Influence of Short Birth Spacing on Pregnancy Outcome

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To the soul of my Father

Mother ...

Brothers ...

Friends ...

Fatima
قال تعالى:

((وَوَصَّيْنَا الإنسَانَ بَوَالَيْدِهِ حَمَلَتُهُ أَمْهُ وَهَنَّ وَفِصَالَةٍ فِي غَيْمِيْنِ أَنْ اشْكُرْ لِي وَلَوَالَيْدِيكَ إِلَىَّ المَصِيرَ))

صدق الله العظيم
سورة لقمان
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ABSTRACT
This descriptive study was carried out to determine the effect of short birth interval (<2 years) on pregnancy outcome (maternal and fetal). It was carried out at Omdurman Maternity Hospital, Khartoum Teaching Hospital and Khartoum North Teaching Hospital, during the period from the 1st of October 2002 to the 30th of April 2003.

The study involved 324 mothers delivered during that period.

The majority of mothers (57.5%) had a birth interval of 2-4 years, (16%) >4 years, while short birth interval (<2 years) was found in 26.5% of cases.

Those with short birth interval (<2 years) had a higher incidence of anaemia, PROM and preterm labour. There was no significant association with either APH or PPH.

Regarding perinatal outcome, those with short birth interval had a higher rate of LBW (46.7% vs 43.3%) and admission to NICU (58.8% vs 29.9%) when compared with those with birth interval of 2-4 years.

The study showed no association between short birth interval and apparent congenital anomalies of the newborn.

In conclusion: short birth interval is associated with an increased risk of adverse pregnancy outcome.

It is recommended that, family planning should be one of the goals of ANC clinics.
ملخص الأطروحة

بسم الله الرحمن الرحيم

(الملخص باللغة العربية بالكامل)

واستنتاجات

(الاستنتاجات وال/=توصيات باللغة العربية بالكامل)
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<tr>
<td>APH</td>
<td>Antepartum Haemorrhage</td>
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<td>ANC</td>
<td>Antenatal Care</td>
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<td>CLAP</td>
<td>Latin American Center for Perinatology</td>
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<td>DHS</td>
<td>Demographic Health Surveys</td>
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<td>Fe</td>
<td>Ferrous</td>
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<td>GA</td>
<td>Gestational Age</td>
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<td>GDM</td>
<td>Gestational Diabetes Mellitus</td>
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<td>IUGR</td>
<td>Intrauterine Growth Restriction</td>
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<td>LBW</td>
<td>Low Birth Weight</td>
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<td>NICU</td>
<td>Neonatal Intensive Care Unit</td>
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<td>NTD</td>
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<td>PPH</td>
<td>Postpartum Haemorrhage</td>
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<td>PROM</td>
<td>Premature Rupture of the Membranes</td>
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<td>SB</td>
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<td>Safe Motherhood Survey</td>
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<td>SGA</td>
<td>Small for Gestational Age</td>
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<td>UTI</td>
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<td>WHO</td>
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Introduction & Literature Review

The time interval between births is an important marker of health among women of childbearing age, shorter intervals are often associated with ineffective family planning\(^{(1)}\).

It is described as actual, which is the interval between births, and preferred, which is the interval woman’s wishes to have between births\(^{(2)}\).

Actual birth intervals:-

These can be measured in three ways, and different programs and researchers use different measurements :-\(^{(2)}\)

- Birth – to – birth interval (“birth interval”):- is the period between two consecutive births, including alive or stillbirth, from birth date to birth date. There is a loss of an intervening pregnancy ending in abortion or fetal loss. If the second child born prematurely, the interval is automatically shortened \(^{(3)}\).

- Interpregnancy interval :- is the period from conception of the first child to conception of the next. It is best used to study relationships with maternal health because it includes some pregnancies that end in induced or spontaneous abortion. This is important because fetuses conceived but not born also influence maternal and child health \(^{(4)}\). Adding 9
months to an interpregnancy interval makes data comparable to those on birth interval (2).

- Birth – to – conception interval:- is the period between a live birth or stillbirth and the conception of the next pregnancy. It excludes any time spent in pregnancy and is often used by researchers because it is not affected if the second baby is born prematurely\(^5\).

The conception date, which is needed to calculate the birth – to – conception interval and interpregnancy interval, is often difficult to estimate, however, birth – to – birth intervals are easy data to collect and calculate (2).

Estimating actual and preferred intervals is important because they serve as powerful tools in research, programming, and advocacy. The choice of measurement method depends on the intended use of data (2).

**Preferred birth intervals :-**

Preferred birth intervals are more difficult to measure than actual birth intervals. Estimates usually are based on women’s perspectives and do not incorporate their husbands’ preferences (6).

These are measured in three different ways: asking women what they think is the best interval; asking women about their preference for their next birth interval; and asking women their reaction to their most recent birth interval. There is little consensus on which approach is best (6).

In many countries women’s preferred birth intervals are getting longer, as contraception becomes widely available and social norms change, more people are choosing longer intervals. In
study of nine sub-Saharan African countries with repeated surveys, women’s preferred birth intervals increased in length. Median preferred birth intervals rose by an average of 5 months between the first and most recent surveys (7).

Actual versus preferred birth intervals:

In most developing countries women’s actual birth intervals are shorter than the intervals they would prefer (8). In several countries, such as Egypt, however, women’s actual intervals are close to their preferred intervals (2). Where as, in many sub-Saharan African countries, women are the furthest from achieving their preferred intervals (7). In almost all sub-Saharan African countries, women who prefer longer intervals are more likely to have a surviving previous child, to be older, to have more surviving children, to know and to use contraception, to approve of family planning, and to be married to a man with more education. It also depends on the desired family size. Lower-order births tend to have shorter birth intervals, and women tend to report as mistimed those births that are the result of shorter birth intervals (9).
Determinants of birth spacing:

Worldwide, women differ widely in their birth spacing practices. A variety of factors influence a woman’s birth spacing, including (2).

(1) Maternal characteristics:

i- Age: younger women are more likely to have shorter birth intervals. In DHS conducted in 50 countries, it was found that, 60% or more of women ages 15 to 19 years had birth intervals shorter than 3 years (2). Longer interpregnancy intervals were correlated with older maternal age (10).

ii- Education: in SMS conducted in Sudan 1999, although the level of education is rising among women, as much as 70% of ever married women age 15 to 49 years were illiterate. Eleven percent discontinued schooling at primary level; 8% after junior secondary level and only 11% had schooling of higher secondary level, or more. The median birth interval for illiterate women was 27 months while 30 months for women with higher secondary education or more (11).

In seven surveyed countries, however, women with secondary or higher education were more likely to have intervals shorter than 3 years. One explanation is that, women with more education marry at older ages and then have children in quick succession. In other countries there was little or no difference in birth intervals between women with no education and with secondary or higher education. Researchers have not explained
why women’s education level affects their birth intervals differently from one place to another (2).

Differences in childbearing preferences may account for some birth spacing differences. In some countries women with more education were more likely to use contraception to prolong their birth intervals (12). Also, women with more education may work outside the home or live in urban regions, both of which can lead to longer birth spacing (2).

iii- Social status and employment :-

Women with lower social status and those women who are not employed tend to have shorter birth intervals than women of higher status or who are employed. For example, in Turkey women with less productive and economic decision – making power, and who typically do not work outside the home, have birth intervals 5.4 months shorter than women with more decision making power and who are usually employed (2). In India, women of lower social and economic status have median birth intervals of 14 months compared with 21 months among women of higher status (13).

iv- Place of residence :-

Women who live in rural areas are more likely than women in urban areas to have birth intervals shorter than 3 years, as urban women have better access to education and employment opportunities (2).
(2) Cultural norms :-

Cultural norms and customs that influence women’s birth spacing practices include:

i- Social pressure to prove fertility :-

Couples who face pressure for childbearing from their families or society want to have their first child soon after marriage and continue to have children rapidly. In some societies having many children and having them quickly is a sign of male virility and female fertility. In traditional Indian society, for examples, childbearing brings prestige to a new wife, and so couples have their first child quickly. \(^{(13)}\)

ii- Breastfeeding practices :-

Whether women breastfeed at all, how frequently, and how long influence their birth spacing practices. \(^{(14)}\)

In nearly all developing countries nearly all women breastfeed their newborn children. Breastfeeding differs among cultures both in duration and frequency, however. Among developing regions the duration of breastfeeding ranges from an average of 14 months in Latin-American to 21 months in Africa. \(^{(2)}\)

Breastfeeding practices help to determine how long women remain amenorrheic – without menses and thus less likely to get pregnant – after giving birth. Women who fully or nearly fully breastfeed their infants remain amenorrheic longer. \(^{(15)}\)

iii- Postpartum abstinence :-
Couples who do not practice postpartum sexual abstinence – avoiding sex for several months after a birth – tend to have their next child quickly. Postpartum abstinence is common in many countries. When the length of such abstinence exceeds the length of postpartum amenorrhea, this practice can help women delay their next pregnancy. Traditional beliefs often influence sexual practice after childbirth (2). For example mothers are separated from their husbands for as long as the mothers are breastfeeding because they believe that having sex with a lactating woman would spoil her milk and thus the child health (3).

While taboos against postpartum sexual activity are widespread, particularly in Africa, the duration of postpartum abstinence varies greatly both within and among countries (15).

According to DHS, conducted in 55 countries, the median duration of postpartum abstinence in Africa ranges from 2 to 22 months (16).

iv-Son preferences :-

Couples who prefer sons tend to have their next child soon after the birth of a daughter. In China, for example, among women who had given birth to a girl most had their next child within 37 months. In contrast, among women who had given birth to a boy, most had their next child within 46 months (17).

(3) Survival and health of the previous child :-
a) Infant survival :-

The health of a woman’s previous child often affects the timing of her next birth. Studies around the world, including Egypt and Kenya, showed that, parents are more likely to have their next child sooner if a newborn dies than if a newborn survives \(^{(18)}\). When a child dies, mothers’ subsequent birth intervals are 60% shorter, on average, than when a child survives, according to data from DHS. This study also found that, the longer the previous child survives, the less the effect on the subsequent birth interval. After age two a child’s death appears not to influence the mother’s subsequent birth interval at all \(^{(16)}\). Some couples unintentionally have their next child quickly because a child’s early death ends breastfeeding, and women return to menses and resume ovulation sooner \(^{(16)}\).

Other couples make a conscious effort to replace the lost child soon. When a child dies, the duration of postpartum sexual abstinence can fall by as much as 47%, according to data from DHS \(^{(16)}\). Some studies found that, resumption of sexual activity is less important than the early cessation of breastfeeding in explaining why the next child is born sooner than when a previous child dies \(^{(19)}\).

b) Fetal loss :-

Women whose pregnancies end in miscarriage or abortion are usually more likely to have a next child quickly. Few studies have looked at this relationship, however, because miscarriages, stillbirths, and abortions are rarely recorded. A study by the CLAP found that half of adolescents age 19 or younger whose pregnancies ended in abortion or miscarriage became pregnant
again within 2 years, compared with about one-third of adolescents who had a previous live birth. Among women ages 20 to 24, 28% whose pregnancy ended in abortion or miscarriage became pregnant within 2 years, compared with 21% of those who had a previous live birth (2).

An African study, however, found that women whose pregnancies end in miscarriage or stillbirths are less likely to have a next child quickly. Some 14% of women who miscarried or had stillbirth used contraception subsequently, far more than the percentage who used contraceptives during breastfeeding or after weaning. When asked why they used contraception after a miscarriage or stillbirth, women reported that they wanted to give their bodies time to rest, recover and have a better chance of conceiving a healthy baby in the future (20).

c) Infant health :-

If a newborn survives but is sickly, women tend to have their next child sooner. One explanation is that sick newborns are less likely to breastfeed (21). If infants cannot breastfeed often and intensely, mothers resume ovulation more quickly and, without contraception or sexual abstinence, may soon become pregnant again (22). Also, if a woman is worried that her sick child will die in infancy, she may try to have a healthy child quickly. For this same reason, mothers whose newborns are low in weight at birth may have their next child quickly, too (23, 21).

(4) Chance :-
Short interpregnancy intervals are more likely to occur in those with irregular menstrual cycles through an unplanned pregnancy \(^{(24)}\).

(5) A matter of choice :-

For couples, child-spacing decisions can be even more complex than deciding when to start having children and when to end childbearing. Whether explicitly or implicitly, couples weigh the benefits of spacing births longer against their social and economic disadvantages.

Longer birth intervals are healthier for mothers and their children, enable parents to devote more of their time to each child in the early years, give parents more time for activities other than child-rearing and often ease pressure on family finances. These are not the only factors that couples consider in making decision about child spacing, however, \(^{(2)}\).

Many couples consider how birth intervals affect the mother’s employment. For example, in Ethiopia, research found that, women who work outside the home tend to space their children more closely to complete their families quickly and thus minimize their time out of the workforce, or to compress the economic and physical burdens of child rearing \(^{(25)}\). Other couples space their births based on whether or not childcare is available and affordable, so they space their children close together while they live with the husband’s parents because the parents provide child care \(^{(2)}\).

In some countries, as women tend to marry at older ages, they may want to have children sooner rather than later. Women
may also speed up childbearing as they get older to have as many children as possible before menopause, as in India (2).

Just as some couples space their births based on their own needs or desires, others prefer to leave childbearing unplanned, to fate, or up to God, as some women said in surveys (2).

Couples and individuals need to make their own spacing decisions based on accurate information and a range of contraceptive options (26).

**Optimum birth spacing:**

The Qur’an encourages breast feeding and specifies a period of up to two years which is considered the optimum birth interval (27).

- Over the years research has consistently demonstrated that, when mothers space births at least 2 years apart, their children are more likely to survive and to be healthy. Many programs have recommended 2 years intervals, and the message was widely known in surveys as most women said.

  Couples who space their births 3 to 5 years apart increase their children’s chances of survival, and mothers are more likely to survive, too, according to new research at the DHS(2).

- A hypothetical “critical” interpregnancy interval has been proposed, indicating the threshold for significant increases in the prevalence of unfavorable outcome. This critical interval has varied among published reports, ranging from 6 months in developed, industrialized nations to 18 months, or longer in developing countries (28).
Birth intervals trends:-

The median birth intervals in developing countries is about 32 months, 4 months short of 3 years, based on DHS data. While this statistic suggests that many women are close to reaching the healthiest birth interval, in fact, 57% of women in the countries included in the analysis space their births shorter than three years (2).

- The percentage of women with birth intervals shorter than 3 years ranges from 52% in Latin American to 60% in sub-Saharan Africa. However, sub-Saharan Africa has fewer women with birth intervals shorter than 2 years than any other region. Only 22% of women have such short birth intervals, compared with 26% in Asia and Pacific to 31% in Eastern Europe and Central Asia (2). The largest proportion of women with intervals shorter than 3 years tend to be in some higher income developing countries, such as Jordan and Yemen. In these countries, use of long-term contraceptive methods for limiting births is more common than use of short-term methods for spacing. Birth intervals are shorter in such countries because many women prefer to have their births in close succession and then to use contraception for limiting rather than spacing births (8).

In SMS conducted in 16 states of Northern Sudan and in selected urban areas of three Southern States, it was found that, the median birth interval was 27 months, 16% of births occur within 18 months after the previous birth, 18% occur between 18 and 23 months, 36% occur between 2 to 3 years and 30% occur after 3 years or more (11).

Why short and long birth intervals are associated with adverse pregnancy outcome?
The reasons for the association between short birth intervals and adverse pregnancy outcome are unclear. A number of causal mechanisms have been proposed these include:-

(1) Postpartum hormonal imbalance containing into the new pregnancy, but was not tested for \(^{(29)}\).

(2) Preovulatory ageing of the oocyte:- due to an extended follicular phase of the first few ovulatory cycles \(^{(30)}\).

(3) Maternal stress : induced by lactation and the new pregnancy \(^{(30)}\).

(4) Maternal depletion syndrome :-

Although this term has been commonly used to explain poor maternal and infant health, whether such a syndrome actually exists remains unclear. This uncertainty may be due to the lack of a clear definition of the syndrome and the absence of theoretical frame works that account for many factors related to reproduction nutrition. The new definition is based on overall change in maternal nutritional status over one reproductive cycle in relation to initial nutritional status \(^{(31)}\).

Little is known about why birth intervals longer than five years are less healthy for mothers and their children. It has been suggested that, after five or more years of not having children, mothers may lose the protective benefits of previous childbearing, such as a reduced risk of pre-eclampsia and eclampsia. Thus they may be just as likely to experience the health problems associated with pregnancy as first – time mothers. Their children also could be just as likely to experience health problems or a higher risk of death as first – born children \(^{(10)}\).
Maternal nutrition during pregnancy and lactation :-

Iron:

Total iron requirements in pregnancy vary with the body weight of the mother and the size and maturity of the fetus. In an average pregnancy, the requirements are:

a) Basal iron.
b) Expansion of red cell mass.
c) For transfer to the fetus.
d) For placenta, and
e) Blood loss at delivery

An additional 500-600mg of iron is required in pregnancy or 4-6mg/day of absorbed iron, which can only be achieved by mobilizing iron stores in addition to maximum iron absorption from the diet \(^{(32)}\).

Maternal iron stores, like those of folate, might remain depleted for several months after delivery, and are more prone to iron deficiency anaemia in subsequent pregnancy \(^{(30)}\).

Most women enter pregnancy with little or no iron reserve, which is further compounded by repeated and closely spaced pregnancies and prolonged periods of lactation \(^{(33)}\).

Effects of iron deficiency on pregnancy :-

a) Maternal effects:
   - Increased incidence of preterm labour & subsequent LBW newborns \(^{(30)}\).
- Sepsis in the form of postpartum endometritis and poor wound healing (32).

b) Fetal effects:
- Irrespective of maternal iron stores, the fetus tends to obtain iron from transferrin, which actively transports iron to the fetus. Gradually, however, such fetuses tend to have decreased iron stores.
- Adverse perinatal outcome in the form of preterm and SGA babies and increased perinatal mortality rates have been observed in the neonates of anaemic mothers (32).

Folate:

Human beings are fully dependent on dietary sources or supplements for their folate, which is required for cell division because of its role in DNA synthesis (34). Requirements are increased during pregnancy and the placenta transports folate actively to the fetus even in the face of maternal deficiency. Maternal folate metabolism is altered early in pregnancy like many other maternal functions, before fetal demand acts directly (35).

The normal dietary folate intake is inadequate to prevent changes in the bone marrow in approximately 25% of pregnant women. The fall in serum and red cell folate could be a physiological phenomenon in pregnancy but the incidence of megaloblastic changes in the bone marrow is reduced only when the folate levels are maintained in a steady state by adequate oral supplements. There is much controversy about the requirement for folate particularly during pregnancy. The WHO recommends a daily folate intake of 0.8mg in the antenatal period and 0.6mg during lactation (35).
Without adequate folate supplementation, concentration of folate in maternal serum, plasma and red blood cell decrease from the fifth month of pregnancy onwards (30).

Concentration continue to decrease for several weeks after delivery, and by the second to third month postpartum, a third of all mothers can have subnormal concentration of folate in serum and red blood cells (36). By 6 months postpartum, 20% of mothers were reported as still folate deficient (37). However, should any deficiency of folate have developed and remained untreated in pregnancy, it may present clinically for the first time in the puerperium (35).

Study to evaluate whether micronutrient supplementation improve the nutritional status of women with poor diets during the interpregnancy interval, was conducted in East London, fifty five women who had given birth to a LBW baby and who had planned to have further pregnancy, were selected. According to dietary information, were categorized into inadequate and adequate dietary intake groups. Half of the inadequate diet group were given micronutrient supplement. Serum folate and Fe stores were measured at 3 and 9 months postpartum. Half of the un supplemented inadequate diet group remained severely deficient in folate and had low serum ferritin levels (38).

**Folate deficiency related adverse pregnancy outcome :-**

A number of studies have addressed the relation between pregnancy outcome and either maternal blood folate concentration, folate intake, or hyperhomocysteinaemia (the effect of inadequate folate intake or abnormal folate metabolism) (30).

a) On pregnancy :-
i- Abortion:
There is increased incidence of abortion, but the effects of folate supplementation on the risk of spontaneous abortion are less clear. Women who habitually miscarry generally have higher plasma concentration of homocysteine, caused by the increased frequency of a genetic disorder of folate metabolism (39). On the other hand, no significant decrease or increase in the risk of spontaneous abortion was reported in normal women receiving periconceptional folate supplement (40).

ii- Increased risk of abruptio placentae and pre-eclampsia (32).

b) On fetus:

i- Neural tube defects: Periconceptional folate supplementation has been shown to reduce the risk of NTDs by almost three quarters (30).

ii- IUGR and preterm labour: Mothers of growth retarded fetuses generally have lower folate intake, lower blood folate concentration and higher homocysteinaemia rates than mothers of normal weight fetuses. The same is true for mothers who deliver prematurely (34).

Other micronutrients:

Vitamin B₁₂:
The majority of mothers had a low serum B₁₂ value at term. This is a phenomenon of pregnancy, thought to be partly related to haemodilution, and partly a disturbance in cobalamin metabolism.
Low serum $\text{B}_{12}$ level may not reflect low tissue $\text{B}_{12}$ levels. However, low values persisted at 6 and 12 months postpartum. Low $\text{B}_{12}$ levels were not related to anaemia or macrocytosis, as this may be a later development, preceded by megaloblastic changes in bone marrow (41).

Concentrations of other micronutrients such as zinc and vitamins A and $\text{B}_{6}$ also fall during pregnancy, but either return to normal within a few weeks postpartum or do not have a relation with pregnancy outcome, or both. Therefore, folate deficiency seems the most important nutritional factor in the excess risk of poor pregnancy outcome after short interpregnancy intervals (30).

Effects of birth intervals on pregnancy :-

(1) Spontaneous Abortion:

The length of birth interval may be considered as a risk factor in spontaneous abortion, this was still true after other important risk factors, such as maternal age, parity and previous spontaneous abortion, had been taken into account. However, separate analysis of pregnancies according to whether they occur more or less than 1 year after contraception (if used) had been stopped, showed that the relationship between a long interval and spontaneous abortion was only significant for subfertile women who took longer than 1 year to conceive (42).

Kamel et al, has found an inverse relationship between fetal wastage (both stillbirths and abortion) and interpregnancy interval among currently married women 15 to 45 years of age. Fetal wastage was found to be lowest for interpregnancy intervals of more than 36 months (3). Using a more refined measure of
pregnancy interval, El – Sherbini et al, found an additional increase in pregnancy wastage at more prolonged pregnancy intervals (more than six years) (3).

(2) Neural Tube Defects:
Using data from a population based case – control study, there was found an increase NTD risk for mothers with an interpregnancy interval of < or = 6 months compared with > 12 - < or = 24 months. This risk was greatest among mother whose immediately prior pregnancy had resulted in a live birth rather than spontaneous abortion or elective termination (43).

(3) Preterm Labour:
Preterm birth is the single most important cause of perinatal mortality due to prematurity and it consequences. In addition, it is responsible for nearly half of all cases of congenital neurological disability, including cerebral palsy (44).

The identification of modifiable causal factors is an essential first step in any primary prevention programme. A short interpregnancy interval has been identified as potentially being such a risk factor but the results of epidemiological studies have been equivocal. Most were conducted in the USA using large administrative data sets, and found that a short interpregnancy interval was significantly related to an increased risk of preterm birth; however, some studies have found no significant relationship (45).

In Denmark, frequency of preterm birth and LBW were evaluated as a function of interpregnancy interval in women who had at least two live births. After controlling for possible factors,
the odds ratios were 3.6 for intervals up to 4 months and 2.28 for intervals between 4.01 and 8 months compared with deliveries after 24 to 36 months, in which the risk of preterm birth was 3.5%. Thus, short interpregnancy intervals were not associated with preterm birth (29).

The effect of interpregnancy interval on the risk of preterm labour was estimated in multiparous women at Boston Hospital for Women. The rate of preterm birth after spontaneous onset of labour was found to be 3.8%. While the possibility of an increased risk of preterm labour for interpregnancy intervals of 3 months or less can not be definitely excluded, no relation was found between other interpregnancy intervals and the risk of preterm labour (46).

In the same study, interpregnancy intervals of 0 to 3 months, as well as interpregnancy intervals of 59 months or longer, were associated with a higher risk of preterm labour than were intervals of 25 to 36 months. However, after adjustment for confounding factors, the latter association was not statistically significant (46).

The incidence of preterm birth is increased as the length of the interpregnancy interval decrease, but only for women who had not had a previous preterm birth (47).

In study conducted in United Arab Emirates, there was found a significant association between short interpregnancy intervals and preterm labour (45).
Effects of birth intervals on perinatal survival and health :-

(a) LBW, Prematurity and SGA :

- LBW, defined as a birth weight of less than 2500g, represent a disproportionately large component of the neonatal and infant mortality. Maternal factors associated with a LBW infant caused by premature birth or IUGR, include a previous LBW birth, low socioeconomic status, low level of educational achievement, no antenatal care, maternal age less than 16 or greater than 35 years, short time intervals between pregnancies, physical or psychological stresses, low pre-pregnancy weight (< 45 kg) and poor weight gain during pregnancy (48).
In a hospital based study of multiparous women, those conceived within 1-4 months of a prior live birth were found to be at increased risk of delivering a LBW newborn, as were those conceived 5-8 months later when compared with women conceived 9 or more months later (49). The adverse effects of short birth intervals on birth outcome were most noticeable among births after an interval of less than 12 months. However, the higher risk of adverse outcomes continued to exist for intervals of up to 18 months (49).

Other studies had found a scarce effect of short interpregnancy interval on the risk of prematurity and LBW, and that obstetrical risk factors had a greater impact on gestational outcome. In study of 279 pairs of newborns of the same mothers, it was found that, newborns with shorter interpregnancy intervals had a LBW, among the less than 3 months the prevalence of prematurity – LBW was slightly greater (7.1%) which was not statistically significant (50).

Fuentes – Afflick found that, women with interpregnancy intervals of 18-59 months had the lowest risk of very premature (23-32 weeks) and moderately premature (33-37 weeks) infants while those with short and long intervals were 14% and 12% more likely to have premature infants (51).

SGA, defined as birth weight less than the tenth centile for GA and sex, has been associated with short birth interval.
- The relationship between the length of the preceding birth interval and the risk of IUGR was analysed using data from WHO study of perinatal mortality. It was found that, infants born after
birth intervals of 12 months or less are 30% more likely to be SGA than infants born 18-59 months after the previous birth (52).
- Zhu et al found that, infants born 27 to 32 months after a previous live birth had the lowest risks of adverse perinatal outcomes; shorter and longer birth intervals were associated with higher risks. Compared with infants born 27 to 32 months after a previous birth, those born less than 15 months, had a risk of 1.4% for preterm birth; 1.4% for LBW and 1.3% for SGA; infants born 120 months or more, had risk of 2.0%, 1.5%, and 1.8% for these three adverse outcomes respectively (10).
- Children born 27 to 32 months after a previous birth were more likely to survive the perinatal period, than children born after short (< 12 months) and long (> 69 months or more) intervals.

They are also less likely to have a low Apgar score five minutes after birth. The Apgar score is a composite index of a newborn’s status. It reflects respiration, heart rate, muscle tone, reflex response, and skin color at birth (10).

**Influence of birth intervals on lactation :-**

It is well established that breastfeeding has been the major determinant of infant growth, health and survival and the contraceptive effect of lactation has been the principle regulator of human fertility (53).
- Lactating women lose about 1-2kg of weight during lactation, with weaning these women tend to regain their body weight over the next year or two, provided they do not become pregnant during this period (53).
If mothers have their next child while they are breastfeeding, they are often less able to produce breast milk for the previous child (2).

When children are weaned too soon, their growth suffers, they are more likely to suffer from diarrhoeal disease and skin infections, and they are thus at greater risk of dying. Milk diminution is more likely to occur as women have more children and are undernourished. Thus longer birth spacing benefits children through allowing longer breastfeeding (2).

**Effects of birth intervals on infant and child health :-**

- It has long been known that avoiding closely spaced births is advantageous to child health. Two – year spacing was widely identified and promoted as “the healthy interval”.
- Many studies found that, infants spaced at least 2 years a part are more likely to survive than infants spaced less than 2 years (59). In addition, infants spaced at least 2 years a part are less likely to be premature, less likely to be malnourished. The survival chances of the next – to – youngest child improve, too, when births are at least 2 years a part (2).
- When children are close in age, they compete for resources and for maternal care. Mothers may not be able to breastfeed the older sibling properly, either because her milk flow slows or because her time is taken up by the newborn. Mothers also may not be able to breastfeed the newborn
properly, placing the newborn at higher risk for nutritional deficiency, infectious diseases contracted from older siblings, and other health problems as immunity declines (54).

- It is unclear whether siblings’ competition for resources is important to explain the effects of short spacing, however, the risk of mortality for the older sibling remains the same when the newborn dies, but the risk of mortality for the newborn declines when the older sibling dies or when the older sibling is age five or older (2).

- New findings from researches at the DHS program found that, when a mother spaces her child’s birth 3 to 5 years after the previous birth compared with children born less than 2 years after a previous birth, were:
  
  1.5 times more likely to survive the first week of life;
  2.2 times more likely to survive the first 28 days of life;
  2.3 times more likely to survive the first year of life;
  and 2.4 times more likely to survive to age five (2).

It was also found that, children born 3 to 5 years after a previous birth were less likely to be malnourished during infancy and childhood through age five.

They also suffer less from stunting (short height for age) and underweight (low weight for age) than infants born after intervals shorter than 3 years (2).

Neonatal mortality:

Neonatal mortality which may chiefly reflect the mother’s health during pregnancy, was found to be higher only after intervals of less than 6 months between birth and conception. In
contrast, post neonatal mortality, which may chiefly reflect the social and economic circumstances in which the child is cared for, gradually declines as the interval lengthened to 38 months (27).

**Infant mortality :-**

Infant mortality is directly influenced by the preceding birth interval. A longer birth interval increases the odds of an infant’s survival by 25 percent (55).

Available evidence in developing countries showed that, short birth intervals are linked to high infant death rates. Infants are more likely to die or suffer from poor health when born soon after a previous birth or another birth follows soon after their own birth (27).

**Effects of birth spacing on maternal survival and health:-**

The reasons for the association between short interval between pregnancies and adverse maternal outcome are unclear. This might be explained by the maternal depletion hypothesis, depletion of maternal nutrients stores and anaemia (4).

Anaemia have been found to play a part in the pathogenesis of PROM and puerperal endometritis (56).

These conditions may contribute to the increased risk of maternal death among women with short interpregnancy intervals. Other alternative explanations might be postpartum stress levels, socioeconomic factors, unstable life styles, failure to use healthcare services or inadequate use of such services, and other behavioural or psychological determinants (4).
Some studies found that, intervals of less than 2 years risk mothers’ health, while others did not (2).

In the CLAP study it was found that, women who have their babies 27 to 32 months after a previous birth are more likely to survive pregnancy and child birth than women who give birth after very short intervals (9 to 14 months) or very long intervals (59 months or longer). These women are also healthier during and after pregnancy (4).

In the previous study, compared with those have their babies 27 to 32 months after a previous birth, women with birth intervals of 14 months or less had higher risks of APH (1.73%), PROM (1.72%), puerperal endometritis (1.33%), and anaemia (1.30%). There was found, no significant association between birth intervals and PPH (4).

It had been postulated that, a short birth interval might interfere with the normal processes of remodeling of endometrial blood vessels after delivery, with subsequent uteroplacental underperfusion, thereby increasing the likelihood of placental abruption and placenta praevia (4).

**Pre-eclampsia and Eclampsia :-**

The risk of pre-eclampsia is generally lower in the second pregnancies than in first, but not if the mother has a new partner for the second pregnancy.

One explanation is that, the risk is reduced with repeated maternal exposure and adaptation to specific antigens from the same partner. However, the difference in risk might instead be explained by the interval between births. A longer birth interval
may be associated with both a change of partner and a higher risk of pre-eclampsia and eclampsia (57).

In the CLAP study, women with birth intervals longer than 68 months were found to have a significantly increased risk of pre-eclampsia (1.85%) and eclampsia (1.80%) when compared with those with birth intervals of 27 to 32 months (4).

**Gestational Diabetes Mellitus (GDM):**

There was found an increased rate of GDM among those with birth intervals greater than 68 months, this could be mediated through older maternal age and higher body mass index pre-pregnancy (4).

**Maternal Death:**

Undoubtedly the major factor which determines a pregnant woman’s risk of death is the lack of access to well equipped health care services. Nevertheless, some women run additional risks. Lack of adequate spacing between pregnancies increases the risk to the mother (58).

In the CLAP study, women with birth intervals of less than 14 months were found to have a 2.5 fold higher risk of death (4).
Objectives

1) To determine the effects of short birth intervals on pregnancy including: anaemia, preterm labour, PROM, APH & PPH in the study population.

2) To study the impact of short birth intervals on perinatal outcome including: birth weight, state of newborn at birth and apparent congenital anomalies of the new born in the study population.
Methodology

Study Design:-
This is a hospital based descriptive, prospective study performed to determine the effects of short birth intervals on pregnancy outcome.

Setting:-
The study was carried out during the period from the 1st of October 2002 to the 30th of April 2003. In the following hospitals;
(1) Khartoum Teaching Hospital.
(2) Omdurman Maternity Hospital.
(3) Khartoum North Teaching Hospital.
These are main central, referral hospitals with qualified medical staff, receiving patients from all over the country.

Study Population:-
A sample of 324 mothers in the labour ward were selected randomly according to the following criteria:-
1) Inclusion criteria:-
   - Multiparous.
   - Singleton pregnancy.
   - No past history of chronic medical illness.
- No past history of preterm labour.
- Last pregnancy ended in live birth or SB after 28 weeks.

2) Exclusion criteria:-
- Primigravida.
- Multiple pregnancy.
- Past history of chronic medical illness, preterm labour or LBW.
- Most recent previous pregnancy ended in abortion.

Data Collection:-

Data were collected by direct questionnaire filled by the researcher. It consists of:

- General history:
  - Social class: the grading system depends on the residence, education, husband's occupation, income and home facilities (water, electricity and toilet).

- Obstetric history.

- ANC utilization: Mothers were classified according to number of visits into: regular ANC (5 visits or more) irregular (less than 5 visits minimum 3) and no ANC (less than 3 or at all).

- Obstetric complications & GA.

- Outcome regarding condition of the newborn at birth. Those with low Apgar score at 5 min were admitted to NICU.
- Birth weight: newborns were classified into four categories for comparison. Those with birth weight less than 2500g were regarded as LBW.
- Newborns were examined for apparent congenital anomalies.
- Birth intervals were calculated using birth date of the previous child and date of delivery, or using age of the previous child.
- The data were collected and analyzed manually using master sheet, then computerized using SPSS (Statistical Package for Social Sciences). Cross tabulation between variables were analyzed using chi-square test, P-value less than 0.05 was significant.
Results

**Figure (1)**: Shows the distribution of the studied population according to age.

**Table (1)**: Shows the distribution of the studied population according to education.

**Table (2)**: Shows the distribution of the studied population according to socioeconomic status.

**Figure (2)**: Shows the distribution of the studied population according to birth interval in years.

**Table (3)**: Shows relationship between birth interval (in years) and duration of breastfeeding (in months). The study showed that 24.1% of the studied population had duration of breastfeeding less than 12 months.

**Table (4)**: Shows the distribution of the studied population according to ANC utilization.

**Figure (3)**: Shows relationship between birth interval (in years) and ANC utilization.

**Tables (5)**: Shows the distribution of the studied population according to medical disorders in current pregnancy.

**Figure (4)**: Shows relationship between birth interval (in years) and medical disorders in current pregnancy in the studied population (P = 0.001).

**Table (6)**: Shows the distribution of the studied population according to obstetric disorders in current pregnancy.
Figure (5): Shows relationship between birth interval (in years) and obstetric disorders in current pregnancy in the studied population (P= 0.002).

Table (7): Shows the distribution of the studied population according to condition of the newborn at birth.

The study showed that 2.8% (9 cases) of newborns were SB due to: congenital anomalies (5 cases), hydrops fetalis (1 case), macerated SB (2 cases) and prematurity (1 case).

Figure (6): Shows relationship between birth interval (in years) and condition of the newborn at birth (P= 0.004).

Table (8): Shows the distribution of the studied population according to birth weight of the newborn (in grams).

Figure (7): Shows relationship between birth intervals (in years) and birth weight of the newborn (in grams) in the studied population (P= 0.002).

Table (9): Shows relationship between birth interval (in years) and apparent congenital anomalies of the newborn in the studied population.

The study showed that 1.9% (6 cases) of the newborns had congenital anomalies in the form of NTD (anencephaly 4 cases), hydrocephalus (one case) and polydactyly (one case).

Figure (8): Shows relationship between birth interval (in years) and third stage of labour complications in the studied population (P= 0.08). There was no maternal death.
Figure (1):

Distribution of the studied population according to age.
Table (1): Distribution of the studied population according to education

<table>
<thead>
<tr>
<th>Education</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illiterate</td>
<td>124</td>
<td>38.3</td>
</tr>
<tr>
<td>Primary</td>
<td>100</td>
<td>30.9</td>
</tr>
<tr>
<td>Secondary</td>
<td>60</td>
<td>18.5</td>
</tr>
<tr>
<td>University &amp; Postgraduate</td>
<td>40</td>
<td>12.3</td>
</tr>
<tr>
<td>Total</td>
<td>324</td>
<td>100</td>
</tr>
</tbody>
</table>
Table (2): Distribution of the studied population according to socioeconomic status

<table>
<thead>
<tr>
<th>Socioeconomic status</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>80</td>
<td>24.7</td>
</tr>
<tr>
<td>Moderate</td>
<td>211</td>
<td>65.1</td>
</tr>
<tr>
<td>High</td>
<td>33</td>
<td>10.2</td>
</tr>
<tr>
<td>Total</td>
<td>324</td>
<td>100</td>
</tr>
</tbody>
</table>
Figure (2):

Distribution of the studied population according to birth interval (years).
Table (3): Relationship between birth interval (in years) and duration of breastfeeding (in months)

<table>
<thead>
<tr>
<th>Birth interval</th>
<th>&lt;12</th>
<th>12-24</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>%</td>
</tr>
<tr>
<td>&lt;2</td>
<td>46</td>
<td>59</td>
</tr>
<tr>
<td>2-4</td>
<td>20</td>
<td>25.6</td>
</tr>
<tr>
<td>&gt;4</td>
<td>12</td>
<td>15.4</td>
</tr>
<tr>
<td>Total</td>
<td>78</td>
<td>100</td>
</tr>
</tbody>
</table>

P= 0.000
Table (4): Distribution of the studied population according to ANC utilization

<table>
<thead>
<tr>
<th>Antenatal care</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular</td>
<td>168</td>
<td>51.9</td>
</tr>
<tr>
<td>Irregular</td>
<td>66</td>
<td>20.3</td>
</tr>
<tr>
<td>No</td>
<td>90</td>
<td>27.8</td>
</tr>
<tr>
<td>Total</td>
<td>324</td>
<td>100</td>
</tr>
</tbody>
</table>
Figure (3):

Relationship between birth interval (in years) and ANC utilization among the studied population.
Table (5): Frequency of medical disorders in the study population

<table>
<thead>
<tr>
<th>Medical disorders</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
<td>14</td>
<td>4.3</td>
</tr>
<tr>
<td>DM</td>
<td>4</td>
<td>1.2</td>
</tr>
<tr>
<td>Anaemia</td>
<td>12</td>
<td>3.7</td>
</tr>
<tr>
<td>UTI</td>
<td>12</td>
<td>3.7</td>
</tr>
<tr>
<td>Others (malaria, respiratory tract infection)</td>
<td>6</td>
<td>1.9</td>
</tr>
<tr>
<td>No</td>
<td>276</td>
<td>85.2</td>
</tr>
<tr>
<td>Total</td>
<td>324</td>
<td>100</td>
</tr>
</tbody>
</table>
Figure (4):

Relationship between birth interval (in years) and medical disorders in current pregnancy in the studied population.
<table>
<thead>
<tr>
<th>Obstetric disorders</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preterm labour</td>
<td>24</td>
<td>7.4</td>
</tr>
<tr>
<td>PROM</td>
<td>18</td>
<td>5.6</td>
</tr>
<tr>
<td>Malpresentation</td>
<td>22</td>
<td>6.8</td>
</tr>
<tr>
<td>APH</td>
<td>4</td>
<td>1.2</td>
</tr>
<tr>
<td>Others (Polyhydramnios, IUFD …)</td>
<td>18</td>
<td>5.6</td>
</tr>
<tr>
<td>No</td>
<td>238</td>
<td>73.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>324</strong></td>
<td></td>
</tr>
</tbody>
</table>
Figure (5):

Relationship between birth interval (in years) and obstetric disorders in current pregnancy in the studied population.
Table (7): Distribution of the studied population according to condition of the newborn at birth

<table>
<thead>
<tr>
<th>Condition of the newborn at birth</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stillbirth</td>
<td>9</td>
<td>2.8</td>
</tr>
<tr>
<td>Well (not resuscitated and not admitted)</td>
<td>288</td>
<td>88.9</td>
</tr>
<tr>
<td>Resuscitated</td>
<td>10</td>
<td>3.1</td>
</tr>
<tr>
<td>Admitted to NICU</td>
<td>17</td>
<td>5.2</td>
</tr>
<tr>
<td>Total</td>
<td>324</td>
<td>100</td>
</tr>
</tbody>
</table>

Figure (6):

Relationship between birth interval (in years) and condition of the newborn at birth in the studied population.
Figure (6): Relationship between birth interval and condition of the newborn at birth
Table (8): Distribution of the studied population according to birth weight of the newborn (in grams)

<table>
<thead>
<tr>
<th>Birth weight</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;2500</td>
<td>30</td>
<td>9.3</td>
</tr>
<tr>
<td>2500-2999</td>
<td>114</td>
<td>35.2</td>
</tr>
<tr>
<td>3000-3999</td>
<td>174</td>
<td>53.7</td>
</tr>
<tr>
<td>≥4000</td>
<td>6</td>
<td>1.9</td>
</tr>
<tr>
<td>Total</td>
<td>324</td>
<td>100</td>
</tr>
</tbody>
</table>

Figure (7):

Relationship between birth interval (in years) and birth weight of newborn (in grams) in the studied population.
Table (9): Relationship between birth interval (in years) and apparent congenital anomalies of the newborn in the studied population

<table>
<thead>
<tr>
<th>Birth Interval</th>
<th>0%</th>
<th>20%</th>
<th>40%</th>
<th>60%</th>
<th>80%</th>
<th>100%</th>
<th>120%</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;2 yrs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-4 yrs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;4 yrs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure (7): Relationship between birth interval and birth weight (in grams)
<table>
<thead>
<tr>
<th>Birth interval</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>%</td>
</tr>
<tr>
<td>&lt;2</td>
<td>2</td>
<td>33.3</td>
</tr>
<tr>
<td>2-4</td>
<td>2</td>
<td>33.3</td>
</tr>
<tr>
<td>&gt;4</td>
<td>2</td>
<td>33.3</td>
</tr>
<tr>
<td>Total</td>
<td>6</td>
<td>100</td>
</tr>
</tbody>
</table>

P= 0.3

**Figure (8):**

Relationship between birth interval (in years) and third stage of labour complications in the studied population.
Discusion

Short birth interval has been identified as potentially being such a risk factor of unfavorable pregnancy outcome but the results of epidemiological studies have been equivocal.

In this study a sample of 324 mothers were studied during the period from the 1st of October 2002 to the 30th of April 2003.

The study showed that 65% of the studied population were of moderate socioeconomic status which reflects a homogenous
population. Only 38.3% of the studied population were illiterate in contrast to the findings in SMS\textsuperscript{(11)}, which indicates rising level of education among females.

The vast majority of the studied population had birth interval of 2-4 years (57.5%) and duration of breastfeeding of 12-24 months (75.9%). Mothers who had birth interval less than 2 years, had a shorter duration of breastfeeding (< 12 months). This reflects the role of lactation in birth spacing.

Most of those with birth interval of less than 2 years had poor ANC (40%), which might be due to later recognition of the pregnancy.

Women with birth interval less than 2 years had a higher rate of anaemia (66.7%) compared with those with birth interval of 2-4 years (16.7%) this agrees with findings in previous studies\textsuperscript{(4)} and might be explained by the maternal depletion hypothesis.

This group also had a higher rate of PROM (55.6%) and preterm labour (75%) compared to those with birth interval of 2-4 yrs (33.3%) and (25%) respectively. These are similar to findings in previous study by the CLAP. It is attributed to the higher prevalence of anaemia in this group predisposing them to infections such as genital tract infections and UTI.
There was found no association between birth interval less than 2 years and APH in contrast to previous study\(^{(4)}\) in which there was found slight increase in the risk of APH (1.73%) in those with birth interval of 14 months or less. There was found no significant association between birth interval less than 2 years and PPH similar to findings in the previous study\(^{(4)}\).

Mothers with birth interval of more than 4 years had a higher rate of hypertension (60%) which agrees with finding in previous study\(^{(4)}\) and might be explained by loss of the protective mechanism.

Regarding perinatal outcome, mothers who had birth interval less than 2 years had slightly higher rate of LBW (46.7%) compared to those with birth interval of 2-4 years (43.3%) in harmony with the finding in previous study\(^{(10)}\). This might be explained by the maternal depletion hypothesis.

Newborns to mothers with birth interval less than 2 years had a higher rate of admission to NICU (58.8%) compared to those with birth interval of 2-4 years (29.9%). This is due to low Apgar score at 5 minutes, which might be due to LBW and prematurity. There was found no significant association between birth interval less than 2 years and risk of apparent congenital anomalies of
the newborn in contrast to finding in previous study\textsuperscript{(43)} in which NTD was higher among those with birth interval of less than 6 months.

**Conclusion**

- In this study, mothers with short birth interval (< 2 years) had a higher rate of anaemia, PROM and preterm labour.

- Short birth interval (< 2 years) is not associated with APH or PPH.

- Those with short birth interval (<2 years) had a shorter duration of breast feeding.
Newborns to mothers with short birth interval (< 2 years) tend to have increased incidence of LBW and low Apgar score at 5 minutes thus, increased admission to NICU.

**Recommendations**

- The importance of birth spacing by using the available methods of family planning, particularly after a birth, to promote safe motherhood and achieve better pregnancy outcome, should be emphasized.

- Health education concerning family planning should be one of the goals of ANC clinics.

- Promotion of breastfeeding to ensure safe childhood, in addition to its role in birth spacing.
Further researches should be done to evaluate the effects of long birth interval on pregnancy outcome.

References


# Influence of Short Birth Spacing on Pregnancy Outcome

1. Name: 

2. Residence: 

3. Age: 
   - (a) < 20 
   - (b) 20-24 
   - (c) 25-29 
   - (d) 30-34 
   - (e) ≥ 35

4. Education: 
   - (a) illiterate 
   - (b) primary 
   - (c) secondary 
   - (d) university & postgraduate

5. Occupation: 
   - (a) house wife 
   - (b) employee 
   - (c) worker 
   - (d) others 

6. Husband’s occupation: 
   - (a) worker 
   - (b) employee 
   - (c) others 

7. Social class: 

8. Obstetric history: G: 
   P: 
   +: 

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<tr>
<th>Pregnancy</th>
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<th>G.A</th>
<th>Mode of delivery</th>
<th>Outcome</th>
<th>Duration of breastfeeding</th>
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9. Antenatal care attendance: 
   - (a) regular 
   - (b) irregular 
   - (c) No
10- Medical disorders in current pregnancy:  
(a) hypertension  
(b) D.M  
(c) anemia  
(d) U.T.I  
(e) others: specify……………..

11- Obstetric problems in current pregnancy:

(a) abortion  
(b) preterm labour  
(c) PROM  
(d) malpresentation  
(e) APH  
(f) others specify…………

12- LMP:  

13- Mode of delivery: 

14- If operative delivery: indication: 

15- Outcome:  
(a) alive  
(b) stillbirth: 1- FSB  
2-MSB

16- If still birth possible cause: 

17- Obvious congenital anomalies: 

(a) Yes specify……………………….  
(b) No

18- Live birth:  
(a) well  
(b) resuscitated  
(c) admitted to NICU

19- Birth weight: Kg

20- Date of delivery: 

21- Third stage of labour complications: 

22- Birth interval: 