

Intrapartum Obstetric Complications of Home Birth Versus Hospital Birth Among Sudanese Women Ad-Damar City, River Nile State January 2021 – June 2021

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Abstract

Background: A home birth is a birth that takes place in a residence rather than in a hospital or a birthing center.

Objective: To study intrapartum maternal and fetal complication of home birth versus hospital birth. **Method:** This was a cross-sectional, prospective hospital-based and community-based study, conducted at Ad-Damar Teaching Hospital. The study sample was 700 women fulfilled inclusion criteria of the study. The study sample included 327 delivered at home and 373 delivered at hospital. Data was collected using a questionnaire filled with women after taking informed consent.

Results: The most common socio-demographic differences, women delivered at home aged > 39 years 123(37.6%), 160(78.9%) illiterate, and 254(77.7%) from rural areas, while women delivered at hospital the common age was 20 – 29 years 283(75.9%), mostly had secondary education 138(37%) and 216(57.9%) from urban areas (P value < 0.05). women delivered at hospital 215(65.7%) were referred to hospital. The causes of refer to the hospital were obstructed labor 73(36.3%) prolonged labor 63(29.3%), postpartum hemorrhage 44(20.4%) and retained placenta 30(14%). Among women delivered at home maternal complications were reported in 247(75.5%) compared to 71(19%) of the women delivered at hospital. The common postpartum complication in women delivered at home were postpartum hemorrhage 44(24.4%), delay of second stage of labor 31(9.5%), retained placenta 30(9.2%) and cervical tear 28(8.6%). These complications reported in 11(2.9%), 18(4.8%) and 4(1.1%) respectively of the women delivered at hospital (P = 0.011 < 0.05). Alive babies (bedside mother) were 261(79.8%) for the women delivered at home compared to 353(94.6%) in women delivered at hospital. Neonatal intensive care admission 51(15.6%), deaths 15(4.6%) in the babies of women delivered at home compared to 18(4.8%) and 2(0.5%) of the women delivered at hospital (P = 0.014 < 0.05). **Conclusion:** The study concluded that home birth was significantly associated with maternal complications such as postpartum hemorrhage, retained placenta and obstructed labor. In addition, fetal deaths and admission to neonatal intensive care unit was significantly common among women delivered at home than in women delivered at hospital.

Keywords: Home Delivery; Sudan; River Nile State; Obstetrics and Gynaecology; Napata College;

Introduction

An ongoing debate regarding where birth ought to take place (at home, in hospice, etc..) is ever ongoing as some might argue that forcing hospital births may be a violation of the parents' rights, however, undesirable outcomes of home delivery, such as high maternal and perinatal mortality, are documented in developing countries ^[1].

Approximately 800 women die each day from causes related to pregnancy and childbirth, 99% of said deaths take place in developing countries, and most can be avoided with immediate and effective professional care during and after delivery. Although home births could be, and many times is, safe, delivery in hospital is advocated in most countries. This is justified by the ability for professionals to address any emergency promptly. As a result, hospital delivery is recognized as an effective strategy in reducing maternal and perinatal mortality, as well as improving the health and well-being of the mothers and newborns ^[2].

A plethora of factors affecting the utilization of maternal care including maternal, familial and social factors, policy interventions, and health facility factors. While there are studies that looked into the demanding factors, social/provision factors remain poorly understood ^[3].

The third Sustainable Development Goal is focused on reducing rates of maternal mortality ^[4]. Some progress was achieved in reducing maternal mortality during the era of Millennium Development Goals. However, a number of nations, especially in sub-Saharan Africa, failed to meet targets of this goal. Globally, maternal deaths dropped over 40% between the years 1990 and 2015 ^[5]. In 2015, almost all global maternal deaths (99%) occurred in developing countries, with sub-Saharan Africa accounting for around two-thirds of that statistic. 63% of maternal deaths occur intrapartum or postpartum; ergo, it seems fair to assume that access to high quality skilled care around the time of childbirth can reduce maternal mortality ^[6].

The World Health Organization (WHO) noted that 75% of maternal deaths occur as a result of avoidable causes including severe bleeding, sepsis, pre-eclampsia, unsafe abortion and complications in childbirth. Approximately, two-thirds of women die in Ghana due to similar causes ^[7]. The United Nations Population Fund (UNFPA) reported that maternal deaths in Ghana could be reduced by 90% if expectant mothers were provided access to emergency healthcare ^[8].

In 2015, the SDGs negotiated new targets of reducing the maternal deaths ratio to less than 70 per 100,000 live births, as well as ending preventable deaths of newborns by 2030 ^[9]. There are two maternal healthcare strategies proposed in the renewed commitments to stakeholders, with a high potential for preventing avoidable obstetric deaths: skilled attendance at birth and emergency obstetric healthcare ^[10]. These measures are promoted through effective antenatal education and efficient management of referrals, coupled with adequate skilled healthcare professional attendance to both normal childbirths and those with obstetric

complications. In many countries, these interventions form part of the birth preparedness and complication readiness (BPCR) strategy, a component of the antenatal care (ANC) programme ^[11].

Although factors such as social, economic and cultural issues impact on the use of ANC and implementation of BPCR, there are also 'supply side' (healthcare provider factors) barriers to improving maternal health outcomes. These include commodities/logistics (drugs and non-drug consumables and medical equipment), skilled human resources, appropriate technology and the capacity to handle maternity cases ^[12]. Availability of accessible emergency obstetric services (such as parenteral oxytocics, antibiotics and anticonvulsants, assisted deliveries, manual extraction of the placenta, blood transfusions and so on) are mandatory for the continuum of quality maternity healthcare. Preference for facility-based childbirth can be high when there is the appropriate quality of care, with the necessary medical facilities, such as equipment for surgery and blood transfusion services ^[13]. For childbirth to be called skilled birth, the attendant must receive training from an accredited health institution and be licensed to practice. The inadequacy of trained healthcare workers, including midwives, was identified as a significant barrier to improved maternal and neonatal health (MNH) outcomes. Although public and private sector efforts have recently increased the numbers of skilled birth attendants (SBAs) on the global front, the opposite exists in some Sub-Saharan Africa (SSA) countries. There, the nurse/midwife to population ratio was estimated by the World Bank (for the periods of 2008–2014) as 0.9 per 1000 for Ghana and less than 1 to over 95 000 people in the study area since 2010, compared with the global standard of 4.45 per 1000 people ^[14].

Some qualitative studies have reported that distance to health facilities, urgent deliveries, lack of transport means, lack of money to cover indirect costs, decision by husband on place of delivery and fear of a caesarean section were barriers to institutional childbirth ^[15].

A quantitative study has revealed that women's education, 3 of antenatal care (ANC), experience of complications during pregnancy, and living in urban areas were positively associated with use of skilled birth attendants ^[16].

Skilled birth attendants (SBAs) play an important role in reducing maternal and neonatal mortality because they provide timely obstetric and newborn care for life-threatening complications ^[17]. This amended policy helps develop safe motherhood programs, protocols, and human resources production, focusing mainly on expanding and improving maternal care at central and peripheral health institutions ^[18].

Literature Review

Home birth: A home birth is a birth that takes place in a residence rather than in a hospital or a birthing center. They may be attended by a midwife, or lay attendant with experience in managing home births. Home

birth was, until the advent of modern medicine, the de facto method of delivery. The term was coined in the middle of the 19th century as births began to take place in hospitals [19].

Women with access to high-quality medical care may choose home birth because they prefer the intimacy of a home and family-centered experience, to avoid risks related to in-hospital births, or desire to avoid a medically centered experience typical of a hospital, among other reasons. Professionals attending home births can be obstetricians, certified or uncertified midwives, and doulas. In developing countries, where women may not be able to afford medical care or it may not be accessible to them, a home birth may be the only option available, and the woman may or may not be assisted by a professional attendant of any kind [20].

Multiple studies have been performed concerning the safety of home births for both the child and the mother. Standard practices, licensing requirements and access to emergency hospital care differ between regions making it difficult to compare studies across national borders. A 2014 US survey of medical studies found that perinatal mortality rates were triple that of hospital births, and a US nationwide study over 13 million births on a 3-year span (2007–2010) found that births at home were roughly 10 times as likely to be stillborn (14 times in first-born babies) and almost four times as likely to have neonatal seizures or serious neurological dysfunction when compared to babies born in hospitals, while a 2007 UK survey found that perinatal mortality rates were only slightly higher in that country than planned hospital births for low-risk pregnancies. Higher maternal and infant mortality rates are associated with the inability to offer timely assistance to mothers with emergency procedures in case of complications during labor, as well as with widely varying licensing and training standards for birth attendants between different states and countries [21].

Types of home birth: Home births are attended or unattended, planned or unplanned. Women are attended when they are assisted through labor and birth by a professional, usually a midwife, and rarely a general practitioner. Women who are unassisted or only attended by a lay person, perhaps a doula, their spouse, family, friend, or a non-professional birth attendant, are sometimes called freebirths. A "planned" home birth is a birth that occurs at home by intention. An "unplanned" home birth is one that occurs at home by necessity but not with intention. Reasons for unplanned home births include inability to travel to the hospital or birthing center due to conditions outside the control of the mother such as weather or road blockages or speed of birth progression [22].

Factors behind home birth: Many women choose home birth because delivering a baby in familiar surroundings is important to them. Others choose home birth because they dislike a hospital or birthing center environment, do not like a medically centered birthing experience, are concerned about exposing the infant to hospital-borne pathogens, or dislike the presence of strangers at the birth. Others prefer home birth because they feel it is more natural and less stressful. In a study published in the *Journal of Midwifery and Women's*

Health, women were asked, *Why did you choose a home birth?* The top five reasons given were safety, avoidance of unnecessary medical interventions common in hospital births, previous negative hospital experiences, more control, and a comfortable and familiar environment. One study found that women experience pain inherent in birth differently, and less negatively, in a home setting ^[23].

Cost is also a factor. The estimated average cost of a home birth in the United States in 2021 was \$4,650, compared with \$13,562 for a vaginal hospital birth. In developing countries, where women may not be able to afford medical care or it may not be accessible to them, a home birth may be the only option available, and the woman may or may not be assisted by a professional attendant of any kind ^[24].

Some women may not be able to have a safe birth at home, even with highly trained midwives. There are some medical conditions that can prevent a woman from qualifying for a home birth. These often include heart disease, renal disease, diabetes, preeclampsia, placenta previa, placenta abruption, antepartum hemorrhage after 20 weeks gestation, and active genital herpes. Prior cesarean deliveries can sometimes prevent a woman from qualifying for a home birth, though not always. It is important that a woman and her health care provider discuss the individual health risks prior to planning a home birth ^[25].

Trends of home birth: Home birth was, until the advent of modern medicine, the *de facto* method of delivery. In many developed countries, home birth declined rapidly over the 20th century. In the United States there was a large shift towards hospital births beginning around 1900, when close to 100% of births were at home. Rates of home births fell to 50% in 1938 and to less than 1% in 1955. However, between 2004 and 2009, the number of home births in the United States rose by 41% ^[26]. In the United Kingdom a similar but slower trend happened with approximately 80% of births occurring at home in the 1920s and only 1% in 1991. In Japan the change in birth location happened much later, but much faster: home birth was at 95% in 1950, but only 1.2% in 1975 ^[27]. In countries such as the Netherlands, where home births have been a regular part of the maternity system, the rate for home births is 20% in 2014 ^[28]. Over a similar time period, maternal mortality during childbirth fell during 1900 to 1997 from 6–9 deaths per thousand to 0.077 deaths per thousand, while the infant mortality rate dropped between 1915 and 1997 from around 100 deaths per thousand births to 7.2 deaths per thousand ^[29].

Home birth versus hospital delivery: In 2014, a comprehensive review in the *Journal of Medical Ethics* of 12 previously published studies encompassing 500,000 planned home births in low-risk women found that neonatal mortality rates for home births were triple those of hospital births ^[30]. This finding echoes that of the American College of Obstetricians and Gynecologists. Due to a greater risk of perinatal death, the College advises women who are postterm (greater than 42 weeks gestation), carrying twins, or have a breech presentation not to attempt home birth ^[31]. The *Journal of Medical Ethics* review additionally found that

several studies reported that home births had a higher risk of failing Apgar scores in newborns, as well as a delay in diagnosing hypoxia, acidosis and asphyxia. This contradicts a 2007 UK review study by the National Institute for Health and Clinical Excellence (NICE), which expressed concern for the lack of quality evidence in studies comparing the potential risks and benefits of home and hospital birthing environments in the UK. Their report noted low numbers of intrapartum-related perinatal mortality in the UK, but that in cases of unanticipated obstetric complications, the mortality rate was higher for home births due to the time needed to transfer the mother to an obstetric unit [32].

The uncertain evidence suggests intrapartum-related perinatal mortality (IPPM) for booked home births, regardless of their eventual place of birth, is the same as, or higher than for birth booked in obstetric units. If IPPM is higher, this is likely to be in the group of women in whom intrapartum complications develop and who require transfer into the obstetric unit. When unanticipated obstetric complications arise, either in the mother or baby, during labor at home, the outcome of serious complications is likely to be less favorable than when the same complications arise in an obstetric unit [33].

A 2002 study of planned home births in the state of Washington found that home births had shorter labors than hospital births. In North America, a 2005 study found that about 12 percent of women intending to give birth at home needed to be transferred to the hospital for reasons such as a difficult labor or pain relief [34].

Both the *Journal of Medical Ethics* and NICE report noted that usage of caesarean sections were lower for women who give birth at home, and both noted a prior study that determined that women who had a planned home birth had greater satisfaction from the experience when compared with women who had a planned birth in a hospital [35].

In 2009 a study of 500,000 low-risk planned home and hospital births in the Netherlands, where midwives have a strong licensing requirement, was reported in the *British Journal of Obstetrics and Gynaecology*. The study concluded that for low-risk women there was no increase in perinatal mortality, provided that the midwives were well-trained and there was easy and quick access to hospitals. Further, the study noted there was evidence that "low risk women with a planned home birth are less likely to experience referral to secondary care and subsequent obstetric interventions than those with a planned hospital birth [36]. "The study has been criticized on several grounds, including that some data might be missing and that the findings may not be representative of other populations" [37].

In 2012, Oregon performed a study of all births in the state during the year as a part of discussing a bill regarding licensing requirements for midwives in the state. They found that the rate of intrapartum infant mortality was 0.6 deaths per thousand births for planned hospital births, and 4.8 deaths per thousand for planned home births. They further found that the death rate for planned home births attended by direct-entry midwives was 5.6 per thousand. The study noted that the statistics for Oregon were different for other areas, such as British Columbia, which had different licensing requirements ^[38]. Oregon was noted by the Centers for Disease Control and Prevention as having the second-highest rate of home births in the nation in 2009, at 1.96% compared to the national average of 0.72% ^[39]. A 2014 survey of nearly 17,000 voluntarily reported home births in the United States between 2004 and 2010 found an intrapartum infant mortality rate of 1.30 per thousand; early neonatal and late neonatal mortality rates were a further 0.41 and 0.35 per thousand. The survey excluded congenital anomaly-related deaths, as well as births where the mother was transferred to a hospital prior to beginning labor ^[40].

Babies born at home are roughly 10 times as likely to have an Apgar score of 0 after 5 minutes and almost four times as likely to have neonatal seizures or serious neurological dysfunction when compared to babies born in hospitals. The study findings showed that the risk of Apgar scores of 0 is even greater in first-born babies—14 times the risk of hospital births. The study results were confirmed by analyzing birth certificate files from the U.S. Centers for Disease Control and Prevention (CDC) and the National Center for Health Statistics. Given the study's findings, Dr. Amos Grunebaum, professor of clinical obstetrics and gynecology at Weill Cornell Medical College and lead author of the study, stated that the magnitude of risk associated with home delivery is so alarming that necessitates the need for the parents-to-be to know the risk factors. Another author, Dr. Frank Chervenak, added that the study underplayed the risks of home births, as the data used counted home births where the mother was transferred to a hospital during labor as a hospital birth ^[41,42].

2022 study, which examined the introduction of maternity wards in Sweden, found that the wards substantially reduced home deliveries and early neonatal mortality, as well as positive long-term effects on labor income, unemployment, health-related disability and schooling for individuals born in maternity wards ^[43].

Hutton, et al evaluated different birth settings by comparing neonatal mortality, morbidity and rates of birth interventions between planned home and planned hospital births in Ontario, Canada. They compared 11 493 planned home births and 11 493 planned hospital births. The risk of our primary outcome did not differ

significantly by planned place of birth (relative risk [RR] 1.03, 95% confidence interval [CI] 0.68–1.55). These findings held true for both nulliparous (RR 1.04, 95% CI 0.62–1.73) and multiparous women (RR 1.00, 95% CI 0.49–2.05). All intrapartum interventions were lower among planned home births ^[44].

Janssen et al compared the outcomes of planned home births attended by midwives with those of planned hospital births attended by midwives or physicians. The rate of perinatal death per 1000 births was 0.35 (95% confidence interval [CI] 0.00–1.03) in the group of planned home births; the rate in the group of planned hospital births was 0.57 (95% CI 0.00–1.43) among women attended by a midwife and 0.64 (95% CI 0.00–1.56) among those attended by a physician. Women in the planned home-birth group were significantly less likely than those who planned a midwife-attended hospital birth to have obstetric interventions (e.g., electronic fetal monitoring, relative risk [RR] 0.32, 95% CI 0.29–0.36; assisted vaginal delivery, RR 0.41, 95% CI 0.33–0.52) or adverse maternal outcomes (e.g., third- or fourth-degree perineal tear, RR 0.41, 95% CI 0.28–0.59; postpartum hemorrhage, RR 0.62, 95% CI 0.49–0.77). The findings were similar in the comparison with physician-assisted hospital births. Newborns in the home-birth group were less likely than those in the midwife-attended hospital-birth group to require resuscitation at birth (RR 0.23, 95% CI 0.14–0.37) or oxygen therapy beyond 24 hours (RR 0.37, 95% CI 0.24–0.59). The findings were similar in the comparison with newborns in the physician-assisted hospital births; in addition, newborns in the home-birth group were less likely to have meconium aspiration (RR 0.45, 95% CI 0.21–0.93) and more likely to be admitted to hospital or readmitted if born in hospital (RR 1.39, 95% CI 1.09–1.85) ^[45].

van der Kooy, et al compared the mode of delivery between planned home versus planned hospital births and to determine if differences in intervention rates could be interpreted as over- or undertreatment. The intervention rate was lower in planned home compared to planned hospital births (10.9% 95% CI 10.8–11.0 vs. 13.8% 95% CI 13.6–13.9). Intended place of birth had significant impact on the likelihood to intervene after adjustment (planned homebirth (OR 0.77 95% CI. 0.75–0.78)). The mortality rate was lower in planned home births (0.15% vs. 0.18%). After adjustment, the interaction term home- intervention was significant (OR 1.51 95% CI 1.25–1.84). In risk groups, a higher perinatal mortality rate was observed in planned home births ^[46].

Wax et al systematically review the medical literature on the maternal and newborn safety of planned home vs planned hospital birth. Planned home births were associated with fewer maternal interventions including epidural analgesia, electronic fetal heart rate monitoring, episiotomy, and operative delivery. These women

were less likely to experience lacerations, hemorrhage, and infections. Neonatal outcomes of planned home births revealed less frequent prematurity, low birthweight, and assisted newborn ventilation. Although planned home and hospital births exhibited similar perinatal mortality rates, planned home births were associated with significantly elevated neonatal mortality rates ^[47].

Snowden et al reported that Planned out-of-hospital birth was associated with a higher rate of perinatal death than was planned in-hospital birth (3.9 vs. 1.8 deaths per 1000 deliveries, $P=0.003$; odds ratio after adjustment for maternal characteristics and medical conditions, 2.43; 95% confidence interval, 1.37 to 4.30; adjusted risk difference, 1.52 deaths per 1000 births; 95% CI, 0.51 to 2.54). The odds for neonatal seizure were higher and the odds for admission to a neonatal intensive care unit lower with planned out-of-hospital births than with planned in-hospital birth. Planned out-of-hospital birth was also strongly associated with unassisted vaginal delivery (93.8%, vs. 71.9% with planned in-hospital births; $P<0.001$) and with decreased odds for obstetrical procedures ^[48].

Jakhar R. and Choudhary identified the pattern of Obstetric referral to our hospital and the primary reasons for referral in India. They found that out of a total of 10172 delivered patients, 1014 (9.96%) cases were referred patients. Maximum cases i.e. 713 (70.3%) were in the age group of 21-30. Most of the cases 678 (66.86%) did not receive any treatment at referral hospital before being referred. Only 27.52% patients were referred with referral slips/chit etc., having adequate information and 40.24% of cases were delayed referrals. 183 (18.04%) patients required intensive care unit admission ^[49].

Qureshi et al in Pakistan found that of the 634 obstetric referrals, 279(44%) patients were referred to the study site, while 355(56%) sought care in other hospitals. Of those patients who were referred to the hospital, medical records of 195(69.9%) were available for review. The mean age of the participants was 28 ± 4.7 years. Obstetric complications led to 122(61%) referrals. The top three reasons among these were pregnancy-induced hypertension, preterm labor and fetal causes. Medical causes such as viral infections were the cause of 50(27%) referrals. Moreover, 177(91%) patients were pregnant at the time of referral and the remaining 18(9%) were referred after delivery. Of the pregnant women, 133(75%) delivered at the study site. Caesarean section was the mode in 92(69%) deliveries. There was 1(0.75%) maternal death due to puerperal sepsis while 9(7%) neonatal deaths were recorded ^[50].

Onwudiegwu and Ezechi examined the nature of emergency obstetric admissions in a Nigerian university

hospital in association with such factors as late referrals and misdiagnoses and their contribution to maternal and perinatal morbidity/mortality. Referrals to the university hospital were made only after prolonged delay and onset of complications. Obstetric hemorrhage (24.6%) was the most common cause for referral followed by labor disorders (19%) and hypertensive disorders (8.4%). Thirteen maternal deaths occurred, giving a maternal mortality ratio of 6.2%, while perinatal mortality rate was 461 per 1000 births. Twelve of the maternal deaths were in women living within 5 km of the hospital. There was a caesarean section rate of 50.9%, a 4.8% incidence of diagnostic laparotomy, a 9% incidence of emergency hysterectomy and 44% of emergency blood transfusions. Misdiagnoses of clinical conditions were made by the referring centers in 68% of cases, which contributed to the high maternal morbidity and mortality. Patient attitude was the main cause of non-use of teaching hospital facilities (fear of operation in 32% of cases, dissuasive advice from friends in 27.4% and negative staff attitude in 7%) [51].

Yaya et al examined the association between women's choice of health facility delivery with their SES. They showed that in proportion of women delivering at home was higher than of delivery at a health facility. Overall percentage of women who delivered at health facility was 39.8%, with the rate being substantially higher among urban (67.8%) compared with their rural (30.2%) counterparts. Percentage of delivering at home was highest in Oio region (23.8%) and that of delivery at a health facility was highest in the Sector Autónomo de Bissau region (18.7%). In the multivariable analysis, women in urban areas compared those who had no education, those who had primary and secondary/higher level of education were 2.2 and 3.3 times more likely to deliver at a health facility. The odds of facility were also highest among the women from the richest households, 5.3 and 5 times among urban and rural women, respectively [52].

Chowdhury et al assessed socio-demographic determinants of UTBA assisted home delivery in rural Bangladesh. Mothers residing in rural Bangladesh, who gave valid information on both delivery place and assistance during delivery, were included in this study (n = 4983). Binary logistic regression model was used to explore factors influencing home delivery assisted by untrained traditional birth attendant. Most of the mothers (79%) reported to have delivered at home and of these home deliveries, 76% were assisted by untrained traditional birth attendant. In multivariate regression model, it is found that the odds of UTBA assisted home delivery decreased with mother's education, husband's education, higher wealth index, number of Antenatal Care (ANC) visits and media exposure [53].

Problem Statement: Home birth can be safe for women at low risk and emotionally satisfying to the mother

and family, but there is potential risk for home birth including failure of progress, fetal distress, inadequate analgesia, bleeding, and neonatal complications, hospital transfer with risk of delay lead to worse outcome. Hospital birth associated with low maternal and perinatal mortality but associated with more intervention.

Justification: Evaluation of the intrapartum complication need to resolve and decrease maternal and prenatal mortality at home and hospital birth. Counseling mother with high risk that hospital delivery is safer, if low risk mothers and she wishes to have home birth, she should be counseled with full information about the increase in perinatal mortality and possibility to hospital transfer. Home birth can have a good outcome for mother and baby when a trained midwife attends the delivery, and arrangement for transfer to hospital in cases of any complication, providing support and care during delivery and immediate postnatal period.

Objectives

General objective To study intrapartum maternal and fetal complication of home birth versus hospital birth.

Specific objectives

1. To compare between home birth and hospital birth according to sociodemographic data.
2. To determine causes of the referral from home to hospital birth.
3. To determine intrapartum maternal complication of home birth and hospital birth.
4. To determine fetal complication of home birth and hospital birth.
5. To identify postpartum complication of home birth and hospital birth.

Research Methodology

Study design: This is a cross sectional a prospective hospital based and community-based study.

Study area: The study was conducted in Ad-Damer City at River Nile State. Ad-Damer is the capital city of the state.

Study duration: The study conducted was conducted during the period of 6 months.

Study population: All women who are childbearing at the aforementioned city during the study period.

Inclusion criteria: Childbearing women who accept to participate.

Exclusion criteria: Refusal to participate in the study.

Sample size

Sample size was calculated by the following equation:

$$n = \frac{N}{1+N(d)^2}$$

Where:

n = Sample size.

N = The estimated number of child birth

d=margin variable.

The sample size was 700.

2.5.2 Sampling technique: Systematic random sampling technique was used to select the sample. The sample size included 327 women delivered at home and 373 women delivered at hospital.

Data collection tools: Data was collected using a questionnaire that fulfills the objective of the study. The questionnaire contains questions about socio-demographic data (age, education, occupation), parity, duration of labor, maternal complication, satisfaction.

Study variables: Independent variables: about socio-demographic data (age, education, and occupation), parity.

Dependent variables duration of labor, maternal complications, satisfaction.

Statistical analysis: Data was tabulated and analyzed using the Statistical Package for Social Sciences (SPSS) 0.26. Chi square test was used and significance differences (P value) was adjusted with confidence interval (CI) 95% (P < 0.05 significant, P > 0.05 not significant). Results were analyzed, discussed and recommendations suggested.

Ethical considerations

- Ethical clearance from SMSB Ethical Committee.
- Written consent was obtained from the hospital administration.
- Written consent was obtained from the participants.

Confidentiality of data collected was considered (No names, data was coded; data was interpreted in form of statement tables & figures).

Results:

Women aged > 39 years 123(37.6%) were more likely to deliver at home, while women aged 20 –29 years 283(75.9%) more likely to deliver at hospital ($P = 0.017 < 0.05$) (Table 1).

Table (2) illustrates that illiterates were significantly higher among women who opt to deliver at home (78.9%) while secondary education was more common among women delivered at hospital 138(37%) ($P = 0.26 < 0.05$).

Among women delivered at home housewives were 305(93.3), workers 12(3.6%) and employees 10(3.1%). These occupations were reported in 287(76.9%), 65(17.5%) and 61(5.6%) of the women delivered at hospital (P value = $0.014 < 0.05$) (Figure 1).

Home delivery was found to be significantly associated with rural residence 254(77.7%) versus 157(42.1%) of the women delivered at hospital. On the other hand, 22.3% of the women delivered at home from urban areas compared to 57.9% of the women delivered at home ($P = 0.012 < 0.05$) (Figure 2).

Among women delivered at home irregular ANC 138(42.2%), no ANC 103(31.5%) and regular 86(26.3%). Among women delivered at hospital regular ANC 287(76.9%), irregular 55(14.7%) and no ANC 31(8.4%) ($P = 0.033 < 0.05$) (Figure 3).

Long duration of labor (more than 24 hours) was reported in 87(26.6%) of the women who delivered at home versus 28(7.5%) of the women delivered at hospital ($P = 0.021 < 0.05$) (Table 3).

Among women who delivered at home, maternal complications were reported in 247(75.5%) compared to

71(19%) of the women delivered at hospital. The common complication in women delivered at home were postpartum hemorrhage 44(24.4%), delay of second stage of labor 31(9.5%), retained placenta 30(9.2%) and cervical tear 28(8.6%). These complications reported in 11(2.9%), 18(4.8%), 4(1.1%) and 3(0 respectively of the women delivered at hospital ($P = 0.011 < 0.05$) (Table 4).

Among women delivered at hospital 215(65.7%) were referred to hospital (Figure 4).

The causes of refer to the hospital were obstructed labor 73(36.3%) prolonged labor 63(29.3%), postpartum hemorrhage 44(20.4%) and retained placenta 30(14%) (Figure 5).

Alive babies (bedside mother) were 261(79.8%) for the women delivered at home compared to 353(94.6%) in women delivered at hospital. Neonatal intensive care admission 51(15.6%), deaths 15(4.6%) in the babies of women delivered at home compared to 18(4.8%) and 2(0.5%) of the women delivered at hospital ($P = 0.014 < 0.05$) (Table 5).

Table (1) Distribution of the women according to age

Age	Home delivery		Hospital delivery	
	N	%	N	%
< 20 years	47	14.4	20	5.4
20 - 29 years	111	33.9	283	75.9
30 - 39 years	46	14.1	51	13.7
> 39 years	123	37.6	19	5.1
Total	327	100.0	373	100.0

P value = 0.017 < 0.05

Table (2) Distribution of the women according to educational level

Education	Home delivery		Hospital delivery	
	N	%	N	%
Illiterate	160	48.9	39	10.5
Primary school	92	28.1	166	44.5
Secondary school	69	21.1	138	37.0
University/above	6	1.8	30	8.0
Total	327	100.0	373	100.0

P value = 0.026 < 0.05

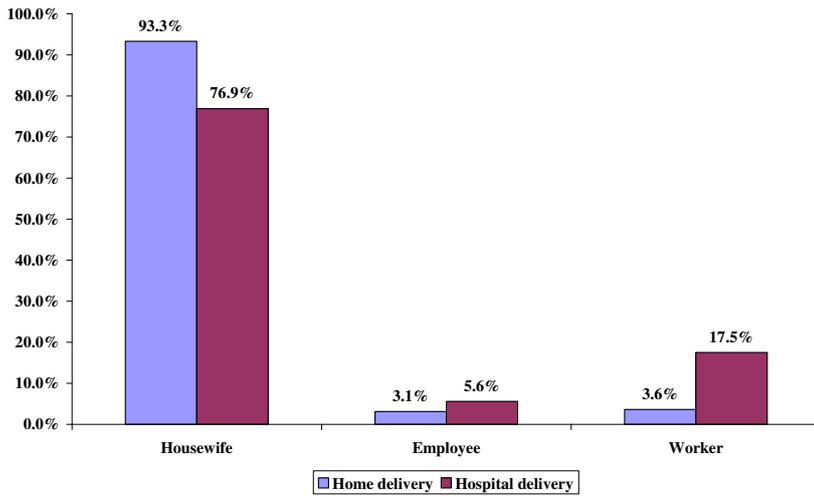


Figure (1) Distribution of women according to occupation

P value = 0.037 < 0.05

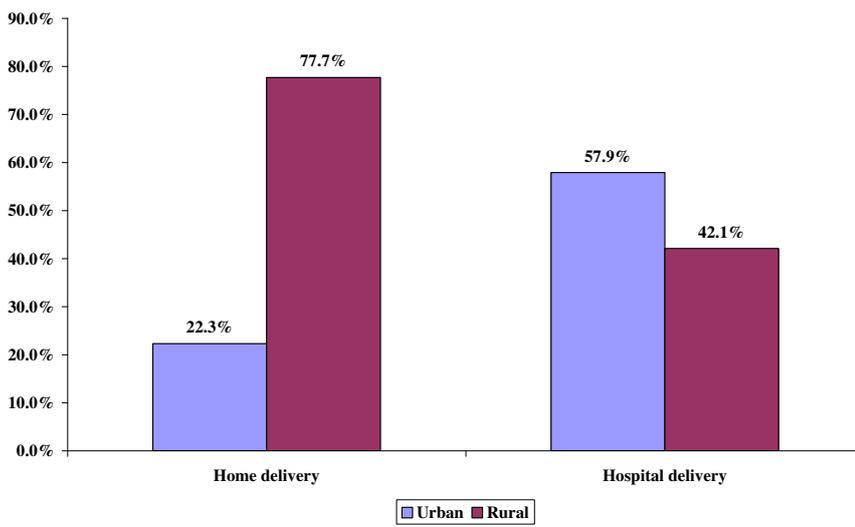


Figure (2) Distribution of women according to residence

P value = 0.012 < 0.05

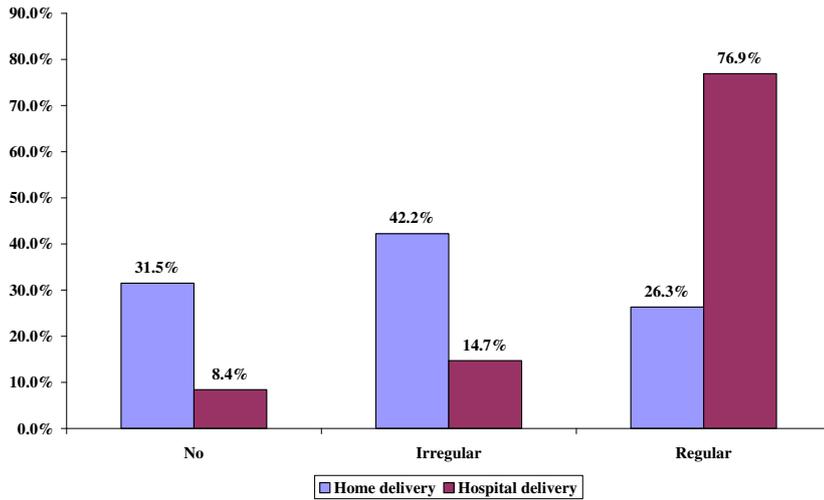


Figure (3) Distribution of the women according to ANC follow up

P value = 0.033 < 0.05

Table (3) Distribution of women according to duration of labor

Duration of labor	Home delivery		Hospital delivery	
	N	%	N	%
4 - 8 hrs	70	21.4	216	57.9
9 - 16 hrs	105	32.1	115	30.8
17 - 24 hrs	65	19.9	14	3.8
> 24 hrs	87	26.6	28	7.5
Total	327	100.0	373	100.0

P value = 0.021 < 0.05

Table (4) Distribution of women according to maternal complications

Complication	Home delivery		Hospital delivery	
	N	%	N	%
Delay second stage of labor	31	9.5	18	4.8
Instrument delivery	21	6.4	9	2.4
Shoulder dystocia	14	4.3	2	0.5
Cervical tear	28	8.6	3	0.8

Cord prolapsed	22	6.7	12	3.2
Retained placenta	30	9.2	4	1.1
Emcs	24	7.3	6	1.6
Amniotic fluid embolism	19	5.8	3	0.8
perineal tear	14	4.3	3	0.8
PPH	44	13.5	11	2.9
No complications	80	24.4	302	81.1
Total	327	100.0	373	100.0

P value = 0.011 < 0.05

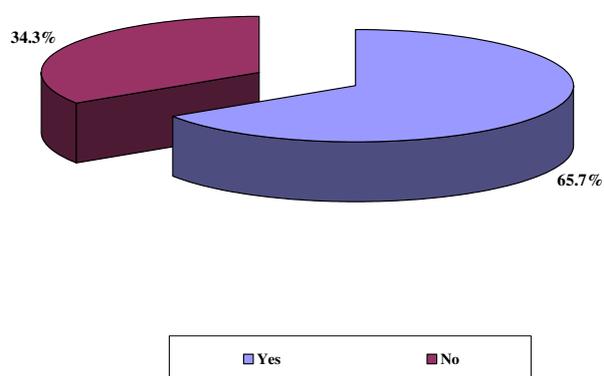


Figure (4) Distribution of the women according to refer to hospital (women delivered at home n=327)

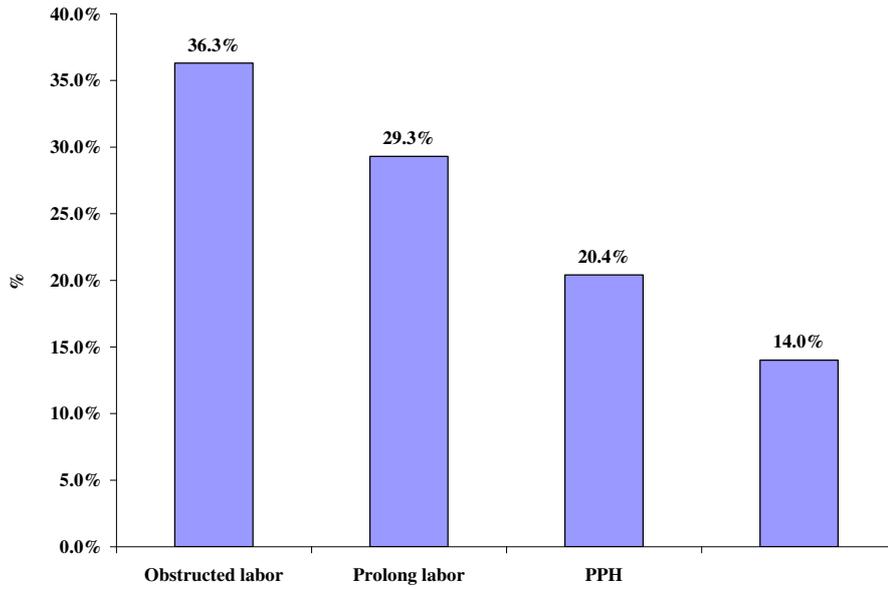


Figure (5) Distribution of women according to causes of refer to hospital (n=215)

Table (5) Distribution of women according to fetal outcome

Fetal outcome	Home delivery		Hospital delivery	
	N	%	N	%
Bedside mother (alive)	261	79.8	353	94.6
NICU	51	15.6	18	4.8
Death	15	4.6	2	0.5
Total	327	100.0	373	100.0

P value = 0.014 < 0.05

Discussion

Our findings were similar to those reported by Yaya and colleagues who examined the association between women’s choice of health facility delivery with their socioeconomic status. They showed that in proportion of women delivering at home was higher than of delivery at a health facility. Overall percentage of women who delivered at health facility was 39.8%, with the rate being substantially higher among urban (67.8%) compared with their rural (30.2%) counterparts. Percentage of delivering at home was highest in Oio region (23.8%) and that of delivery at a health facility was highest in the Sector Autónomo de Bissau region (18.7%). In the multivariable analysis, women in urban areas compared those who had no education, those who had primary and secondary/higher level of education were 2.2 and 3.3 times more likely to deliver at a health

facility ^[52]. Chowdhury et al assessed socio-demographic determinants of UTBA assisted home delivery in rural Bangladesh. Mothers residing in rural Bangladesh, who gave valid information on both delivery place and assistance during delivery, were included in this study (n = 4983). Binary logistic regression model was used to explore factors influencing home delivery assisted by untrained traditional birth attendant. Most of the mothers (79%) reported to have delivered at home and of these home deliveries, 76% were assisted by untrained traditional birth attendant. In multivariate regression model, it is found that the odds of UTBA assisted home delivery decreased with mother's education, husband's education, higher wealth index, number of Antenatal Care (ANC) visits and media exposure ^[53].

In this study, among women delivered at hospital 215(65.7%) were referred to hospital. The causes of refer to the hospital were obstructed labor 73(36.3%) prolonged labor 63(29.3%), postpartum hemorrhage 44(20.4%) and retained placenta 30(14%) this was similar to reports by Onwudiegwu and Ezechi who examined the nature of emergency obstetric admissions in a Nigerian university hospital in association with such factors as late referrals and misdiagnoses and their contribution to maternal and perinatal morbidity/mortality. Referrals to the university hospital were made only after prolonged delay and onset of complications. Obstetric hemorrhage (24.6%) was the most common cause for referral followed by labor disorders (19%) and hypertensive disorders (8.4%). Thirteen maternal deaths occurred, giving a maternal mortality ratio of 6.2%, while perinatal mortality rate was 461 per 1000 births. Twelve of the maternal deaths were in women living within 5 km of the hospital. There was a caesarean section rate of 50.9%, a 4.8% incidence of diagnostic laparotomy, a 9% incidence of emergency hysterectomy and 44% of emergency blood transfusions. Misdiagnoses of clinical conditions were made by the referring centers in 68% of cases, which contributed to the high maternal morbidity and mortality. Patient attitude was the main cause of non-use of teaching hospital facilities (fear of operation in 32% of cases, dissuasive advice from friends in 27.4% and negative staff attitude in 7%) ^[51].

Among women delivered at home maternal complications were reported in 247(75.5%) compared to 71(19%) of the women delivered at hospital. The common postpartum complication in women delivered at home were postpartum hemorrhage 44(24.4%), delay of second stage of labor 31(9.5%), retained placenta 30(9.2%) and cervical tear 28(8.6%). These complications reported in 11(2.9%), 18(4.8%) and 4(1.1%) respectively of the women delivered at hospital (P = 0.011 < 0.05). Comparable to van der Kooy, et al compared the mode of delivery between planned home versus planned hospital births and to determine if differences in intervention rates could be interpreted as over- or undertreatment. The intervention rate was lower in planned home compared to planned hospital births (10.9% 95% CI 10.8–11.0 vs. 13.8% 95% CI 13.6–13.9). Intended place of birth had significant impact on the likelihood to intervene after adjustment (planned homebirth (OR 0.77

95% CI. 0.75–0.78)). The mortality rate was lower in planned home births (0.15% vs. 0.18%). After adjustment, the interaction term home- intervention was significant (OR1.51 95% CI 1.25–1.84). In risk groups, a higher perinatal mortality rate was observed in planned home births ^[46].

Alive babies (bedside mother) were 261(79.8%) for the women delivered at home compared to 353(94.6%) in women delivered at hospital. Neonatal intensive care admission 51(15.6%), deaths 15(4.6%) in the babies of women delivered at home compared to 18(4.8%) and 2(0.5%) of the women delivered at hospital (P = 0.014 < 0.05). Similar to Wax et al systematically review the medical literature on the maternal and newborn safety of planned home vs planned hospital birth. Planned home births were associated with fewer maternal interventions including epidural analgesia, electronic fetal heart rate monitoring, episiotomy, and operative delivery. These women were less likely to experience lacerations, hemorrhage, and infections. Neonatal outcomes of planned home births revealed less frequent prematurity, low birthweight, and assisted newborn ventilation. Although planned home and hospital births exhibited similar perinatal mortality rates, planned home births were associated with significantly elevated neonatal mortality rates ^[47].

Snowden et al reported that Planned out-of-hospital birth was associated with a higher rate of perinatal death than was planned in-hospital birth (3.9 vs. 1.8 deaths per 1000 deliveries, P=0.003; odds ratio after adjustment for maternal characteristics and medical conditions, 2.43; 95% confidence interval, 1.37 to 4.30; adjusted risk difference, 1.52 deaths per 1000 births; 95% CI, 0.51 to 2.54). The odds for neonatal seizure were higher and the odds for admission to a neonatal intensive care unit lower with planned out-of-hospital births than with planned in-hospital birth. Planned out-of-hospital birth was also strongly associated with unassisted vaginal delivery (93.8%, vs. 71.9% with planned in-hospital births; P<0.001) and with decreased odds for obstetrical procedures ^[48].

Conclusion

The study concluded that home birth was significantly associated with maternal complications such as postpartum hemorrhage, retained placenta and obstructed labor. Additionally, fetal deaths and admission to neonatal intensive care unit was significantly common among women delivered at home than in women delivered at hospital.

Recommendations

- Midwives should be well trained and should have training in advanced life support in obstetric and neonatal resuscitation. They should be aware of the diagnosis of abnormal labor, known as the red flag of labor and be able to refer cases at appropriate time after doing the necessary first aid resuscitative measures.
- Good antenatal care and selection of pt effective in reducing complications.

- Equitable distribution of health services according to the principle of the health area and establishing standard referral to the central hospital to ensure accessibility to the health services.
- Labor should be regarded as an emergency therefore should be free of charge as well as the drugs, to encourage hospital delivery.
- All health centers in the periphery in any health area should be provided with free service of ambulance and trained personnel able to do the primary resuscitation and maintenance of general condition during refer time.
- All home deliveries and referred cases by midwives should be under regular audit and midwives in one area should be supervised by a dedicated person.

References

1. World Health Organization. From MDGs, millennium development goals to SDGs, sustainable development goals [internet] Geneva: World Health Organization; 2015. Health in 2015; page 1.
2. Xiao S., Yan H., Shen Y., Dang S., Hemminki E., Wang D., Long Q., Gao J. Utilization of delivery care among rural women in China: Does the health insurance make a difference? A cross-sectional study. *BMC Public Health*. 2010; 10:815.
3. Pardeshi G.S., Dalvi S.S., Pergulwar C.R., Gite R.N., Wanje S.D. Trends in choosing place of delivery and assistance during delivery in Nanded District, Maharashtra, India. *J. Health Popul. Nutr.* 2011; 29:71–76.
4. World Health Organization. Trends in Maternal Mortality: 1990 to 2013. World Health Organization; Geneva, Switzerland: 2014; page 1.
5. Ross N, Von Xylander S. Why do maternal and newborn deaths continue to occur? *Best Pract Res Clin Obstet Gynaecol*. 2016; 36:30–44.
6. World Health Organization. World Health Statistics 2017: monitoring health for the SDGs, Sustainable Development Goals. Geneva: World Health Organization; 2017 page 1.
7. WHO. Maternal mortality. WHO News/Fact sheets, 2018 page 2.
8. UNFPA. Ghana; accelerating progress towards MDG5. United Nations Population Fund G, ed. Facts Sheet. UNFPA Home Page, 2014.
9. Galaa SZ, Haruna U, Dandeebo G. Trends and Causes of Maternal Mortality at the Wa Regional Hospital, Ghana: 2005-2010. *Ghana Journal of Development Studies* 2016; 13:80–96.
10. Hoyer M, Finlayson SR, McClain CD, et al. Shortage of doctors, shortage of data: a review of the global surgery, obstetrics, and anesthesia workforce literature. *World J Surg* 2014; 38:269–80.

11. Fapohunda BM, Orobato NG. When women deliver with no one present in Nigeria: who, what, where and so what? PLoS One 2013;8: 69569.
12. Sumankuuro J, Crockett J, Wang S. Antenatal care on the Agenda of the Post-Millennium Development Goals in northern Ghana. International Journal of Innovation and Applied Studies 2016; 18:341–52.
13. Sumankuuro J, Crockett J, Wang S. Sociocultural barriers to maternity services delivery: a qualitative meta-synthesis of the literature. Public Health 2018; 157:77–85.
14. Sakeah E, McCloskey L, Bernstein J, et al. Can community health officer-midwives effectively integrate skilled birth attendance in the community-based health planning and services program in rural Ghana? Reprod Health 2014; 11:90.
15. Mugo NS, Agho KE, Dibley MJ. Risk Factors for Non-use of Skilled Birth Attendants: Analysis of South Sudan Household Survey, 2010. Maternal and child health journal. 2016;20(6):1266–79.
16. Mugo N, Zwi AB, Botfield JR, Steiner C. Maternal and Child Health in South Sudan: Priorities for the Post-2015 Agenda. SAGE Open. 2015;5(2).
17. Witter S, Khadka S, Nath H, Tiwari S. The national free delivery policy in Nepal: early evidence of its effects on health facilities. Health Policy Plan 2011; 26: 84-91.
18. Bayu H, Fisseha G, Mulat A, et al. Missed opportunities for institutional delivery and associated factors among urban resident pregnant women in South Tigray Zone, Ethiopia: a community-based follow-up study. Glob Health Action 2015; 8:28082.
19. MacDorman MF, Declercq E, Mathews TJ. Recent trends in out-of-hospital births in the United States. J Midwifery Womens Health 2013; 58:494-501.
20. Van Teijlingen, E. Midwifery and the Medicalization of Childbirth: Comparative Perspectives. Nova Publishers. 2004; ISBN 978-1594540318.
21. MacDorman, Marian F.; Declercq, Eugene; Mathews, T.J. Recent Trends in Out-of-Hospital Births in the United States. Journal of Midwifery & Women's Health. 2014; 58 (5): 494–501.
22. Vedam, S. (2003). Home Birth versus Hospital Birth: Questioning the Quality of the Evidence on Safety. Birth. 30 (1): 57–63.
23. Vernon, D. Men at Birth. Canberra: Australian College of Midwives; 2007.
24. Anderson, D.; Gilkison, G. The Cost of Home Birth in the United States. International Journal of Environmental Research and Public Health. 2021; 18(19): 10361.
25. Boucher, D.; Bennett, C.; McFarlin, B; Freeze, R. Staying Home to Give Birth: Why women in the United States choose home birth. Journal of Midwifery & Women's Health. 2009; 54(2): 119–126.

26. Montagu, D. Yamey G; Visconti A; Harding, A. Yoong, J. Mock, N. Where Do Poor Women in Developing Countries Give Birth? A Multi-Country Analysis of Demographic and Health Survey Data. PLOS ONE. 2011; 6(2): e17155.
27. Cassidy, T. Birth. New York: Atlantic Monthly Press. 2006; pp. 54–55. ISBN 0-87113-938-3.
28. Zielinski, R. Ackerson, K. Kane L. L. Planned home birth: benefits, risks, and opportunities. International Journal of Women's Health. 2015; 7: 361–377.
29. Grünebaum A, McCullough LB, Sapra KJ, et al. Apgar score of 0 at 5 minutes and neonatal seizures or serious neurologic dysfunction in relation to birth setting. Am J Obstet Gynecol 2013; 209:323. e1-323.e6.
30. de Crespigny L. Savulescu J. Homebirth and the Future Child. Journal of Medical Ethics. 2014; 40(12): 807–812.
31. The American College of Obstetricians and Gynecologists issues opinion on planned home births. OBGYN.net. 24 January 2011.
32. Committee on obstetric practice. Committee opinion, number 476: Planned home birth. Obstet Gynecol. 2011; 117 (2 Pt 1): 425–8.
33. Goldstein, S. A. Home births. Archived from the original on August 2005.
34. Pang, J.; Heffelfinger, J.; Huang, G. Outcomes of planned home births in Washington State: 1989–1996. Obstetrics & Gynecology. 2002; 100(2): 253–259.
35. Cheyney, M. Marit B. Courtney E. et al. Outcomes of Care for 16,924 Planned Home Births in the United States: The Midwives Alliance of North America Statistics Project, 2004 to 2009. Journal of Midwifery & Women's Health. 2014; 59 (1): 17–27.
36. de Jonge A, van der Goes BY, Ravelli AC, et al. Perinatal mortality and morbidity in a nationwide cohort of 529688 low-risk planned home and hospital births. BJOG. 2009; 116 (9): 1177–84.
37. Cahill A, Stamilio D, Adibo A, et al. Is vaginal birth after cesarean (VBAC) or elective repeat cesarean safer in women with a prior vaginal delivery? Am J Obstet Gynecol. 2006; 195:1143–7.
38. Martin JA, Hamilton BE, Osterman MJK, Curtin SC, Mathews TJ. Births: final data for 2012. Natl Vital Stat Rep 2013; 62:1-68.
39. Sgro M, Campbell D, Shah V. Incidence and causes of severe neonatal hyperbilirubinemia in Canada. Can Med Assoc J. 2006; 175:587–90.
40. Schroeder E, Petrou S, Patel N, Hollowell J, Puddicome D, Redshaw M, et al. Cost effectiveness of alternative planned places of birth in woman at low risk of complications: evidence from the Birthplace in England national prospective cohort study. BMJ. 2012;344e2292.

41. Williams R. Using the margins command to estimate and interpret adjusted predictions and marginal effects. *Stata J* 2012; 12:308-331.
42. Renfrew MJ, McFadden A, Bastos MH, et al. Midwifery and quality care: findings from a new evidence-informed framework for maternal and newborn care. *Lancet* 2014; 384:1129-1145.
43. Lazuka, V. It's a Long Walk: Lasting Effects of Maternity Ward Openings on Labour Market Performance. *The Review of Economics and Statistics*: 2022; 1–47.
44. Hutton, E. K. Cappelletti, A. Angela H. et al. Outcomes associated with planned place of birth among women with low-risk pregnancies *CMAJ* March 15, 2016 188 (5) E80-E90.
45. Janssen PA, Saxell L, Page LA, Klein MC, Liston RM, Lee SK. Outcomes of planned home birth with registered midwife versus planned hospital birth with midwife or physician [published correction appears in *CMAJ*. 2009 Oct 27;181(9):617]. *CMAJ*. 2009;181(6-7):377-383.
46. van der Kooy, J., Birnie, E., Denktas, S. et al. Planned home compared with planned hospital births: mode of delivery and Perinatal mortality rates, an observational study. *BMC Pregnancy Childbirth* 2017; 17, 177.
47. Wax JR, Lucas FL, Lamont M, Pinette MG, Cartin A, Blackstone J. Maternal and newborn outcomes in planned home birth vs planned hospital births: a metaanalysis. *Am J Obstet Gynecol*. 2010 Sep;203(3): 243.e1-8.
48. Snowden, J. M. Tilden, E. L. Snyder, J. lanned Out-of-Hospital Birth and Birth Outcomes. *N Engl J Med* 2015; 373:2642-2653.
49. Jakhar R. and Choudhary A. Study of maternal outcome in referral obstetric cases in a tertiary care centre. *J Family Med Prim Care*. 2019 Sep; 8(9): 2814–2819.
50. Qureshi R. N. Sikandar R. Hoodbhoy Z. Bano R. Jabeen N. Referral pattern of emergencies in obstetrics: Implications for defining scope of services and policy. *JPMA* 2016; 66: 1606.
51. Onwudiegwu, U. O. Ezechi C. Emergency obstetric admissions: late referrals, misdiagnoses and consequences. *Journal of Obstetrics and Gynaecology*. 2009; 570-575.
52. Yaya S. Bishwajit G. Gunawardena, N. Socioeconomic factors associated with choice of delivery place among mothers: a population-based cross-sectional study in Guinea-Bissau. *BMJ*. 2018; 4(2).
53. Chowdhury A. Hasan M. Ahmed S. et al. Socio-demographic factors associated with home delivery assisted by untrained traditional birth attendant in rural Bangladesh. *American Journal of Public Health Research*. 2013; 1(8).