TSFM-FMPC: Progesterone and preterm birth prevention: Translating clinical trials data into clinical practice. *American Journal of Obstetrics and gynecology*. 206(5): 376-386.

Berhan, Y. and Berhan, A. (2014) A Meta-Analysis of Selected Maternal and Fetal Factors for Perinatal Mortality. Ethiopian Journal of Health Sciences, 24, 55-68. <https://doi.org/10.4314/ejhs.v24i0.6S>

Blencowe H, C S, Chou D, Oestergraard M, Say L, Moller AB, Kinney M, Law J. (2013). 15 million preterm birth; Priorities for action based on national and global estimates, Reproductive Health.

Blencowe H, Cousens S, Oestergaard MZ, Chou D, Moller AB, Narwal R, Adler A, Vera Garcia C, Rohde S, Say L, Lawn JE. (2012). National, regional, and worldwide estimates of preterm birth rates in the year 2010 with time trends since 1990 for selected countries: a systematic analysis and implications. Lancet. 9;379(9832):2162-72. doi: 10.1016/S0140-6736

Chang HH, L J, Blencowe H, Spong CY, Howson CP, Cairns-Smith S, Lackritz EM, Lee SK, Mason E, Serazin AC, Walani S, Simpson JL, Lawn JE. (2013). Born too soon preterm prevention analysis group: preventing preterm birth: analysis of the trends and potential reductions with intervention in 39 countries with very high human development index. The lancet. 381(9862):223-234. 10.1016/S0140-6736(12)61856-X.

Chawanpaiboon, S., Vogel, J.P., Moller, A., Lumbiganon, P., Petzold, M., Hogan, D., Landoulsi, S., Jampathong, N., Kongwattanakul, K., Lopaiboon, M., Lewis, C. et al., (2019). Global, regional, and national estimates of levels of preterm birth in 2014: a systematic review and modelling analysis. The Lancet Global Health, Volume 7, Issue 1, e37 - e46.

Caira-Chuquineyra B, Fernandez-Guzman D, Meza-Gómez A, Luque-Mamani BM, Medina-Carpio SL, Mamani-García CS, Romani-Peña M, Díaz-Vélez C. (2023). Prevalence and factors associated with adolescent pregnancy among sexually active adolescent girls in Peru: Evidence from Demographic and Family Health Survey, 2015-2019. F1000Res. 11:566. doi: 10.12688/f1000research.108837.2.

Cantarutti, A., Rescigno, P., Borso, C., Doblas, J., Bressan, S., Barbieri, E., et al. (2024). Association Between Early-Life Exposure to Antibiotics and Development of Child Obesity: Population-Based Study in Italy. JMIR PUBLIC HEALTH AND SURVEILLANCE, 10 [10.2196/51734].

This work is licensed under a [Creative Commons Attribution 4.0 Unported License](#)

ISSN: 3043-6087. Science and Education Development Inst., Nigeria

Carlson SE, C J, Gajewski BJ, Gustafson KM, Mundy D, Yeast J, Georgieff MK, Markley LA, Kerling EH, Shaddy DJ. (2013). DHA supplementation and pregnancy outcomes. *Am J Clin Nutr.*, 97(4): 808-815. 10.3945/ajcn.112.050021.

Gamberini, C., Angeli, F. & Ambrosino, E. Exploring solutions to improve antenatal care in resource-limited settings: an expert consultation. *BMC Pregnancy Childbirth* **22**, 449 (2022). <https://doi.org/10.1186/s12884-022-04778-w>

Goldfeld, S., O'Connor, M., Cloney, D., Gray, S., Redmond, G., Badland, H., Williams, K., Mensah, F., Woolfenden, S., Kvalsvig, A., & Kochanoff, A. T. (2018). Understanding child disadvantage from a social determinants perspective. *Journal of Epidemiology and Community Health*, **72**(3), 223–229. <https://doi.org/10.1136/jech-2017-209036>

Goya M, P L, Mercod C, Rodo C, Valle L. (2012). On behalf of the Pesario Cervical para Evita Prematuridad (PECEP) trial group: Cervical pessary in pregnant women with a short cervix (PECEP): an open-label randomize controlled trial. *The Lancet*. 379(9828): 1800-1806. 10.1016/S0140-6736(12)60030-0.

Haider BA, Bhutta ZA. (2017). Multiple-micronutrient supplementation for women during pregnancy. *Cochrane Database Syst Rev*. 13;4(4): doi: 10.1002/14651858.CD004905.pub5.

Heidkamp R; NEP Working Group. The National Evaluation Platform for Maternal, Newborn, and Child Health, and Nutrition: From idea to implementation. *J Glob Health*. 2017 Dec;7(2):020305. doi: 10.7189/jogh.07.020305.

Hentschel, R., Bohlin, K., van Kaam, A. *et al.* (2020). Surfactant replacement therapy: from biological basis to current clinical practice. *Pediatr Res* **88**, 176–183. <https://doi.org/10.1038/s41390-020-0750-8>

Holbrook AM, Kaltenbach KA. (2011). Effectiveness of a smoking cessation intervention for methadone-maintained women: a comparison of pregnant and parenting women. *International Journal of Pediatric*. 567056

Iams JD, R R, Culhane JF, Goldenberg RL. (2008). Primary, Secondary, and tertiary interventions to reduce the morbidity and mortality of preterm birth. *Lancet*. 12;371(9607):164-75. doi: 10.1016/S0140-6736(08)60108-7

Kpordoxah MR, Issah AN, Yeboah D, Mruts KB, Boah M. (2023). Assessing the association between an early and recommended number of focused antenatal care visits and the number of prenatal care content received before delivery in Ethiopia. *PLoS One*. 18(3):e0282694. doi: 10.1371/journal.pone.0282694.

Lattof SR, Moran AC, Kidula N, Moller AB, Jayathilaka CA, Diaz T, Tunçalp Ö. (2020). Implementation of the new WHO antenatal care model for a positive pregnancy experience: a monitoring framework. *BMJ Glob Health*. 5(6):e002605. doi: 10.1136/bmjgh-2020-002605.

Lawn JE, Kerber K, Enweronu-Laryea C, Cousens S. (2010). 3.6 million neonatal deaths--what is progressing and what is not? *Semin Perinatol*. 34(6):371-86. doi: 10.1053/j.semperi.2010.09.011.

Lewis SJ, Arseneault L, Caspi A, Fisher HL, Matthews T, Moffitt TE, Odgers CL, Stahl D, Teng JY, Danese A 2019). The epidemiology of trauma and post-traumatic stress disorder in a representative cohort of young people in England and Wales. *Lancet Psychiatry*. 6(3):247-256. doi: 10.1016/S2215-0366(19)30031-8.

Liu L, Oza S, Hogan D, Perin J, Rudan I, Lawn JE, Cousens S, Mathers C, Black RE. Global, regional, and national causes of child mortality in 2000-13, with projections to inform post-2015 priorities: an updated systematic analysis. *Lancet*. 385(9966):430-40. doi: 10.1016/S0140-6736(14)61698-6.

McLeish J, Redshaw M. (2019). Maternity experiences of mothers with multiple disadvantages in England: A qualitative study. *Women Birth*. 32(2):178-184. doi: 10.1016/j.wombi.2018.05.009.

Medicine IO. (2007). *Preterm Birth: Causes, consequences, and Prevention*. Washington, DC: National Academy Press.

This work is licensed under a [Creative Commons Attribution 4.0 Unported License](https://creativecommons.org/licenses/by/4.0/)

ISSN: 3043-6087. Science and Education Development Inst., Nigeria

- Menon R. (2008). Spontaneous preterm birth, a clinical dilemma: etiologic, pathophysiologic and genetic heterogeneities and racial disparity. *Acta obstetrician et gynecological Scandinavica*: 2008, 87 (6): 590-600. 10.1080/00016340802005126
- Moore ML. (2002). Preterm birth: a continuing challenge. *The journal of perinatal Education*. 11 (4): 37-40
- Moster D, Lie RT, Markestad T. (2008). Long-term medical and social consequences of preterm birth. *N Engl J Med.*, 359(3):262-73. doi: 10.1056/NEJMoa0706475.
- Nagatani, S., Horiuchi, S., Takahashi, K. *et al.* (2023). Risk of low birthweight associated with the timing and frequency of antenatal care visits in Lao PDR: a retrospective cohort study. *BMC Pregnancy Childbirth* **23**, 119. <https://doi.org/10.1186/s12884-023-05442-7>
- NICE (2008). Antenatal care: Routine care for healthy pregnant woman. London, UK. 2008
- Parets SE, Conneely KN, Kilaru V, Fortunato SJ, Syed TA, Saade G, Smith AK, Menon R. (2013). Fetal DNA Methylation Associates with Early Spontaneous Preterm Birth and Gestational Age. *PLoS One*. 27;8(6):e67489. doi: 10.1371/journal.pone.0067489.
- Penman, S.V., Beatson, R.M., Walker, E.H., Goldfied, S., Molloy, E.S. (2023). Barriers to accessing and receiving antenatal care: Findings from interviews with Australian women experiencing disadvantage. *EMPIRICAL RESEARCH QUALITATIVE*. 79(12). 4672-4686
- Pervin J, Rahman SM, Rahman M, Aktar S, Rahman A. (2020). Association between antenatal care visit and preterm birth: a cohort study in rural Bangladesh. *BMJ Open*. 10(7):e036699. doi: 10.1136/bmjopen-2019-036699.
- Requejo J, Merialdi, M., Althabe, F., Keller, M., Katz, J., Menon, R. (2013). Born Too Soon: Care during pregnancy and childbirth to reduce preterm deliveries and improve health outcomes of the preterm baby. *Reproductive Health* 2013, 10(Suppl 1):S4.
- Serra V,P A, Mesequer J, Parrilla JJ, Lara C, Bellver J, Grifol R, Alcover I, Sala M, Martinez-Escoriza JC, Pellicer A. (2013). Increased doses of vaginal progesterone for the prevention

This work is licensed under a [Creative Commons Attribution 4.0 Unported License](#)

ISSN: 3043-6087. Science and Education Development Inst., Nigeria

of preterm birth in twin pregnancies: a randomized controlled double-blind multicenter trial. *BJOG*. 120 (1): 50-57. 10.1111/j.1471-0528.2012.03448.x.

Shaheen R, Roy M, Anny A, Shova NY, Hema TJDSA HMJ. (2020). Prevalence of low birth weight in urban Dhaka and its association with maternal age and socioeconomic status. *PLoS One*. 2:162-6. Doi: 10.2991/dsahmj.k.200905.001.

Tafere TE, Afework MF, Yalew AW. (2018). Providers adherence to essential contents of antenatal care services increases birth weight in Bahir Dar City Administration, north West Ethiopia: a prospective follow up study. *Reprod Health*. 15(1):163.

Tayebi, N., Omid, A., Chahkhoei, Z. Z.M., Maryam-Askary, N., Najafi, K., Aliravari, H., Haghshenas, A. (2019). Barriers standards of professional ethics in clinical care from the perspective of nurses. *Revista Latinoamericana de Hipertensión*, 14(3): 265-273

Teune MJ, Bakhuizen S, Gyamfi Bannerman C, Opmeer BC, van Kaam AH, van Wassenaer AG, Morris JM, Mol BW. (2011). A systematic review of severe morbidity in infants born late preterm. *Am J Obstet Gynecol*. 205(4):374.e1-9. doi: 10.1016/j.ajog.2011.07.015.

Uwimana, G., Elhoumed, M., Gebremedhin, M.A. *et al*. Association between quality antenatal care and low birth weight in Rwanda: a cross-sectional study design using the Rwanda demographic and health surveys data. *BMC Health Serv Res* **23**, 558 (2023). <https://doi.org/10.1186/s12913-023-09482-9>

Vogel, J.P., Habib, N.A., Souza, J.P. *et al*. (2013). Antenatal care packages with reduced visits and perinatal mortality: a secondary analysis of the WHO Antenatal Care Trial. *Reprod Health* **10**, 19. <https://doi.org/10.1186/1742-4755-10-19>.

Wastnedge EAN, Reynolds RM, van Boeckel SR, Stock SJ, Denison FC, Maybin JA, Critchley HOD. (2021). Pregnancy and COVID-19. *Physiol Rev*. 2021 Jan 1;101(1):303-318. doi: 10.1152/physrev.00024.2020.

World Health Report (2005). Make every mother and child count. WHO Library Cataloguing-in-Publication Data.

This work is licensed under a [Creative Commons Attribution 4.0 Unported License](#)

ISSN: 3043-6087. Science and Education Development Inst., Nigeria

WHO (2016). World Health Organization. *Organization. Chapter 4. Implementation of the ANC guideline and recommendations. In WHO Recommendations on Antenatal Care for a Positive Pregnancy Experience p.105 (World Health Organization, Geneva. 6*

Zhou H, Wang A, Huang X, Guo S, Yang Y, Martin K, Wang Y. (2019). Quality antenatal care protects against low birth weight in 42 poor counties of Western China. PloS one. 14(1):e0210393.