Bibliography

Maternal, Infant and Young Child Nutrition and Family Planning (MIYCN-FP) Integration

May 2014
This bibliography was compiled by members of the Maternal, Infant and Young Child Nutrition and Family Planning (MIYCN-FP) Integration Technical Working Group under the Maternal and Child Health Integrated Program.

The Maternal and Child Health Integrated Program (MCHIP) is the USAID Bureau for Global Health’s flagship maternal and child health program. MCHIP supports programming in maternal, newborn, and child health and immunization, nutrition, family planning, malaria, and HIV/AIDS, and strongly encourages opportunities for integration. Cross-cutting technical areas include water, sanitation, hygiene, urban health, and health systems strengthening. Visit http://www.mchip.net to learn more.

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Introduction

In an effort to promote documented best practices, the MIYCN-FP Technical Working Group has supported the development of this annotated bibliography of Maternal, Infant and Young Child Nutrition (MIYCN) and Family Planning (FP) Integration to serve as reference for both researchers and program managers. The purpose of this bibliography is to provide a brief, illustrative sample of documents describing the basic elements of MIYCN-FP integration. The documents listed here provide an overview of the rationale for integrated MIYCN-FP programs. While not exhaustive, this bibliography does contain a comprehensive compilation of materials.

Methodology

This edition of the bibliography focuses on journal articles published from 2001 or later with an emphasis on studies that were undertaken in developing countries. The literature review began with a search on Medline using the following keywords: family planning services, family planning policy, contraception, birth intervals, breastfeeding, exclusive breastfeeding (EBF), maternal nutrition, birth outcomes, pregnancy outcomes, pregnancy intervals and short birth interval. In addition, experts in the fields of nutrition and family planning were asked to review. This update to the bibliography includes articles published from 2001 through April 2014.

Key Studies of Interest

- Becker S, et al. 2001. Dynamics of contraceptive use and breastfeeding during the postpartum period in Peru and Indonesia. Emphasizes the importance of integrating breastfeeding counseling and family planning services for postpartum women.
- Conde-Agudelo A, Rosas-Bermúdez A, Kafury-Goeta A. 2006. Birth Spacing and Risk of Adverse Perinatal Outcomes: A Meta-analysis. Review of studies showed that Intervals of less than 18 months and longer than 59 months were associated with a significantly greater risk for adverse perinatal outcomes.
- DaVanzo J, et al. 2008. The effects of pregnancy spacing on infant and child mortality in Matlab, Bangladesh: How they vary by the type of pregnancy outcome that began the interval. Controlled for other correlates of infant and child mortality in Matlab, Bangladesh and found that shorter birth intervals are associated with higher mortality.
- Gebreselassie T, et al. 2005. Contraceptive use, breastfeeding, amenorrhea and abstinence during the postpartum period: An analysis of four countries. Based on the findings authors recommend that prenatal programs include information on breastfeeding and PP contraception, and discuss contraception during the postpartum visits.
- Jakobsen MS, et al. 2003. Termination of breastfeeding after 12 months of age due to a new pregnancy and other causes is associated with increased mortality in Guinea-Bissau. Weaning due to a new pregnancy is associated with higher infant mortality.
Key Studies of Interest Continued

Rutstein SO. 2008. Further evidence of the effects of preceding birth intervals on neonatal, infant, and under-five-years mortality and nutritional status in developing countries: Evidence from the Demographic and Health Surveys. *Importance of birth spacing for child survival and health.*


Tilley IB, et al. 2009. Breastfeeding and contraception use among women with unplanned pregnancies less than 2 years after delivery. *Describes relationship between breastfeeding and beliefs about protection from pregnancies. Among the breastfeeding women, most didn’t use contraception because they believed breastfeeding would prevent pregnancy.*


Bibliography


Abstract: In this review, the authors summarize current knowledge on maternal nutritional requirements during pregnancy, with a focus on the nutrients that have been most commonly investigated in association with birth outcomes. Data sourcing and extraction included searches of the primary resources establishing maternal nutrient requirements during pregnancy (e.g., Dietary Reference Intakes), and searches of Medline for “maternal nutrition”/“specific nutrient of interest” and “birth/pregnancy outcomes,” focusing mainly on the less extensively reviewed evidence from observational studies of maternal dietary intake and birth outcomes. The authors used a conceptual framework which took both primary and secondary factors (e.g., baseline maternal nutritional status, socioeconomic status of the study populations, timing and methods of assessing maternal nutritional variables) into account when interpreting study findings. The authors conclude that maternal nutrition is a modifiable risk factor of public health importance that can be integrated into efforts to prevent adverse birth outcomes, particularly among economically developing/low-income populations.


Abstract: This paper examines the interaction between contraceptive use and breastfeeding in relations to resumption of intercourse and duration of amenorrhea postpartum. We used data from the month-by-month calendar of reproductive events from the Demographic and Health Surveys (DHS) in Peru and Indonesia. The analyses show that breastfeeding women were less likely than non-breastfeeding women to have resumed sexual intercourse in the early postpartum in both countries. In Peru, but not in Indonesia, breastfeeding women had significantly lower odds than non-breastfeeding women of adopting contraception. Although the likelihood of contraceptive adoption was highest in the month women resumed menstruation in both countries, about ten percent of subsequent pregnancies occurred to women before they resumed menses. These results emphasize the importance of integrating breastfeeding counseling and family planning services in programmes serving postpartum women, as a means of enabling those who wish to space their next birth to avoid exposure to the risk of a pregnancy that may precede the return of menses.


Abstract: To explore attitudes about birth spacing among low-income, recently postpartum women, using qualitative methods, seven focus groups among postpartum women were conducted, probing knowledge and attitudes related to desired birth spacing. Transcripts of the
discussions were reviewed and coded for salient themes using a Grounded Theory approach. In regards to whether to pursue pregnancy in the future, major themes included the availability of adequate resources, current family composition and the role of partners. With respect to when to have a next pregnancy, themes centered around the desire for particular intervals between siblings. Discussions of the effect of spacing on the health of the mother or child did not emerge frequently. Theme underlying postpartum women’s desire for particular birth spacing are varied, but social and family considerations seem to predominate over concerns or knowledge about potential health effects. Improving women’s knowledge about these consequences could lead to lowering the incidence of short interpregnancy intervals, known to be associated with adverse perinatal outcomes.


Abstract: The objective of the study was to explore the association between birth spacing and risk of adverse maternal outcomes. The study was a systematic review of observational studies that examined the relationship between interpregnancy or birth intervals and adverse maternal outcomes. Twenty-two studies met the inclusion criteria. Overall, long interpregnancy intervals, possibly longer than 5 years, are independently associated with an increased risk of preeclampsia. There is emerging evidence that women with long interpregnancy intervals are at increased risk for labor dystocia and that short intervals are associated with increased risks of uterine rupture in women attempting a vaginal birth after previous cesarean delivery and uteroplacental bleeding disorders (placental abruption and placenta previa). Less clear is the association between short intervals and other adverse outcomes such as maternal death and anemia. Long interpregnancy intervals are independently associated with an increased risk of preeclampsia. Both short and long interpregnancy intervals seem to be related to other adverse maternal outcomes, but more research is needed.


Context: Both short and long interpregnancy intervals have been associated with an increased risk of adverse perinatal outcomes. However, whether this possible association is confounded by maternal characteristics or socioeconomic status is uncertain.

Objective: To examine the association between birth spacing and relative risk of adverse perinatal outcomes.

Data Sources: Studies published in any language were retrieved by searching MEDLINE (1966 through January 2006), EMBASE, ECLA, POPLINE, CINAHL, and LILACS, proceedings of meetings on birth spacing, and bibliographies of retrieved articles, and by contact with relevant researchers in the field.

Study Selection: Included studies were cohort, cross-sectional, and case-control studies with results adjusted for at least maternal age and socioeconomic status, reporting risk estimates and 95% confidence intervals (or data to calculate them) of birth spacing and perinatal outcomes. Of 130 articles identified in the search, 67 (52%) were included.

Data Extraction: Information on study design, participant characteristics, measure of birth spacing used, measures of outcome, control for potential confounding factors, and risk estimates was abstracted independently by 2 investigators using a standardized protocol.

Data Synthesis: A random-effects model and meta-regression analyses were used to pool data from individual studies. Compared with interpregnancy intervals of 18 to 23 months, interpregnancy intervals shorter than 6 months were associated with increased risks of preterm birth, low birth weight, and small for gestational age (pooled adjusted odds ratios [95%
confidence intervals: 1.40 [1.24-1.58], 1.61 [1.39-1.86], and 1.26 [1.18-1.33], respectively). Intervals of 6 to 17 months and longer than 59 months were also associated with a significantly greater risk for the 3 adverse perinatal outcomes.

**Conclusions:** Interpregnancy intervals shorter than 18 months and longer than 59 months are significantly associated with increased risk of adverse perinatal outcomes. These data suggest that spacing pregnancies appropriately could help prevent such adverse perinatal outcomes.


**Abstract:** Using high-quality longitudinal data on 125,720 singleton live births in Matlab, Bangladesh, we assessed the effects of duration of intervals between pregnancy outcomes on infant and child mortality and how these effects vary over subperiods of infancy and childhood and by the type of outcome that began the interval. Controlling for other correlates of infant and child mortality, we find that shorter intervals are associated with higher mortality. Interval effects are greater if the interval began with a live birth than with another pregnancy outcome. In the first week of the child’s life, the effects of short intervals are greater if the sibling born at the beginning of the interval died; after the first month, the effects are greater if that sibling was still alive. Many relationships found are consistent with the maternal depletion hypothesis, and some with sibling competition. Some appear to be due to correlated risks among births to the same mother.


**Problem/Condition:** In 2006, CDC published recommendations to improve health and health care for women before pregnancy and between pregnancies (CDC. Recommendations to improve preconception health and health care—United States: a report of the CDC/ATSDR Preconception Care Work Group and the Select Panel on Preconception Care. MMWR 2006;55 [No. RR-6]). The Pregnancy Risk Assessment Monitoring System (PRAMS) provides data concerning maternal behaviors, health conditions, and experiences for women in the United States who have delivered a live birth. Reporting Period Covered: 2004.

**Description of System:** PRAMS is an ongoing, state- and population-based surveillance system designed to monitor selected maternal behaviors and experiences that occur before, during, and after pregnancy among women who deliver live-born infants in selected states and cities in the United States. PRAMS employs a mixed mode data-collection methodology; up to three self-administered questionnaires are mailed to a sample of mothers, and nonresponders are followed up with telephone interviews. Self-reported survey data are linked to selected birth certificate data and weighted for sample design, non-response, and non-coverage to create annual PRAMS analysis data sets that can be used to produce statewide estimates of perinatal health behaviors and experiences among women delivering live infants. This report summarizes data from 26 PRAMS reporting areas that collected data during 2004 and that had achieved overall weighted response rates of >70% and had weighted data available by the time the analysis was conducted in January 2007. Data are reported on indicators regarding 18 behaviors and conditions that are relevant to preconception (i.e., pre-pregnancy) health and health care and 10 that are relevant to interconception (i.e., postpartum) health and health care. The number of questions that were administered varied by site; certain questions were not asked for all reporting areas.

**Results:** With respect to preconception maternal behaviors and experiences, mean overall prevalence was 23.2% for tobacco use, 50.1% for alcohol use, 35.1% for multivitamin use at least
four times a week, 53.1% for nonuse of contraception among women who were not trying to become pregnant, 77.8% for ever having a dental visit before pregnancy, 30.3% for receiving pre-pregnancy health counseling, 3.6% for experiencing physical abuse, and 18.5% for experiencing at least four stressors before pregnancy. With respect to preconception maternal health conditions, mean overall prevalence was 13.2% for women being underweight (body mass index [BMI]: <19.8), 13.1% for being overweight (BMI: 26.0–29.0), and 21.9% for being obese (BMI: >29.0). Mean overall prevalence was 1.8% for having diabetes, 6.9% for asthma, 2.2% for hypertension, 1.2% for heart problems, and 10.2% for anaemia. Among women with a previous live birth, the mean overall prevalence of having a previous low birth weight infant was 11.6% and of having a previous preterm infant was 11.9% (MMWR December 14, 2007). With respect to interconception maternal behaviors and experiences, mean overall prevalence was 17.9% for tobacco use, 85.1% for contraceptive use, 15.7% for having symptoms of depression, and 84.8% for having social support. Mean overall prevalence was 7.5% for the most recent infant being born low birth weight, 10.4% for having a recent preterm infant, 89.3% for having a check-up, 89.0% for receiving contraceptive use counseling, 30.4% for having a dental visit, and 48.6% for receiving services from the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). Results varied by maternal age, race/ethnicity, pregnancy intention, and health insurance status. For certain risk behaviors and health conditions, mean overall prevalence was higher among women aged <20 years, black women, women whose pregnancies were unintended, and women receiving Medicaid; however, no single subgroup was consistently at highest risk for all the indicators examined in this report.

**Interpretation:** PRAMS results varied among reporting areas. The prevalence estimates in the majority of reporting areas and for the majority of indicators suggest that a substantial number of women would benefit from preconception interventions to ensure that they enter pregnancy in optimal health. The results also demonstrate disparities among age and racial/ethnic subpopulations, especially with respect to pre-pregnancy medical conditions and access to health care both before conception and postpartum. Differences also exist in health behaviors between women who reported intended and unintended pregnancies.

**Public Health Action:** Maternal and child health programs can use PRAMS data to monitor improvements in maternal preconception and interconception behaviors and health status. The data presented in this report, which were collected before publication of CDC’s recommendations to improve preconception health and health care in the United States, can be used as a baseline to monitor progress toward improvements in preconception and interconception health following publication of the recommendations. These data also can be used to identify specific groups at high risk that would benefit from targeted interventions and to plan and evaluate programs aimed at promoting positive maternal and infant health behaviors, experiences, and reproductive outcomes. In addition, the data can be used to inform policy decisions that affect the health of women and infants.


**Abstract:** Women are doubly vulnerable to malnutrition, because of their high nutritional requirements for pregnancy and lactation and also because of gender inequalities in poverty. Undernutrition and overnutrition coexist in developing countries undergoing rapid nutrition transition, and women are susceptible to this double burden of "dysnutrition," often cumulating stunting or micronutrient malnutrition with obesity or other nutrition-related chronic diseases. The purpose of the present paper is to describe the adverse impact of income and gender inequities on women's nutritional health, and the dramatic consequences, not only for women themselves, but for children, families, and societies. Improving women's resources, including health, nutrition, education, and decisional power, is critical for equity and for the health of...
children and adults of future generations, since poor fetal and infancy nutrition is another risk factor for chronic diseases, in particular abdominal obesity, type 2 diabetes, hypertension, and cardiovascular disease. Addressing malnutrition and nutrition-related chronic diseases simultaneously is a challenge facing developing countries, and examples of promising initiatives are provided. Focusing on women along the lifecycle, according to the continuum of care approach, is essential to achieving the Millennium Development Goals and to breaking the intergenerational cycle of poverty, malnutrition, and ill-health.


Abstract: This review addresses the question of whether a short birth interval is associated with adverse nutritional outcomes for the mother or the child. Indices of anthropometric status (maternal weight or BMI; child growth) and micronutrient status (e.g. iron or vitamin A) were included as outcomes. A computerized search of all relevant papers published since 1966 was completed, and the “snowball” method was used to identify additional relevant published or unpublished papers. In total, 57 papers were found to contain data regarding the relationship between birth spacing and nutritional outcomes (35 for child nutrition, 11 for maternal anthropometric status, and 11 for maternal anaemia or micronutrient status). Of these, 23 papers were excluded from further consideration because they did not include any multivariate analysis, leaving 34 papers that met the criteria for the review (22 for child nutrition, eight for maternal anthropometric status, and four for maternal anaemia or micronutrient status). The studies on child nutrition outcomes indicate that a longer birth interval is associated with a lower risk of malnutrition in some populations, but not all. In those countries in which the relationship was significant, the reduction in stunting associated with a previous birth interval ≥ 36 months ranged from 10% to 50%. Some of this reduction may be due to residual confounding, i.e., to factors not included in the analysis (such as breastfeeding and maternal height).

The studies on maternal anthropometric outcomes yielded mixed results. Because the nutritional burden on the mother between pregnancies depends on the extent of breastfeeding, the interpregnancy interval is not the best measure of whether the mother has had a chance to recover from the pregnancy, in terms of repleting her nutritional status. Therefore, some studies examined the “recuperative interval” (duration of the non-pregnant, non-lactating interval) instead. Taken as a whole, the studies do not provide clear evidence of a link between interpregnancy or recuperative interval and maternal anthropometric status. This may be due, in part, to changes in the hormonal regulation of nutrient partitioning between the mother and the fetus when a mother is malnourished.

Only four papers were identified that related to micronutrient status, three of which examined maternal anaemia. One study showed an increased risk for maternal anaemia when the interpregnancy interval was 6 months, but the analysis did not control for iron supplementation during pregnancy. The other two studies did not show a significant association between interpregnancy interval and maternal anaemia. One study of micronutrient status indicated no significant relationship between interpregnancy interval and maternal serum zinc, copper, magnesium, ferritin, folate or thyroid-stimulating hormone.

Important methodological limitations were apparent in most of the studies. Thus, further research with more comprehensive control of potentially confounding variables is needed.

**Abstract:** The objective of this Food and Nutrition Bulletin supplement is to focus attention on the need to integrate actions to improve maternal, infant, and young child nutrition across the different stages of the key “window of opportunity” from preconception through pregnancy, the period of exclusive breastfeeding (0–6 months), and the target age for complementary feeding (6–24 months). It is essential that program managers, policymakers, and researchers have a clear understanding of how nutrition during each of these different phases can affect the health outcomes that are the focus of their efforts. Understanding the synergistic effects of improved nutrition across these different phases, and which interventions are appropriate during each phase, is necessary in order to work jointly, efficiently, and with greater success to reduce the high rates of stunting and micronutrient deficiencies we still see around the world.


**Summary:** The majority of studies of the birth spacing-child survival relationship rely on retrospective data, which are vulnerable to errors that might bias results. The relationship is re-assessed using prospective data on 13,502 children born in two Nairobi slums between 2003 and 2009. Nearly 48% were first births. Among the remainder, short preceding intervals are common: 20% of second and higher order births were delivered within 24 months of an elder sibling, including 9% with a very short preceding interval or less than 18 months. After adjustment for potential confounders, the length of the preceding birth interval is a major determinant of infant and early childhood mortality. In infancy, a preceding birth interval or less than 18 months is associated with a two-fold increase in mortality risks (compared with lengthened intervals of 36 months or longer), while an interval of 18-23 months is associated with an increase of 18%. During the early childhood period, children born within 18 months of an elder sibling are more than twice as likely to die as those born after an interval of 36 months or more. Only 592 children experienced the birth of a younger sibling within 20 months; their second-year mortality was about twice as high as that of other children. These results support the findings based on retrospective data.


**Objectives:** Irrespective of the fact that breastfeeding in India is almost universal, psychosocial and cultural barriers still exists to early breastfeeding. The exact reasons for this delay are not clearly known. Hence we conducted this study to assess breastfeeding knowledge and practices and the factors influencing them among women in rural Punjab, India.

**Methodology:** We interviewed 1,000 women in a community-based analytical cross-sectional study that was carried out in 20 villages of the District of Amritsar, Punjab, India, in 2005–2006 by standard cluster sampling. Time at initiation of breastfeeding and variables like understanding about the importance of colostrum, nutrition during lactation, and motivation by health workers were assessed. Statistical analysis was done by percentages compared with the \( \chi^2 \) test.

**Results:** Two hundred twenty-five respondents (23.8%) started breastfeeding their babies on the first day of birth, but in terms of early breastfeeding only 128 (13.5%) respondents put their babies on the breast within 4 hours of birth. Of the 1,000 respondents, 356 (35.6%) of the respondents were unaware of the importance of colostrum, 733 (77.6%) were not given advice on
benefits of breastfeeding/weaning, and 306 (33.5%) of respondents had not increased their diet during lactation.

**Conclusions:** Early breastfeeding knowledge and practices were suboptimal among the mothers in rural Punjab. Health education on breastfeeding and nutrition remains the dark area. Research and public health efforts like one-to-one “breastfeeding counseling and health education on nutrition” to the mother by health workers should be promoted.

Gebreselassie T, Rutstein SO, Mishra V. Contraceptive use, breastfeeding, amenorrhea and abstinence during the postpartum period: An analysis of four countries. *DHS Analytical Studies*. 2005; (14).

**Abstract:** Contraceptive use during the postpartum period has been of considerable interest to both demographers and family planning managers. The risk of unwanted pregnancy is high during the year following the birth of a child, and many women have unmet need for contraception during this period. This study examines the determinants of time to first use of a contraceptive method after a birth, duration of breastfeeding, and postpartum amenorrhea.

We use data from month-to-month detailed retrospective histories of contraceptive use by women age 15–49. The data come from recent Demographic and Health Surveys (DHS) in Kenya, Indonesia, the Dominican Republic, and Peru. Using life-table methods, we report cumulative percentages of women who initiated contraceptive use by 2, 6, 9, and 12 months, and the median duration until first use of contraception after a birth. We then investigate the independent effects of selected social, economic, and demographic factors on the time to first use of contraception, on durations of breastfeeding, and on postpartum amenorrhea during the first 12 months after a birth. Our bivariate analyses show that in all four countries the likelihood of adopting contraception during the first 12 months postpartum increases with the level of education of the mother, her exposure to the media, the wealth status of the household, and whether delivery was at a public or private health facility.

Additionally, we find that between 20 percent and 40 percent of women in the countries studied did not initiate contraceptive use postpartum before they became at risk for another pregnancy. Our multivariate analyses suggest that in all four countries education and wealth status have a significant positive association with the adoption of any contraceptive method during the first 12 months postpartum. Also, in three of the countries mother’s exposure to mass media has a significant positive association with adoption of a contraceptive method. The study also explores the determinants of adoption of hormonal contraception (specifically, the pill and injectables) and non-hormonal methods during the first 12 months postpartum. Mothers from wealthier households and with formal education are more likely to initiate use of non-hormonal and hormonal contraceptive methods, as well are mothers age 25 and older. Modernization synonymous with urbanization and formal education) is linked to early termination of breastfeeding, our study shows. Older mothers (age 25 and above) are more likely than mothers age 15–24 to terminate breastfeeding early.

In all four countries higher levels of maternal education and wealth are associated with a lower likelihood of remaining amenorrheic during the 12 months postpartum. Additionally, mothers with a preceding birth interval of 24–47 months are more likely to remain amenorrheic during this period. Given that mothers delivering in a health service breastfeed for a shorter period and adopt contraception earlier and more, we recommend that prenatal programs include information on breastfeeding and on using contraception during the postpartum period, as well as the regular inclusion of a discussion of contraception during the postpartum check before discharge for mothers who deliver in health facilities and during postpartum home visits for all mothers.

Abstract: It is well understood that undernutrition underpins much of child morbidity and mortality in less developed countries, but the causes of undernutrition are complex and interrelated, requiring a multipronged approach for intervention. This paper uses a subsample of 3,853 children under age 5 from the most recent family health survey in El Salvador to examine the relationship between birth spacing and childhood undernutrition (stunting and underweight). While recent research and guidance suggest that birth spacing of three to five years contributes to lower levels of infant and childhood mortality, little attention has been given to the possibility that short birth intervals have longer-term effects on childhood nutrition status. The analysis controls for clustering effects arising from siblings being included in the subsample, as well as variables that are associated with household resources, household structure, reproductive history and outcomes, and household social environment. The results of the multiple regression analyses find that in comparison to intervals of 36–59 months, birth intervals of less than 24 months and intervals of 24–35 months significantly increase the odds of stunting (<24 months Odds Ratio (OR) = 1.52; 95% confidence interval (CI): 1.21–1.92; 25–36 months OR = 1.30; 95% CI: 1.05–1.64). Other factors related to stunting and underweight include standard of living index quintile, child’s age, mother’s education, low birthweight, use of prenatal care, and region of the country where the child lives. Policy and program implications include more effective use of health services and outreach programs to counsel mothers on family planning, breastfeeding, and well child care.


Objectives: The promotion of exclusive breastfeeding (EBF) to reduce the postnatal transmission (PNT) of HIV is based on limited data. In the context of a trial of postpartum vitamin A supplementation, we provided education and counseling about infant feeding and HIV, prospectively collected information on infant feeding practices, and measured associated infant infections and deaths.

Design and methods: A total of 14 110 mother-newborn pairs were enrolled, randomly assigned to vitamin A treatment group after delivery, and followed for 2 years. At baseline, 6 weeks and 3 months, mothers were asked whether they were still breastfeeding, and whether any of 22 liquids or foods had been given to the infant. Breastfed infants were classified as exclusive, predominant, or mixed breastfed.

Results: A total of 4495 mothers tested HIV positive at baseline; 2060 of their babies were alive, polymerase chain reaction negative at 6 weeks, and provided complete feeding information. All infants initiated breastfeeding. Overall PNT (defined by a positive HIV test after the 6-week negative test) was 12.1%, 68.2% of which occurred after 6 months. Compared with EBF, early mixed breastfeeding was associated with a 4.03 (95% CI 0.98, 16.61), 3.79 (95% CI 1.40-10.29), and 2.60 (95% CI 1.21-5.55) greater risk of PNT at 6, 12, and 18 months, respectively. Predominant breastfeeding was associated with a 2.63 (95% CI 0.59-11.67), 2.69 (95% CI 0.95-7.63) and 1.61 (95% CI 0.72-3.64) trend towards greater PNT risk at 6, 12, and 18 months, compared with EBF.

Conclusion: EBF may substantially reduce breastfeeding-associated HIV transmission.

**Background:** As part of an assessment of breastfeeding and child health in Guinea-Bissau, we investigated the impact of mother’s reason for weaning on subsequent child mortality.

**Methods:** Children were identified and followed by the demographic health surveillance system of the Bandim Health Project in Guinea-Bissau. Breastfeeding status and survival were ascertained by 3-monthly follow-up home visits. At termination of breastfeeding mothers were interviewed about her reasons for weaning. In all, 1423 children who terminated breastfeeding after 12 months of age were followed to 3 years of age.

**Results:** Median length of breastfeeding was 22 months. Following termination of breastfeeding, 66 children died before 36 months of age. In all, 62% (879/1423) were weaned because they were ‘healthy’. Compared with the ‘healthy’ children, all other causes of weaning were associated with a higher mortality (mortality ratio [MR] = 2.97, 95% CI: 1.54–5.73). For 237 children weaned due to a new pregnancy the MR was 3.25 (95% CI: 1.45–7.30). Seventy-five children weaned because of illness had a 2.98 (95% CI: 0.95–9.39) fold excess mortality compared with children considered healthy. Excess deaths in the ‘non-healthy’ group accounted for 44% (29/66) of post-weaning deaths. Median length of spacing between an index child and a new sibling was 28 months irrespective of whether the index child survived or died before 3 years of age. The majority of the deaths occurred before birth of the new sibling.

**Conclusion:** Popular rationalizations of abstinence during breastfeeding emphasizes, as we observed, that weaning due to new pregnancy of the mother is associated with higher mortality. This was not due to a shorter breastfeeding period of the child weaned due to a new pregnancy. Generally children weaned for other reasons than ‘being healthy’ had higher mortality. The mother’s reason for weaning could potentially be used as screening criteria in child monitoring programmes in areas with high mortality.

King, JC. The risk of maternal nutritional depletion and poor outcomes increases in early or closely spaced pregnancies. *The Journal of Nutrition.* 2003; 133(5): 1732S-1736S.

**Abstract:** An adequate supply of nutrients is probably the single most important environmental factor affecting pregnancy outcome. Women with early or closely spaced pregnancies are at increased risk of entering a reproductive cycle with reduced reserves. Maternal nutrient depletion may contribute to the increased incidence of preterm births and fetal growth retardation among these women as well as the increased risk of maternal mortality and morbidity. In the past, it was assumed that the fetus functioned as a parasite and withdrew its nutritional needs from maternal tissues. Studies in both animals and humans demonstrate, however, that if the maternal nutrient supply is inadequate, the delicate balance between maternal and fetal needs is disturbed and a state of biological competition exists. Furthermore, maternal nutritional status at conception influences how nutrients are partitioned between the mother and fetal dyad. In severe deficiencies maternal nutrition is given preference; in a marginal state the fetal compartment is favored. Although the studies of nutrient partitioning have focused on energy and protein, the partitioning of micronutrients may also be influenced by the maternal nutritional status. Marginal intakes of iron and folic acid during the reproductive period induce a poor maternal status for these nutrients during the interpregnancy interval. Poor iron and folic acid status has also been linked to preterm births and fetal growth retardation. Supplementation with food and micronutrients during the interpregnancy period may improve pregnancy outcomes and maternal health among women with early or closely spaced pregnancies.

**Objective:** To determine the breast-feeding practices and duration of lactational amenorrhoea among women within the first year of delivery in a Nigerian population. Method: Cross-sectional study carried out between January 2005 and April 2006, among mothers within one year of delivery, who were attending the Infant Welfare Clinic at Wesley Guild Hospital, Ilesa, Nigeria. Using a semi-structured questionnaire, mothers were interviewed to obtain information regarding their socio-demographic characteristics, parity, breast-feeding habits, use of contraception and onset of menstruation after delivery. Information obtained was analysed using the Statistical Package for Social Sciences (SPSS) software version 11.

**Results:** All 268 (100%) mothers interviewed breast-fed their babies, 261 (97.4%) of which for at least 6 months. Most (71.6%) suckled exclusively for 6 months and more; only 10 (3.7%) never carried out exclusive breast-feeding. Age, parity and educational level did not affect the duration of exclusive breast-feeding. Lactational amenorrhoea lasted 3 months or more in 229 (85.5%) of the mothers. Of the 174 who exclusively breast-fed for 6 months, 109 (62.6%) remained amenorrhoeic during that time and, hence, met the criteria for use of LAM contraception.

**Conclusion:** Exclusive breast-feeding among nursing mothers is highly prevalent among Yoruba mothers of South-west Nigeria. Since lactational amenorrhoea lasts 6 months in about two-thirds of the women nursing for that period of time, there is a great potential for the application of LAM for contraception. (Kuti O., 2007, Abstract)


**Abstract:** Recently, we showed that following pregnancy and 6 months of lactation, adolescents cease linear growth and have reduced fat and lean mass in rural Bangladesh. Here, we examined whether these changes varied by pregnancy outcomes such as fetal loss, low birthweight (LBW) and neonatal mortality. Anthropometric measurements were taken among 12-19-year-old primigravidae (n = 229) in early pregnancy and at 6 months post-partum. Never-pregnant adolescents (n = 456) matched on age and time since menarche were also measured at the same time. Change in anthropometry among pregnant vs. never-pregnant adolescents was compared by pregnancy outcome adjusting for confounders using mixed effects regression models. Pregnant girls, irrespective of birth outcome, did not gain in stature, while never-pregnant girls increased in height by 0.36 +/- 0.04 cm year(-1) (P < 0.05). Body mass index, mid-upper arm circumference (MUAC) and % body fat among pregnant adolescents whose infants survived the neonatal period had decreased at 6 months post-partum, whereas those who experienced a fetal loss or neonatal death did not change in any of the measurements. Consequently, the difference in change in ponderal size and body composition measures between pregnant and never-pregnant girls was higher among those whose neonates survived vs. those who experienced a fetal loss/neonatal death (BMI: -0.64 +/- 0.11 vs. 0.01 +/- 0.16 kg m(-2) year(-1); MUAC: -0.96 +/- 0.12 vs. -0.35 +/- 0.17 cm year(-1), both P < 0.05). LBW and preterm birth did not have a similar effect modification. Linear growth ceased among pregnant girls regardless of birth outcome. Maternal weight loss and depletion of fat and lean mass at 6 months post-partum were more pronounced when the infants survived through the neonatal period.
Rutstein SO. Further evidence of the effects of preceding birth intervals on neonatal, infant, and under-five years mortality and nutritional status in developing countries: Evidence from the Demographic and Health Surveys. *DHS Working Papers, Demographic and Health Research*. 2008; (41).

**Abstract:** This study pools birth history data from all 52 DHS surveys conducted from 2000 through 2005. Utilizing life tables and Cox hazard multivariate regression, the effects of the birth-to-pregnancy interval are studied for infant and child mortality, broken down into several periods—early neonatal, neonatal, post-neonatal, infant, child (one to four years), and under-age five years. The birth-to-pregnancy interval is classified into groups that will be harmonized with those of forthcoming studies. In the analyses, intervals based on imputed dates of birth are excluded. The resulting data set includes 1,123,454 births.

In general, the findings of this study confirm those of the author's preceding study on 17 DHS surveys. While the excess risk of mortality is highest for very short intervals (less than 12 months birth to pregnancy), there are relatively few children conceived at such intervals (14 percent). Combining both the increased risk of death for children conceived between 12 and 35 months with the great number of children with such intervals (42 percent) results in substantial declines in mortality by avoiding these intervals. The population attributable risk (PAR) for under-five mortality for avoiding conceptions at less than 24 months after a birth is 0.134. In other words, if all women would wait at least 24 months to conceive again, under-five deaths would fall by 13 percent. The effect of waiting 36 months to conceive again would avoid 25 percent of under-five deaths. The impact of avoiding these high risk intervals (less than 36 months) would be a total of 1,836,000 deaths avoided annually in less developed countries, excluding China (where there is a one child policy). Thus, parents who want their children to survive and thrive would do well to wait at least 30 months after a birth to conceive another child. (Excerpt)


**Background:** Breastfeeding does not reliably protect against pregnancy except during the first 6 months postpartum and only then if accompanied by amenorrhea. Reluctance to use other methods of contraception during lactation may result in unplanned pregnancy. The aims of this study were to describe, among women in rural Egypt attending for antenatal care the prevalence of pregnancy during breastfeeding, contraceptive practice and unintended pregnancy. Finally, the study assessed women's impressions of the effect of conception during breastfeeding on breast milk and on the health of the breastfed infant.

**Study Design:** A descriptive study using an interviewer-administered structured questionnaire for 2,617 parous women attending a hospital in Egypt for antenatal care.

**Results:** More than 95% of women breastfed the child before their current pregnancy; 25.3% conceived while breastfeeding. Conception occurred during the first 6 months postpartum in 4.4%, before resumption of menstruation in 15.1% and while exclusively or almost exclusively breastfeeding in 28.1%. Only 10 pregnancies (1.5%) occurred when all the prerequisites of the lactational amenorrhea method of contraception (LAM) were present. Twenty-nine percent of pregnancies conceived during breastfeeding were unintended, 10% of women had considered terminating their pregnancy while 4.4% of them reported trying to do so.

**Conclusions:** Pregnancy during breastfeeding is common in Egypt and is often unintended. There is great potential for using LAM, but it must be properly taught, and women should be encouraged to start using effective contraception as soon as any of the prerequisites of LAM expires.

Abstract: Increased stress, psychosocial problems, economic disadvantages, and lack of prenatal care are proposed to explain discrepancies in the outcome of unintended pregnancies. Studies of maternal intention and pregnancy outcomes have yielded varied results. Objective is to review studies of the risk of low birth weight (LBW)/preterm births (PTB) associated with unintended pregnancies ending in a live birth. We reviewed studies reporting on maternal intentions and outcomes from Medline, Embase, CINAHL, and bibliographies of identified articles. An unintended pregnancy was further classified as mistimed (not intended at that time) or unwanted (not desired at any time). Studies reporting an association between pregnancy intention and any of the outcomes were included. Study quality was assessed for biases in selection, exposure assessment, confounder adjustment, analysis, outcomes assessment, and attrition. Unadjusted and adjusted data from included studies were extracted by two reviewers. There were significantly increased odds of LBW among unintended pregnancies [odds ratio (OR) 1.36, 95% confidence interval (CI) 1.25, 1.48] ending in a live birth. Within the unintended category, mistimed (OR 1.31, 95% CI 1.13, 1.52) and unwanted (OR 1.51, 95% CI 1.29, 1.78) pregnancies were associated with LBW. There were statistically significantly increased odds of PTB among unintended (OR 1.31, 95% CI 1.09, 1.58), and unwanted (OR 1.50, 95% CI 1.41, 1.61) but not for mistimed (OR 1.36, 95% CI 0.96, 1.93) pregnancies. Unintended, unwanted, and mistimed pregnancies ending in a live birth are associated with a significantly increased risk of LBW and PTB.


Background: There is little information on country trends in the complete distributions of children’s anthropometric status, which are needed to assess all levels of mild to severe undernutrition. We aimed to estimate trends in the distributions of children’s anthropometric status and assess progress towards the Millennium Development Goal 1 (MDG 1) target of halving the prevalence of weight-for-age Z score (WAZ) below –2 between 1990 and 2015 or reaching a prevalence of 2 3% or lower.

Methods: We collated population-representative data on height-for-age Z score (HAZ) and WAZ calculated with the 2006 WHO child growth standards. Our data sources were health and nutrition surveys, summary statistics from the WHO Global Database on Child Growth and Malnutrition, and summary statistics from reports of other national and international agencies. We used a Bayesian hierarchical mixture model to estimate Z-score distributions. We quantified the uncertainty of our estimates, assessed their validity, compared their performance to alternative models, and assessed sensitivity to key modelling choices.

Findings: In developing countries, mean HAZ improved from –1.86 (95% uncertainty interval –2.01 to –1.72) in 1985 to –1.16 (–1.29 to –1.04) in 2011; mean WAZ improved from –1.31 (–1.41 to –1.20) to –0.84 (–0.93 to –0.74). Over this period, prevalences of moderate-and-severe stunting declined from 47.2% (44.0 to 50.3) to 29.9% (27.1 to 32.9) and underweight from 30.1% (26.7 to 33.3) to 19.4% (16.5 to 22.2). The largest absolute improvements were in Asia and the largest relative reductions in prevalence in southern and tropical Latin America. Anthropometric status worsened in sub-Saharan Africa until the late 1990s and improved thereafter. In 2011, 314 (296 to 331) million children younger than 5 years were mildly, moderately, or severely stunted and 258 (240 to 274) million were mildly, moderately, or severely underweight. Developing countries as a whole have less than a 5% chance of meeting the MDG 1 target; but 61 of these 141 countries have a 50–100% chance.
Interpretation: Macroeconomic shocks, structural adjustment, and trade policy reforms in the 1980s and 1990s might have been responsible for worsening child nutritional status in sub-Saharan Africa. Further progress in the improvement of children’s growth and nutrition needs equitable economic growth and investment in pro-poor food and primary care programmes, especially relevant in the context of the global economic crisis.


Objective: To examine breastfeeding and contraceptive use after the lactational amenorrhea method (LAM) criteria were no longer met.

Methods: Two hundred and thirty-three parous Egyptian women with unplanned pregnancies less than 2 years after delivery completed a questionnaire examining breastfeeding practice and contraceptive use.

Results: The majority of women (81.5%) with unplanned pregnancies within 2 years of delivery were breastfeeding at conception. Of these women, 36.3% had used a method of contraception other than LAM compared with 60.5% of women who had weaned (P<0.05). Among the breastfeeding women, 61.2% failed to use contraception because they believed breastfeeding would prevent pregnancy.

Conclusion: Breastfeeding women with unplanned pregnancies were less likely to have used contraception than women who had weaned, suggesting that prolonged breastfeeding contributes to unmet contraceptive need.


Overview:

- Undernutrition jeopardizes children’s survival, health, growth and development, and it slows national progress towards development goals. Undernutrition is often an invisible problem.
- A child’s future nutrition status is affected before conception and is greatly dependent on the mother’s nutrition status prior to and during pregnancy. A chronically undernourished woman will give birth to a baby who is likely to be undernourished as a child, causing the cycle of undernutrition to be repeated over generations.
- Children with iron and iodine deficiencies do not perform as well in school as their well-nourished peers, and when they grow up they may be less productive than other adults.
- Stunting reflects chronic nutritional deficiency, aggravated by illness. Compared to other forms of undernutrition, it is a problem of larger proportions:
  - Among children under 5 years old in the developing world, an estimated one third—195 million children are stunted, whereas 129 million are underweight.
  - Twenty-four countries bear 80% of the developing world burden of undernutrition as measured by stunting.
  - In Africa and Asia, stunting rates are particularly high, at 40% and 36% respectively.
  - More than 90 percent of the developing world’s stunted children live in Africa and Asia.
- Progress for children lies at the heart of all Millennium Development Goals (MDGs). Along with cognitive and physical development, proper nutrition contributes
significantly to declines in under-five mortality rates, reductions of disease and poverty, improvements in maternal health and gender equality—thus, it is essential for achieving most of the MDGs.

Programme evidence:

• There is a critical window of opportunity to prevent undernutrition—while a mother is pregnant and during a child’s first two years of life—when proven nutrition interventions offer children the best chance to survive and reach optimal growth and development.

• Marked reductions in child undernutrition can be achieved through improvements in women’s nutrition before and during pregnancy, early and exclusive breastfeeding, and good-quality complementary feeding for infants and young children, with appropriate micronutrient interventions.

• Large-scale programmes—including the promotion, protection and support of exclusive breastfeeding, providing vitamins and minerals through fortified foods and supplements, and community-based treatment of severe acute malnutrition—have been successful in many countries. Where such programming does not yet exist, this experience can guide implementation at scale.

• Unsafe water, inadequate sanitation and poor hygiene increase the risk of diarrhea and other illnesses that deplete children of vital nutrients and can lead to chronic undernutrition and increase the risk of death.

• Improving child and maternal nutrition is not only entirely feasible but also affordable and cost-effective. Nutrition interventions are among the best investments in development that countries can undertake.


Introduction: USAID convened a technical consultation conference in March 2011 for experts in the fields of Family Planning (FP), Maternal, Neonatal, Child Health (MNCH), and Nutrition to present evidence and discuss strategies on integration, following on a successful series of meetings on FP integration into HIV/AIDS services.

Purpose: The key purposes of the FP-MNCH-Nutrition Integration Technical Consultation were to:

• Assess the existing evidence on the application of integrated FP-MNCH-Nutrition models, processes, and tools that include best practices that support an effective integrated approach;

• Identify evidence gaps;

• Prepare a report on the findings of the meeting and the extent to which the evidence for integration enhances service coverage, quality, effectiveness, equity, use, and health outcomes;

• Initiate next steps toward the development of a learning agenda, including recommendations for research, documentation, and follow-on actions.

Objectives: The following list describes the core objectives of the integration consultation:

• Identify evidence-based, integrated FP-MNCH-Nutrition models and approaches that have achieved effective and equitable services for women and children. The models
under consideration are: FP-ANC/Immediate and Facility/Community-Based Postpartum Care; Post Abortion Family Planning; FP-Immunization/Well Baby; and FP-Nutrition;

- Summarize the strength of evidence for each of the four integration models;
- Identify knowledge gaps and topics that require additional research to achieve improvement in health outcomes through integrated FP-MNCH-Nutrition services;
- Identify conditions under which integration makes sense;
- Identify group recommendations and next steps for strengthening effective, integrated FP-MNCH-Nutrition services.

**FP-Nutrition Key Themes:**

**Best Practices**

- Several studies showed LAM users are more likely to use FP than non-LAM users. Countries where LAM is already prevalent – like Mali – respond well to FP messages, whereas countries that do not typically practice LAM, such as India, are often more resistant, and these differences must be taken into account. Working at the community level with CHWs, using counseling tools and job aids, and simple and culturally appropriate BCC materials were key elements of success. Policy-level advocacy was necessary to facilitate programming. Integrated services should be delivered at all points of contact, from ANC through 23-months postpartum, both in individual and support/peer group contacts.

**Barriers**

- Nutritionists and FP practitioners are not trained in the other’s perspective, and different services often exist in silos within health systems; this prevents effective messages from being delivered about exclusive breastfeeding and LAM which would benefit FP and nutrition. The quality of counseling for LAM is currently low, such that women often do not understand LAM or its three components. Counseling to account for local cultural expectations of mother-in-laws and husbands, as well as around the transition from exclusive to complementary breastfeeding at six months, are difficult in most environments. Currently, the Tiahrt amendment also adds to the workload of designing and funding integrated services.

**Gaps in Research and Next Steps**

- Overall, there is little literature on FP-nutrition integration, and programmatic evidence is lacking. A major barrier to addressing the gap is the lack of an agreed-upon research agenda to provide direction to the field. The community perspective and satisfaction with FP-nutrition integrated services is an area that has not received any attention and should also be explored. Advocacy tools, training curricula, job aids, and behavioral change materials are absent, but could be developed based on existing and new research. There is also a large missed opportunity in emergency response food programs. By taking action on developing a research agenda and conducting advocacy with donors, partners and researchers at all levels, FP-nutrition integration proponents could build a strong case and build momentum for the field.

**Abstract:** This document compiles the results of a literature search on birth spacing and maternal depletion using various databases, including Medline, Popline, and Lilacs.

Total of 81 articles listed.


**Overview:** This document summarizes the results of a technical consultation on birth spacing which took place in Geneva from 13 to 15 June 2005. The meeting’s objective was to recommend intervals between births. Therefore, the participating international experts reviewed evidence on the relationship between different birth-spacing intervals and maternal, infant and child health outcomes. The analysis results in two overall recommendations: one on birth spacing after live birth and the other one on spacing after abortion. The participants also identified additional analyses and issues to be addressed.


**Background:** Longer intervals between consecutive births decrease the number of children a woman can have. This results in beneficial effects on population size and on the health status of mothers and children. Therefore, understanding the practice of birth interval and its determinants is helpful to design evidence based strategies for interventions. The objective of this study was to determine duration and determinants of birth interval among women of child bearing age in Lemo district, southern Ethiopia in March 2010.

**Methods:** A community based cross sectional study design with stratified multistage sampling technique was employed. A sample of 844 women of child bearing age were selected by using simple random sampling technique after complete census was conducted in selected kebeles prior to data collection. Structured interviewer administered questionnaire was used for data collection. Actual birth interval was measured with the respondents’ memory since majority of the women or their children in the area had no birth certificate.

**Results:** Majority (57%) of women were practicing short birth interval length with the median birth interval length of 33 months. Actual birth interval length is significantly shorter than preferred birth interval length. Birth interval showed significant variation by contraceptive use, residence, wealth index, breast feeding and occupation of husbands.

**Conclusion:** low proportion of optimal birth spacing practices with short actual birth interval length and longer preferred birth interval lengths were evident among the study subjects. Hence interventions to enhance contraceptive utilization behaviors among women in Lemo district would be helpful to narrow the gap between optimal and actual birth spacing.