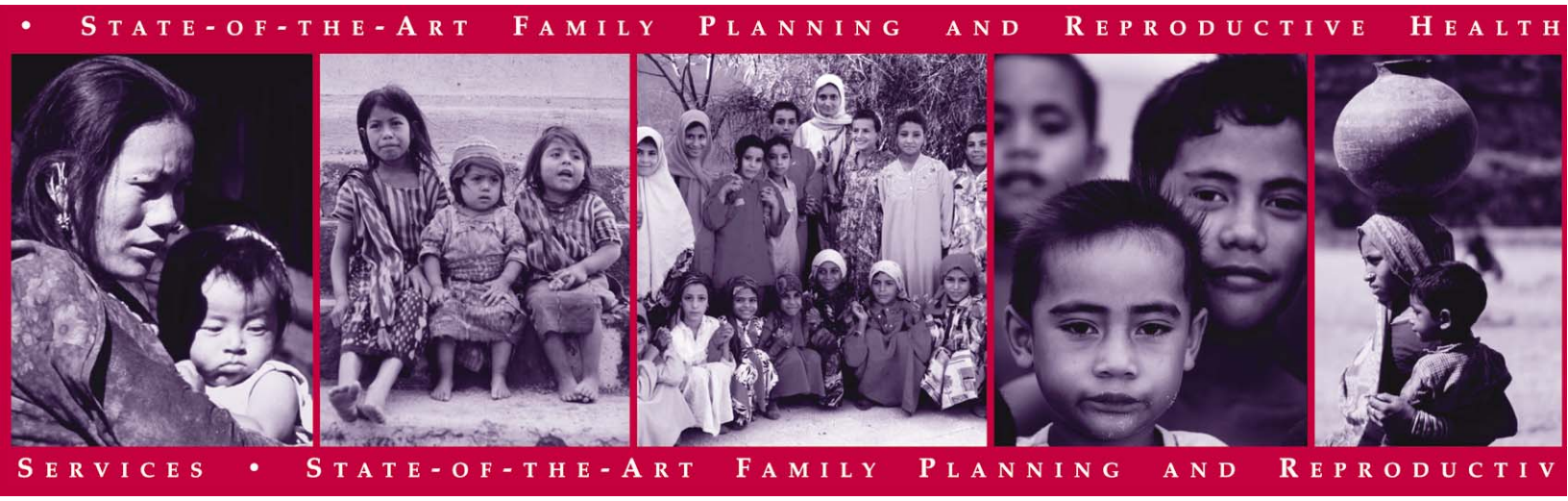

The Public Health Impact of Optimal Birth Spacing: New Research from Latin America and the Caribbean

Suzanne Brockman
Isabel Stout
Kristen Marsh

Based on research by Dr. Agustin Conde-Agudelo

October 2003

CATALYST
consortium

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EXECUTIVE SUMMARY

Birth spacing is defined as the practice of timing the period between births and pregnancies through the use of family planning. Health professionals have generally agreed that a two-year interval between births is important for maternal and child health and survival. However, new research from both developed and developing countries has prompted international organizations, led by the CATALYST Consortium, to advocate for an even longer birth spacing interval to protect the heath of mothers and children.

Six studies by Dr. Agustin Conde-Agudelo show the significant impact optimal birth spacing can have on health and survival. The database used for this research is unique in its size and scope; it provides information on over two million pregnancies in 19 Latin American countries. The statistical analysis of the data produced rates of adverse pregnancy outcomes according to different interpregnancy intervals[1]. Odds ratios were derived through multiple logistical regression analysis using an 18-23 month interpregnancy interval (27-32 month birth-birth interval) as the comparison category. The analysis also controlled for several biological and socioeconomic potentially confounding variables, such as maternal age, marital status, maternal education, history of adverse pregnancy outcomes and access to antenatal care.

These studies show that interpregnancy intervals <12 months are associated with a significantly higher risk for adverse perinatal outcomes such as low birth weight, preterm delivery, small for gestational age, and fetal and neonatal death. For mothers, interpregnancy intervals <6 months are associated with a significantly higher risk for adverse maternal outcomes such as anemia, third trimester bleeding, premature rupture of membranes, postpartum hemorrhage, puerperal endometritis and maternal death.

Long interpregnancy intervals (>60 months) are associated with a significantly higher risk for adverse perinatal outcomes such as low birth weight, preterm delivery, and fetal and neonatal death. Long interpregnancy intervals (>60 months) are also associated with a significantly higher risk for adverse maternal outcomes such as preeclampsia and eclampsia.

Interpregnancy intervals <6 months following a previous spontaneous or induced abortion are associated with a significantly higher risk for adverse perinatal outcomes such as low birth weight and preterm delivery. Women with interpregnancy intervals <6 months following an abortion have a significantly higher risk for anemia and premature rupture of membranes.

Special analyses on adolescents show that adolescent pregnancy is independently associated with increased risk for adverse perinatal and maternal outcomes. These risks are most striking for the youngest adolescents (aged <15 years). Of those that do become pregnant, 50% had interpregnancy intervals less than 12 months, the time period associated with the highest risks for adverse perinatal and maternal outcomes. In addition, nearly 82% had intervals less than the previous recommendation of two years. Adolescents who had a history of previous spontaneous or induced abortion had interpregnancy intervals that were even shorter than those that had a live birth. Again, this finding was most striking for the youngest mothers (aged <15 years).

Based on analyses of maternal sociodemographic characteristics associated with birth spacing in Latin America, Dr. Conde-Agudelo found that a woman is at higher risk for short interpregnancy

[1] The interpregnancy interval (IPI) is defined as the time that has elapsed between last delivery (or abortion) and the date of last menstrual period for the index pregnancy. The birth interval (BI) is defined as the time that has elapsed between one birth and the next birth. In order to compare between the different types of intervals, add nine months to the interpregnancy interval (assuming full term gestation) to get the birth interval.

intervals if she is either: younger than 20 years of age, has a history of irregular menstruation, has a history of spontaneous or induced abortion, or has a history of early neonatal death or fetal death.

The potential public health impact of optimal birth spacing is profound. Currently, the number of births per year in Latin America is about 11 million with a perinatal mortality rate of 39 deaths per 1,000 live births. The total number of perinatal deaths in Latin America during the year 2000 was 429,000. If families chose to delay a new pregnancy for 18-23 months after a previous birth, Dr. Conde-Agudelo has estimated that perinatal mortality would drop 14.1%. Therefore, the total number of perinatal deaths would fall by 60,500 annually. In addition, Dr. Conde-Agudelo's research shows that some of the major causes of neonatal death in Latin America such as low birth weight and complications of prematurity can potentially be addressed through lengthening the birth interval. Some of the major causes of maternal mortality, such as eclampsia and postpartum hemorrhage, can also be potentially reduced through optimal birth spacing.

The research from Latin America by Dr. Conde-Agudelo is supported by research on the impact of birth spacing from both developing and developed countries, and data comparing racial and ethnic minorities with non-minority groups. Taken as a group, these studies indicate that too short and too long birth spacing intervals are a key risk factor for perinatal, neonatal, infant, child and maternal morbidity and mortality. The statistical strength and consistency of these findings support clear guidance for providers and strengthened programs for clients.

ACKNOWLEDGEMENTS

The CATALYST Consortium would like to sincerely thank the OBSI Champions, whose continued commitment and support for Optimal Birth Spacing has advanced our work on this important life saving initiative. CATALYST also would like to thank the first OBSI Champion: Dr. Maureen Norton, Center for Population, Health, and Nutrition, Bureau for Global Programs, U.S. Agency for International Development (USAID) and Cognizant Technical Officer to the CATALYST Consortium. Finally, we would like to acknowledge the technical guidance of Dr. Agustín Conde-Agudelo, Fundación Clínica Valle del Lili in Colombia, for without his work, our work would not be possible.

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GLOSSARY

Abortion: Spontaneous termination or induced pregnancy in the first 20 weeks of gestation.

Anemia: Condition in which the blood is deficient in hemoglobin (values under 11g/dL) causing problems in the carriage of oxygen.

Apgar Score: Ratio used to evaluate the condition of the newborn with a base score (0-1-2) for each of 5 characteristics: color, cardiac frequency, respiration, muscular tone and reflexes. The highest score is 10; if the newborn has a score under 7 at the fifth minute of life a respiratory difficulty is determined.

Birth Interval (BI): The time that has elapsed between one birth of a child and the next birth of a child (birth-birth). It is approximately equivalent to the interpregnancy interval plus nine months.

Child: Young person, generally under 5 years old.

Eclampsia: A life-threatening complication of pregnancy, characterized by convulsions or coma. Preeclampsia can lead to Eclampsia.

Episiotomy: Vulva and perineum surgical incision to facilitate vaginal delivery.

Interpregnancy Interval (IPI): The time that has elapsed between the last delivery and the date of the last menstrual period of the new pregnancy (birth-conception).

Low Birth Weight: Newborn's weight is under 2,500 g.

Maternal Mortality: A woman's death during pregnancy or within 42 days of the end of the pregnancy. Not taking into consideration the duration and place of the pregnancy or a cause related or worsened by the pregnancy or the way it was handled, but not for accidental or incidental causes.

Multipara: A woman who has given birth to more than one child.

Neonatal: The time that has elapsed between the birth and the child's first month of life.

Nulipara: A woman who has never given birth.

Parity: The number of times that a woman has given birth.

Perinatal: Period of time close to birth that includes from the 28^{th} week gestation until the first 7 days of life.

Perinatal Mortality: The sum of fetal deaths (greater than 999 g. or 27 weeks of gestation) and neonatal deaths of any gestational weight and age when born, occurring between birth and the seventh day of life outside the uterus (extrauterina).

Postpartum: Period following the delivery or birth lasting 6 weeks.

Postpartum Hemorrhage: Profuse bleeding coming from the uterus occurring in the postpartum period.

Preeclampsia: Sickness only present in pregnancy. It is distinguished by a blood pressure increase, presence of proteins in the urine, excessive weight gain, headaches and visual alterations.

Premature Rupture of Membranes: Rupture of the membranes surrounding the fetus before the initial delivery with loss of amniotic liquid from the vagina.

Preterm Delivery: Delivery with less than 37 weeks of gestation.

Puerperal Endometritis: Inflamation of the endometrium occurring during childbirth or the period immediately following.

Small for Gestational Age: Birth weight below the 10th percentile for the gestational age.

Stunting: A measure of child nutrition. Stunting results from chronic malnutrition and is characterized by short stature/size for age.

Third Trimester Pregnancy Bleeding: Vaginal bleeding occurring after the 26^{th} week of gestation. The causes are common: placental disorders (placenta previa, abruptio placentae) preterm delivery and vaginal trauma.

Underweight: Weighing less than is normal, healthy or required.

Very Preterm Delivery: Delivery with less than 32 weeks of gestation.

LIST OF ACRONYMS

CA	USAID Cooperating Agency
CLAP	Center for Perinatology and Human Development, Division of Health Promotion and Protection, Pan American Health Organization, World Health Organization, Montevideo, Uruguay
DHS	Demographic and Health Survey
EPI	Expanded Program on Immunization
FP/RH	Family Planning and Reproductive Health
HIV/AIDS	Human Immunodeficiency Virus and Advanced Immunodeficiency Syndrome
IMCI	Integrated Management of Childhood Illness
LAM	Lactational Amenorrhea Method
LINKAGES	A USAID supported project of the Academy for Educational Development designed to support breastfeeding, related complementary feeding and maternal nutrition, and the Lactational Amenorrhea Method
MCH	Maternal Child Health
NGO	Nongovernmental Organization
OBSI	Optimal Birth Spacing Initiative
PAC	Postabortion Care
PAHO	Pan American Health Organization
PRIME	Improving Performance of Primary Providers' Training and Education in Reproductive Health
PVO	Private Voluntary Organization
SIP	Sistema de Información Perinatal/Perinatal Information Systems
STI	Sexually Transmitted Infection
USAID	United States Agency for International Development
WHO	World Health Organization

INTRODUCTION

Risky births have been categorized in the reproductive health and family planning literature by the "four too's": those that occur to women who are *too young* or *too old,* or for births that are *too many* or *too close together*. Having children too close together has long been associated with increased risk of various adverse health outcomes, including mortality, for mothers and children. Increasing the interval between pregnancies through birth spacing and delaying age at first motherhood can reduce maternal and child mortality significantly.

For many years, health professionals have generally agreed that a two-year interval between births is important for maternal and child health. However, this recommendation has rarely been implemented at the policy or programmatic levels. Although birth spacing as a concept is at the heart of reproductive health/family planning, in reality, it is rarely addressed directly. In short, the two-year recommendation for birth spacing is an "invisible norm."

Historically, family planning programs have placed greater emphasis on the ability of women to avoid unwanted births than on promoting optimal spacing between births. Stronger emphasis has been placed on limiting the number of births than on lengthening the time between pregnancies and births. In many countries, contraceptive use for spacing has not been fully utilized, and permanent contraceptive methods, such as sterilization, have often been the choice for clients, once desired family size has been met. Opportunities to reach women with family planning for birth spacing are often lost. Individuals may not be fully informed about the impact of their birth spacing decisions. And, although the majority of unmet need for family planning among women of reproductive age is for spacing births, this demand is met at a much lower level than demand for limiting births.

Addressing these issues is exciting because unlike many other risk factors for unfavorable pregnancy outcome, lengthening the birth spacing interval is potentially within the control of individuals and couples. Short birth spacing is a modifiable risk factor that has an important public health impact. Birth spacing is a public health intervention that uses existing and available technology in the form of modern contraceptive methods. Birth spacing programming, using contraception in combination with revised and strengthened birth spacing training and counseling messages, can be mainstreamed into existing health and non-health programs in both clinical and community settings.

THE CATALYST CONSORTIUM'S OPTIMAL BIRTH SPACING INITIATIVE (OBSI)

The Global OBSI Strategy

The CATALYST Consortium, through the support of USAID, has led the effort to revisit birth spacing as a key reproductive health concept. There is a need to develop a revised optimal birth spacing recommendation, review programmatic opportunities, improve service delivery, and strengthen birth spacing messages and counseling for women, men and couples. Most importantly, there is a need to empower individuals with knowledge and resources so that they can make fully informed reproductive health/family planning decisions. CATALYST has developed a three-pronged strategic approach in order to place optimal birth spacing on the global public health agenda: (1) define and create international consensus on the optimal birth spacing recommendation; (2) strengthen services and community programs with optimal birth spacing programming and (3) empower individuals and communities to adopt and support optimal birth spacing behaviors.

The first prong of the OBSI Strategy centers on creating international consensus for the revised birth spacing recommendation. Public health norms are issued by recognized international organizations such as the World Health Organization (WHO) and are reinforced by international NGOs, professional associations and USAID Cooperating Agencies (CAs). International organizations responsible for family planning, reproductive health, child survival and other health programs that serve women and their families need to learn of the strong association of short and long intervals with elevated risks of infant/child/maternal mortality and morbidity. To achieve this, CATALYST endeavors to create an international consensus about the importance of birth spacing and to create a revised recommendation on the optimal birth spacing period. In order to reach this goal CATALYST has designed activities around the following:

- Create partnerships with the international and multilateral organizations that define public health norms to elicit agreement about the public health impact of optimal birth spacing.
- Support national governments in adopting the revised recommendation.
- Conduct and disseminate qualitative and quantitative research on optimal birth spacing.
- Conduct a systematic review of the literature in accordance with the World Health Organization guidelines.

The second prong of the OBSI Strategy centers on applying the research findings and the revised OBSI recommendation to public health programs in order to strengthen health services and community programs. To reach the widest audience, CATALYST endeavors to include strengthened birth spacing programming into both health and nonhealth programs through both service delivery and community programs. Strong emphasis is placed on provider training. Community-based programs are being identified in order to reach populations at risk and to create a supportive environment for optimal birth spacing. In order to reach the goal of strengthening services and programs, CATALYST has deigned activities around the following:

- Integrate the OBSI recommendation and birth spacing programming into health and nonhealth programs in the public, private and NGO sectors.
- Train providers in the public, private and NGO sectors.
- Work with communities on actions that support optimal birth spacing.
- Develop protocols to guide Ministries of Health and service providers in adopting and applying the revised recommendation in family planning/reproductive health, child survival and other health programs serving women and their families.
- Develop necessary guidelines to support adoption of the revised recommendation in the delivery of public, private and commercial healthcare services.

The third prong of the OBSI Strategy centers on understanding client behaviors. A clients' decision to use family planning method/s for birth spacing is closely tied to the quality of the service received. If the experience is negative, it is unlikely that that woman, or man, will continue to use the service. In addition, social norms about reproductive health affect decisions about birth spacing. In order to help countries offer programs that empower individuals and couples to effectively adopt optimal birth spacing behaviors, CATALYST has designed a series of activities around the following:

- Determine birth spacing knowledge, beliefs and practice.
- Determine the optimal client-provider interaction to ensure women have the best quality family planning and birth spacing services.
- Define the correct behavior messages at the individual, family and community levels needed to render optimal birth spacing counseling.
- Produce a prototype counseling module on birth spacing.

"Three to Five Saves Lives[2]"

Dr. Conde-Agudelo's research from 19 countries in Latin America and the Caribbean shows that there is an optimal birth spacing window between the high-risk periods when the risks for both children and mothers are lowest. The data show that if a woman calculates when she should become pregnant (the interpregnancy interval), the optimal birth spacing period would be between 18-60 months. If a woman calculates when her child should be born (the birth interval), the optimal birth spacing period would be approximately 27 to 69 months. These findings are supported by similar research from the United States by Dr. Bao-Pang Zhu of the Centers for Disease Control and Prevention (CDC) and by Drs. Fuentes-Afflick and Hessol of the University of California at San Francisco on the impact of birth spacing on perinatal health[3].

Over twenty years of research on the impact of birth spacing by Dr. Shea Rutstein has shown that the mortality risks for children are lowest when the birth interval is longer than the previously recommended two-year birth interval. In 2002, Dr. Rutstein analyzed Demographic and Health Survey (DHS) data from 25 surveys in 18 counties in Latin America, Asia, Africa and the Middle East to evaluate the impact of birth spacing. These findings show that a 36-47 month interval between births is best for children at all developmental stages from birth through five years of age. After controlling for multiple potentially confounding variables, a birth interval 36-47 months or longer was associated with the lowest risks for child mortality and adverse nutritional outcomes such as stunting and underweight.

Based on these findings, the current recommendation of two years between births (a 15 month interpregnancy interval) is too close to the high-risk period for both mothers and children. In addition, the current recommendation does not address the risks for mothers and children when birth spacing intervals are too long.

The research collected and commissioned by the CATALYST Consortium as part of OBSI shows that the lowest risk for adverse health outcomes for both mothers and children occurs when there are approximately three to five years between births.

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[2] CATALYST and USAID use the birth interval for the OBSI recommendation; therefore the "Three to Five Save Lives" recommendation is according to the birth interval. In order to convert Dr. Conde-Agudelo's data from the interpregnancy interval into the birth interval, add nine months to the interpregnancy interval (assuming full term gestation).

[3] A description of the research findings by Dr. Zhu, Drs. Fuentes-Affleck and Hessol, Dr. Rutstein and others is included in the section: *Supporting Research Findings on the Impact of Interpregnancy Intervals*.

EPIDEMIOLOGICAL AND SOCIAL CONTEXT FOR BIRTH SPACING IN LATIN AMERICA

Maternal mortality

The overall maternal mortality rate for the Latin American and Caribbean (LAC) region is 190 deaths per 100,000 live births. Maternal mortality is often divided into direct and indirect causes. According to a report by PAHO (2002), the most common direct causes of maternal mortality in the LAC region are: post partum hemorrhage (25%); sepsis (15%); complications of abortion (13%); eclampsia (12%) and obstructed labor (8%). In addition, HIV/AIDS has been identified as an underlying factor in direct maternal mortality. Indirect causes of maternal mortality are likely to be underreported and include chronic health problems not treated or improperly treated after pregnancy and delivery.

The LAC region has great disparity between countries in maternal mortality and morbidity. For example, Chile has a maternal mortality rate (MMR) of 23 maternal deaths per 100,000 live births. Compare this relatively low rate to that of Bolivia that has a MMR of 390, Peru that has a MMR of 185, and Haiti that has a MMR of 523 maternal deaths per 100,000 live births. In addition, there is great variability within countries between urban and rural areas and between geographic regions. This variability reflects inequities in socioeconomic conditions and in access to quality health care services.

Adolescent pregnancy and associated mortality

Adolescent pregnancy is a critical issue for the LAC region. PAHO has estimated that about one-third of all women between the ages of 20-24 years of age have had their first pregnancy by age 20. According to a report by PAHO (2002), " Many of these (adolescent) pregnancies are unwanted or mistimed; therefore, they are more likely to result in health problems for the mother, either because they lead to termination of pregnancy or because young women are less likely to seek appropriate care. Furthermore, the physical and psychological underdevelopment of young women under the age of 16 years of age makes them particularly vulnerable to complications that arise during pregnancy and childbirth."[4]

Child mortality

Data collected by Save the Children (2002) show that there are four primary and direct causes of neonatal mortality: infections (32%); birth asphyxia and injuries (29%); complications of prematurity (24%); and congenital anomalies (10%).

Low birth weight is the most important indirect cause of neonatal morbidity and mortality. According to Save the Children (2002), between 40- 80% of neonatal deaths occur among low birth weight babies. Low birth weight babies are vulnerable to poor growth, increased rates of illness and infectious disease, as well as poor cognitive and behavioral development. In the LAC region, UNICEF estimates that there are 1,031,000 low birth weight babies born each year.

As with maternal mortality, there is great variability between LAC counties in neonatal, infant and child mortality. For example, the neonatal mortality rate (NMR) in Costa Rica is 8 deaths per 1,000 live births. Compare this relatively low rate to that of the Dominican Republic that has a NMR of 27, to Bolivia that has a NMR of 34, or to Guatemala that has a NMR of 23 neonatal deaths per

[4]Pan American Health Organization/World Health Organization. 130th Session of the Executive Committee. Washington D.C. 24-28 June 2002. Page 5.

1,000 live births. There is similar variability between countries and between geographic regions in the infant and child mortality rates.

Fertility and contraception use

The total fertility rate (TFR) for the LAC region is 2.7 average children born to a woman in her lifetime. However, some countries in the LAC region have almost two times the regional TFR. For example, Guatemala has a TFR of 5.0, Honduras has a TFR of 4.9, Haiti has a TFR of 4.7 and Paraguay has a TFR of 4.3.

There is also great variability across LAC countries in the percent of currently married women using family planning. For example, in Costa Rica 71% and in Colombia 64% of women are reported to be using modern methods of contraception. Compare this to Guatemala where 31% of women are using modern methods, and Bolivia where only 25% of currently married women are using modern family planning methods.

Unmet need for family planning and birth spacing

Unmet need for family planning is often described as a disconnection between a woman's fertility preferences and what she is able to do to address those preferences. Many surveys have found that women report a range of obstacles to achieving desired family size and the desired timing between pregnancies and births. Commonly cited reasons include: lack of knowledge about contraception, health concerns, high costs, limited supplies and sociocultural or personal objections such as disapproval by husband or mother-in-law or religious opposition. Within this unmet need for family planning, William Jansen and colleagues at the University of North Carolina has found that is substantial unmet demand for birth spacing services. Jansen (2002) examined DHS data from developing countries in Latin America, Africa and Asia. In Latin America he studied the unmet need for birth spacing in Bolivia and Peru. In both countries, approximately 80% of the demand among low parity (<2 births per woman) and younger women (aged <29 years) is specifically for birth spacing. These findings indicate that many women want to space their pregnancies and births, but are not able to do this. Health and non-health programs that address the reproductive health needs of women and their families need to deliver services in a way that closes this gap.

NEW RESEARCH ON OPTIMAL BIRTH SPACING FROM LATIN AMERICA

The CLAP Database

As part of the Optimal Birth Spacing Initiative (OBSI), the CATALYST Consortium commissioned several retrospective crosssectional studies by Dr. Conde-Agudelo on the association between interpregnancy intervals and maternal and perinatal health outcomes.[5] The Perinatal Information System database in Montevideo, Uruguay was devised by the Latin American Centre for Perinatology and Human Development (CLAP) in 1983. The database is unique in its size and scope. From 1985 to 2001, the database recorded 2,073,968 pregnancies in public institutions in 19 countries: Uruguay, Argentina, Peru, Colombia, Honduras, Paraguay, El Salvador, Chile, Bolivia, Costa Rica, Panama, Dominican Republic, Nicaragua, Brazil, Ecuador, Mexico, Bahamas, Belize and Venezuela.

PAHO estimates that about 75% of all deliveries in the LAC region are performed in institutions. Therefore the CLAP database is potentially representative of births in the region. However, since adverse maternal and perinatal outcomes have been shown to be worse for rural and out-of hospital births, the findings from the CLAP database may represent a more conservative estimate of the impact of interpregnancy intervals on maternal and child health.

Methodology

Only parous women delivering singleton infants and those whose previous pregnancy ended in a live birth or fetal death after 19 weeks gestation were included in the studies. From the first antenatal visit until discharge of both mother and neonate, the attending physicians or nurses collected data on demographic information, reproductive history, maternal characteristics, prenatal care, labor management, maternal complications during pregnancy, delivery, postpartum and neonatal outcomes. A clerk entered the data into a database and checked queries immediately with the attendant physicians or nurses in order to standardize the data. The data were later sent to the Latin American Center for Perinatology and Human Development where further data entry, quality control check and validation were performed.

The interpregnancy interval (IPI) was defined as the time elapsed between the woman's last delivery (or abortion[6]) and the date of the last menstrual period for the index pregnancy. Interpregnancy intervals were categorized as ≤6, 6-11, 12-17, 18-23, 24-35, 36-47, 48-59 and ≥60 months.

Rates of adverse outcomes were calculated for each interpregnancy interval. Estimates of crude odds ratios with 95% confidence interval were computed as measures of association between each interpregnancy interval and the adverse outcome considered. The interval 18-23 months was used as the reference category, because this was the interval during which maternal death and perinatal death was least likely to occur. To test whether interpregnancy interval was an independent risk factor for adverse pregnancy outcomes, several biological, socio-demographic and obstetric variables were evaluated as potential confounding factors.

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[5] All studies by Dr. Conde-Agudelo that appear in this report were commissioned by the CATALYST Consortium/USAID except for the analysis on maternal mortality which was previously published as: Conde-Agudelo, A. and J. Belizan 2000. Maternal Mortality and Morbidity Associated with Interpregnancy Interval: A Cross Sectional Study. British Medical Journal, 321, 1255-1259.

[6] The CLAP database does not distinguish between types of abortion and therefore includes data on both spontaneous abortions (miscarriages) and induced abortions.

Results

This report contains results of the following studies conducted by Dr. Conde-Agudelo:

1. *Effect of Interpregnancy Intervals on Adverse Perinatal Outcomes in Latin America (Pg. 17).*
2. *Maternal Morbidity and Mortality Associated with Interpregnancy Intervals (Pg. 20).*
3. *Maternal and Perinatal Morbidity and Mortality Associated with Interpregnancy Intervals Following an Abortion (Pg. 23).*
4. *Maternal Socio-demographic and Obstetric Factors Associated with Short Interpregnancy Intervals (Pg. 25).*
5. *Maternal and Perinatal Morbidity and Mortality Associated with Adolescent Pregnancy in Latin America (Pg. 28).*
6. *Interpregnancy Intervals among Adolescents whose Previous Pregnancy Ended in Abortion in Latin America (Pg. 31).*

IMPACT OF INTERPREGNANCY INTERVALS ON INFANTS

Effect of Interpregnancy Intervals on Adverse Perinatal Outcomes in Latin America

Background

The World Health Organization estimates that each year there are four million stillbirths and another four million newborns die in the first month of life. Of these deaths, an estimated 98% occur in developing countries. When the causes of death are understood, an estimated 24% of neonatal deaths are attributed to prematurity and an estimated 40-80% of these deaths can be explained by low birth weight (Save the Children: 2002).

Multiple factors have been studied to determine the cause of perinatal morbidity and mortality. One of these factors is the effect of the timing and frequency of pregnancies and births. A pregnancy poses a great biological tax on a mother's body. This is further exacerbated in developing countries, where mothers are often overworked and undernourished. Having another pregnancy soon after a baby's birth may not allow the mother's body to heal and regain the lost nutrients necessary to adequately support the next pregnancy. This has led researchers to ask: "What is the health impact of a short interval between pregnancies on the subsequent baby?" "Is there an optimal interval where risks for adverse health outcomes are lowest?" Data from the Latin American and Caribbean Perinatal Information System database were analyzed by Dr. Conde-Agudelo to determine whether the length of the interpregnancy interval is associated with increased risk of adverse perinatal outcomes.

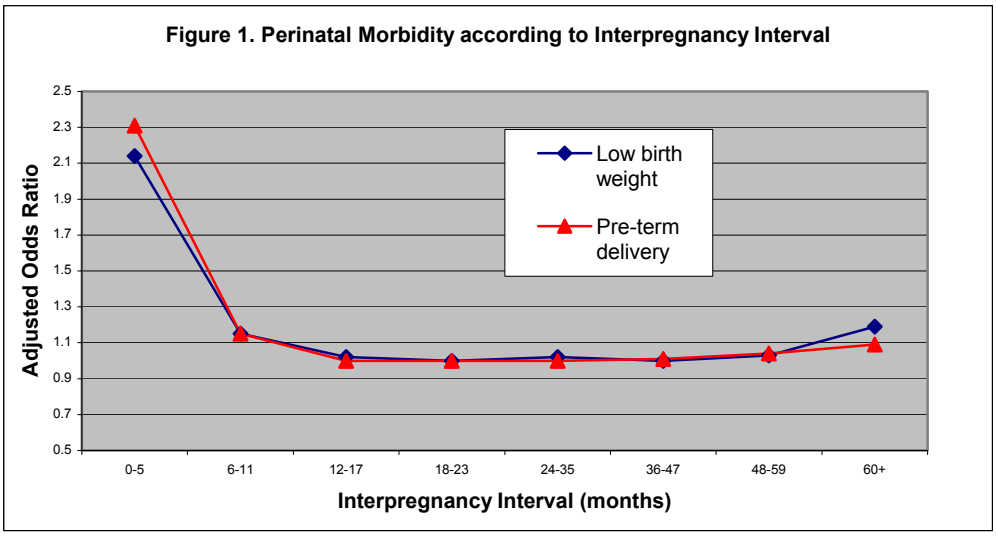
Methods

The objective of this study was to evaluate the interpregnancy interval in relation to adverse perinatal outcomes in Latin America. Dr. Conde-Agudelo analyzed the effects of interpregnancy intervals on low birth weight (<2500 g), very low birth weight (<1500 g), preterm delivery (<37 weeks), very preterm delivery (<32 weeks), small for gestational age (birth weight below the 10th percentile for the gestational age and gender, according to the Williams et al. reference curve), fetal death (occurring at 20 or more weeks of gestation) and low Apgar scores at 5 minutes (less than 7). The effect of this relationship was determined by analyzing data from 1,080,650 singleton infants born to multiparous mothers in Latin America between 1985 and 2000.

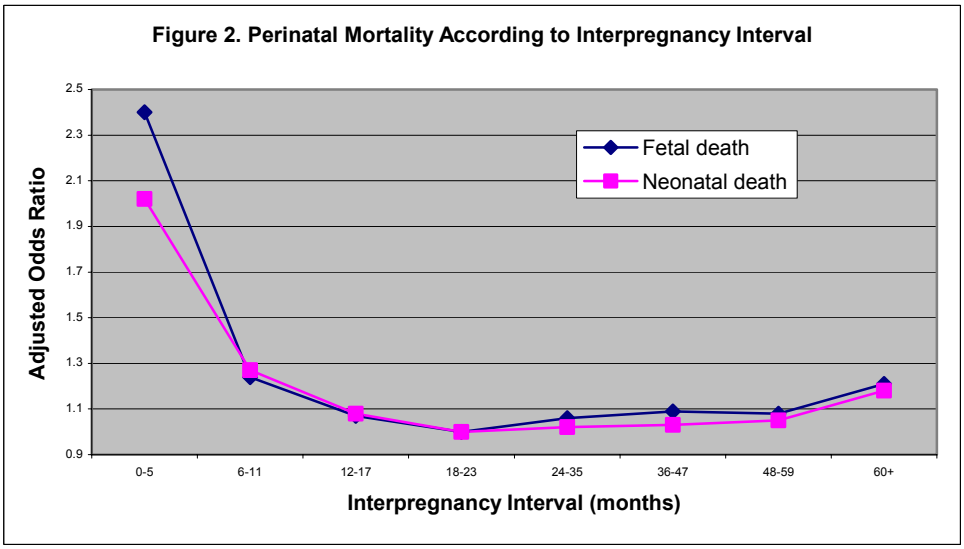
The following confounding factors were taken into account in the multivariate analysis: maternal age, parity, mother's education, marital status, cigarette smoking, pre-pregnancy body mass index, history of miscarriage, history of stillbirth, history of early neonatal death, history of low birth weight, gestational age at first antenatal care visit, number of antenatal care visits, geographic area, hospital type, year of delivery, and neonatal death and low Apgar score were additionally adjusted for birth weight and gestational age.

Results

Infants born after an interpregnancy interval of 18 to 23 months had the lowest risks of adverse perinatal outcomes. Shorter and longer interpregnancy intervals were associated with higher risks. These associations persisted when the data were stratified according to and controlled for the biological, sociodemographic and behavioral risk factors.



As shown in Figure 1, after controlling for major confounding factors, infants with interpregnancy intervals of six months or less compared with an interpregnancy interval of 18-23 months, had odds ratios of 2.14 (95% CI= 2.02-2.28) for low birth weight; 2.25 (95% CI= 1.98-2.54) for very low birth weight; 2.31 (95% CI= 2.20-2.43) for preterm delivery; 3.27 (95% CI= 2.98-3.58) for very preterm delivery; 1.25 (95% CI= 1.20-1.31) for small for gestational age, 2.40 (95% CI= 2.14-2.69) for fetal death; and 2.02 (95% CI= 1.48-2.63) for neonatal death.



As Figures 1 and 2 show, perinatal risks sharply decline after the shortest interpregnancy intervals and tend to level out at a low between 18 to 59 months. This pattern is consistent for each risk factor studied. In addition, Dr. Conde-Agudelo found that infants born after an interpregnancy interval of 60 months or more had odds ratios of 1.19 (95% CI= 1.15-1.24) for low birth weight; 1.15 (95% CI= 1.06-1.25) for very low birth weight; 1.09 (95% CI= 1.05-1.14) for preterm delivery; 1.16 (95% CI= 1.09-1.24) for very preterm delivery; 1.21 (95% CI= 1.15-1.27) for fetal death; and 1.18 (95% CI= 1.06-1.31) for neonatal death, when risk factors were controlled for with logistic regression.

The Case of Latin America: Currently, the number of births per year is 11 million. The perinatal mortality rate for the year 2000 was 39 deaths per 1000 live births. Thus, the total number of perinatal deaths during the year 2000 was 429,000. If couples chose to delay a new pregnancy for 18-23 months after the preceding birth, it is estimated that perinatal mortality would decrease by 14.1%, thereby decreasing the total number of perinatal deaths by 60,500 annually. (Conde-Agudelo, 2002)

Conclusions

In Latin America short (<12 months) and long (>60 months) interpregnancy intervals are independently associated with adverse perinatal outcomes. The data also show that an interpregnancy interval of 18-23 months is associated with the lowest risk. The data answer two important questions for service providers and program planners. First, "Are there serious adverse consequences for babies who are born too close together?" and second, "Is there a less risky interpregnancy window where the adverse health risks on the baby are not as high?"

Family planning and related maternal and child health programs should focus on the risks of too short or too long interpregnancy intervals for adverse perinatal outcomes. Providers should be trained to identify women at risk for both too short and too long birth spacing and help her obtain an IPI that is optimal for the health and survival of her child. Women can be reached through a variety of health and non-health programs. In particular, programs should concentrate on reaching women in the postpartum period and through postabortion care (PAC) programs, and at well-child and immunization visits. Messages about these risks should be integrated into family planning training, counseling and other educational materials, so women can be better informed.

IMPACT OF SHORT INTERPREGNANCY INTERVALS ON MOTHERS

A. Maternal Morbidity and Mortality Associated with Interpregnancy Intervals

Background

In many developing countries, complications of pregnancy and childbirth are the leading causes of death and disability among women of reproductive age. The World Health Organization estimates that nearly 600,000 maternal deaths occur each year. And as many as 300 million women – more than one quarter of all adult women living in the developing world – suffer from long-term and short-term illnesses and injuries related to pregnancy and childbirth. Because the mother's health and survival is inextricably linked to her child's survival, a closer look at some of the contributing factors to maternal survival and health is overdue.

Although much has been learned in the past decade regarding the causes of maternal death, there is little evidence of significant progress towards the international goal of reducing maternal mortality by half. This has led researchers to ask: "Do closely spaced pregnancies affect the mother's health and survival?" Data from the Latin American and Caribbean Perinatal Information System database were analyzed to determine whether the length of the interpregnancy interval is associated with increased risk of adverse maternal outcomes.[7]

Methods

The objective of this study was to determine the impact of the interpregnancy interval on maternal morbidity and mortality. Drs. Conde-Agudelo and Belizan analyzed the effects of different interpregnancy intervals on anemia, third trimester bleeding, premature rupture of membranes, postpartum hemorrhage, gestational diabetes mellitus, puerperal endometritis, preeclampsia, eclampsia and maternal death. A total of 520,689 parous women who delivered singleton infants between 1985 and 1997 were recorded in the database. The final study population included 456,889 women whose records contained complete data on interpregnancy interval and adverse maternal outcomes. Gestational age was estimated from the date of last menstrual period and amended by means of ultrasonography in a quarter of women.

The following confounding factors were taken into account in the multivariate analysis: maternal age, parity, mother's education, marital status, cigarette smoking, pre-pregnancy body mass index, history of miscarriage, history of stillbirth, history of early neonatal death, gestational age at first antenatal care visit, number of antenatal care visits, geographic area, hospital type and year of delivery. Preeclampsia, eclampsia, gestational diabetes and third trimester bleeding were also controlled for history of chronic hypertension.

Results

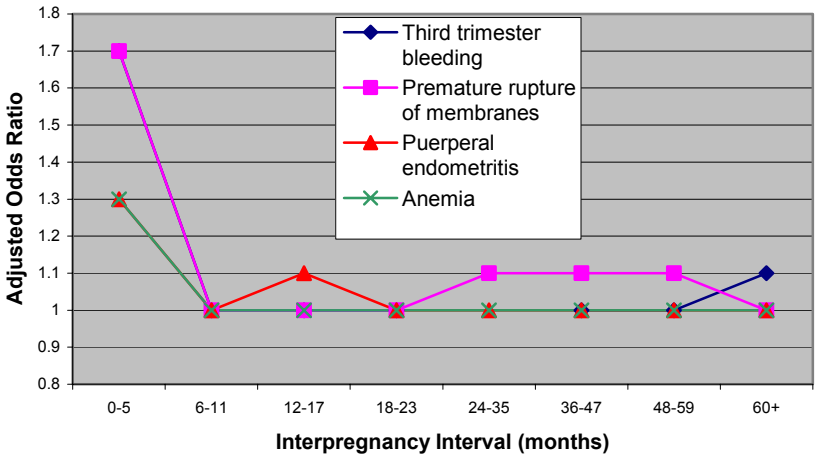
Seventeen percent of women had interpregnancy intervals less than 12 months, 45% had interpregnancy intervals less than two years. Younger maternal age, history of miscarriage, fetal death, early neonatal death, lower rate of previous caesarean delivery, later onset of prenatal care, lower number of prenatal visits and lower body mass index before pregnancy were associated with short intervals between pregnancies. Conversely, women with a long interpregnancy interval were more likely to be older, with greater body mass index before pregnancy and with a history of chronic hypertension. Start of prenatal care and number of prenatal visits correlated with interpregnancy interval: the shorter the interval, the later care started and the fewer number of prenatal visits. There were no obvious differences among the interpregnancy interval groups with

[7] Previously published as Conde-Agudelo, A. and J. Belizan 2000. Maternal Mortality and Morbidity Associated with Interpregnancy Interval: A Cross Sectional Study. *British Medical Journal*, 321, 1255-1259.

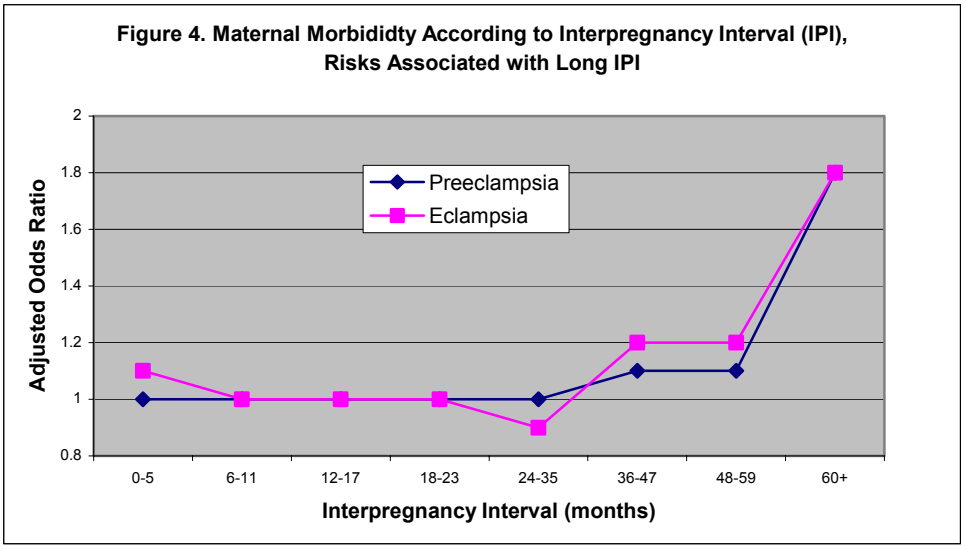
regard to number of previous deliveries, mother's education, marital status and cigarette smoking during pregnancy.

Women with short interpregnancy intervals had the highest rates of third trimester bleeding, premature rupture of membranes, puerperal endometritis, anemia and maternal death. There were 220 maternal deaths in the study population. The rates of preeclampsia, eclampsia and gestational diabetes mellitus were highest among women with intervals longer than 59 months. A slight increase in the rates of third trimester bleeding and maternal death was also seen in women with this interpregnancy interval.

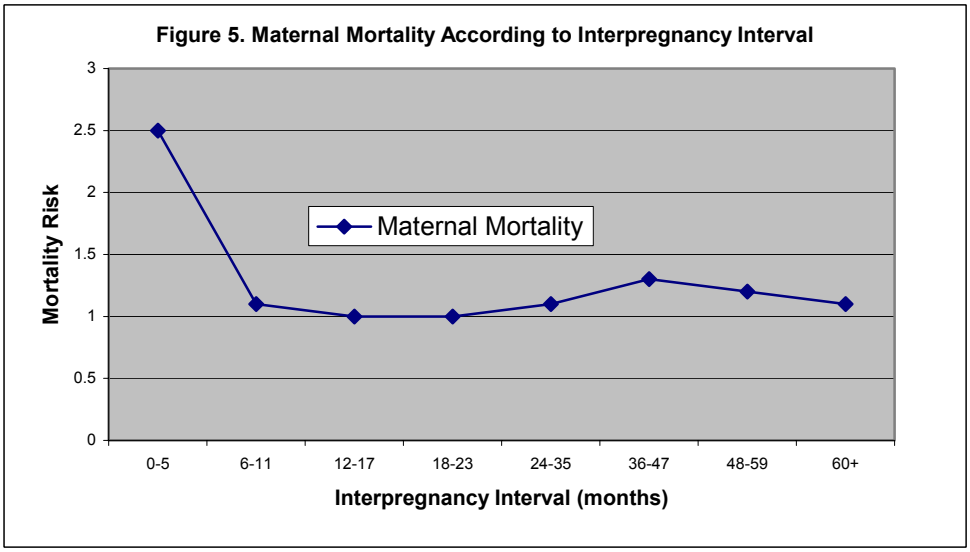
Figure 3. Maternal Morbidity According to Interpregnancy Interval



As shown in Figure 3, after controlling for major confounding factors, women with interpregnancy intervals of six months or less compared with a interpregnancy interval of 18-23 months had odds ratios of 1.73 (95% CI= 1.42 -2.24) for third trimester bleeding; 1.72 (95% CI= 1.53-1.93) for premature rupture of membranes; 1.33 (95% CI= 1.22-1.45) for puerperal endometritis; and 1.30 (95% CI= 1.18-1.43) for anemia. As Figure 3 shows, the risks for adverse maternal outcomes sharply decline after the shortest interpregnancy intervals and tend to level out between 18 to 59 months.



Interestingly, the risks for eclampsia and preeclampsia rise sharply after 59 months, illustrating the risks associated with interpregnancy intervals longer than the optimal interval of three to five years. As shown in Figure 4, women with interpregnancy intervals greater than 59 months had odds ratios of 1.83 (95% CI= 1.72-1.94) for preeclampsia, and 1.80 (CI= 1.38-2.32) for eclampsia.



As Figure 5 shows, the risk of maternal mortality is greatest at the shortest interpregnancy interval. After controlling for major confounding factors, women with interpregnancy intervals of six months or less compared with an interpregnancy interval of 18-23 months had odds ratios of 2.54 (95% CI= 1.22-5.38) for maternal death. The risks drop to a low at 18-23 months and remain statistically low throughout the three to five year period.

Conclusions

This study shows that interpregnancy intervals shorter than 6 months and longer than 59 months are associated with an increased risk of adverse maternal outcomes. Although an interpregnancy interval of 18-23 months is associated with the lowest risk for adverse health outcomes, no

statistically significant differences were found in the effect of interpregnancy intervals on maternal outcomes among intervals of 24-35, 36-47, and 48-59 months and the reference 18-23 months.

These findings have important public health implications. Millions of women around the world lose their lives or become incapacitated due to complications from pregnancy and childbirth. The mother-child dyad is inseparable and adverse outcomes that affect the mother have severe implications for the child.

The evidence is clear that interpregnancy intervals play an important role in maternal health and survival. Family planning programs and related maternal and child health programs need to integrate the optimal birth spacing recommendation into their counseling strategies and concentrate on women at highest risk for short interpregnancy intervals. In addition, communities should be mobilized to raise awareness of this important risk factor.

B. Maternal and Perinatal Morbidity and Mortality Associated with Interpregnancy Intervals Following an Abortion[8]

Background

Although some researchers report a history of previous abortion to be associated with an increased risk of preterm delivery, low birth weight and growth restriction in subsequent pregnancies, the health impact on the subsequent pregnancy may have been underestimated. The underestimation may be due, in part, to a lack of consideration of the time span between the abortion and the next conception (the interpregnancy interval) as a possible intervening factor. This has led researchers to ask: "Does an abortion cause a significant biological toll on a woman's body?" "How does a short interval after a previous abortion affect the subsequent pregnancy?" A short interpregnancy interval may play a significant role if the uterus needs time to recover after an abortion, or if an abortion increases the risk of infections. Data from the Latin American and Caribbean Perinatal Information System database were analyzed to determine whether the length of the interpregnancy interval following a previous spontaneous or induced abortion is associated with increased risk of adverse maternal and perinatal outcomes.

Methods

The objective of this study was to determine whether the length of the interval between an abortion (spontaneous or induced) and the next pregnancy is associated with increased risk of adverse pregnancy outcomes in Latin American women. Dr. Conde-Agudelo analyzed the effects of different interpregnancy intervals after a previous abortion on the following maternal outcomes: anemia, third trimester bleeding, premature rupture of membranes, postpartum hemorrhage, gestational diabetes mellitus, puerperal endometritis, preeclampsia and eclampsia. The effects of different interpregnancy interval after a previous abortion were analyzed for the following perinatal outcomes: low birth weight (<2500 g), very low birth weight (<1500 g), preterm delivery (<37 weeks), very preterm delivery (<32 weeks), small for gestational age (birth weight below the 10th percentile for the gestational age and gender, according to the Williams et al. reference curve), fetal death (occurring at 20 or more weeks of gestation), neonatal death and low Apgar scores at 5 minutes (less than 7). A total of 258,108 women delivering singleton infants and whose previous pregnancy resulted in a spontaneous or induced abortion were recorded on the database between 1985 and 2001.

[8] The CLAP database does not differentiate between spontaneous abortions (miscarriages) and induced abortions.

The following confounding factors were taken into account in the multivariate analysis: maternal age, parity, mother's education, marital status, cigarette smoking, pre-pregnancy body mass index, number of previous abortions, history of stillbirth, history of early neonatal death, history of low birth weight, gestational age at first antenatal care visit, number of antenatal care visits, geographic area, hospital type and year of delivery. Neonatal death and low Apgar score were also controlled for birth weight and gestational age. Preeclampsia, eclampsia, gestational diabetes and third trimester bleeding were also controlled for history of chronic hypertension.

Results for maternal health outcomes

Nearly 20% of women in the database whose previous pregnancy resulted in an abortion had an interpregancy interval less than 12 months. Nearly 45% of women had an interpregnancy interval less than 24 months. These results are similar to women whose previous pregnancy ended in a live birth, whereas 17% percent of women had interpregnancy intervals less than 12 months and 45% had interpregnancy intervals less than 24 months.

Significantly, women with very short interpregnancy intervals (less than 6 months) had the highest rates of premature rupture of membranes and anemia. For the longer intervals, the rates of preeclampsia, eclampsia, and gestational diabetes mellitus were highest among women with intervals longer than 59 months.

After controlling for major confounding factors, women with interpregnancy intervals of six months or less compared with those conceiving at 18 to 23 months after a previous spontaneous or induced abortion had odds ratios of 1.51 (95% CI= 1.37-1.66) for anemia and 1.35 (95% CI= 1.20-1.52) for premature rupture of membranes. No significant differences in the effect of interpregnancy interval following an abortion were found on third trimester bleeding, postpartum hemorrhage, puerperal endometritis, preeclampsia, eclampsia, and gestational diabetes mellitus.

Results for perinatal health outcomes

Infants conceived six months or less after a previous spontaneous or induced abortion compared with those conceived at 18 to 23 months had odds ratios of 2.43 (95% CI= 2.23-2.65) for low birth weight; 2.01 (95% CI= 1.79-2.25) for very low birth weight; 2.16 (95% CI= 2.00-2.35) for preterm delivery, and 2.19 (95% CI= 1.78-2.83) for very preterm delivery. There were no significant differences in the effects of interpregnancy interval following an abortion on small for gestational age, low Apgar score at 5 minutes, fetal death and neonatal death.

After controlling for major confounding factors, infants conceived less than six months after a previous spontaneous of induced abortion were more than two times more likely than infants conceived 18-23 months after a previous abortion to have low birth weight, very low birth weight, or be preterm, and very preterm. In addition, the mothers of these infants were at 51% increased risk of anemia and 35% increased risk of premature rupture of membranes.

Conclusions

In Latin America women whose previous pregnancy ended in spontaneous abortion (miscarriage) or induced abortion and who had interpregnancy intervals less than six months, have increased risks of maternal anemia, premature rupture of membranes, low birth weight, very low birth weight, preterm delivery and very preterm delivery. This study clearly shows that there are serious adverse pregnancy outcomes related to a short interpregnancy interval following an abortion. In addition,

other analyses by Dr. Conde-Agudelo show that short interpregancy intervals are between 30-100% more likely to occur in women with a history of spontaneous or induced abortion[9]

The study supports the importance of birth spacing after an abortion, which may not have been previously considered to have such a significant impact on maternal and perinatal morbidity. Appropriate family planning methods should be offered to these women. Women who become pregnant less than six months following a spontaneous or induced abortion should be considered at higher risk in the antenatal care setting. It is imperative that family planning, postabortion care (PAC), maternal and child health programs counsel women who have had a previous abortion on the risks associated with short and long birth spacing intervals.

[9] The results of this study are in the section: *Maternal Sociodemographic and Obstetric Factors associated with Short Interpregnancy Intervals in Latin America.*

WHO IS HAVING SHORT INTERPREGNANCY INTERVALS IN LATIN AMERICA?

Maternal Sociodemographic and Obstetric Factors Associated with Short Interpregnancy Intervals

Background

Short interpregnancy intervals are a relatively common reproductive health problem. Based on a Johns Hopkins Population Reports analysis of 55 DHS surveys (Setty-Venugolpal and Upadhyay, 2002), the median birth interval in developing countries is about 32 months (23 month interpregnancy interval[10]). Twenty-six percent of women spaced births less than two years (less than 15 month interpregnancy interval).

Few studies have considered the short interpregnancy interval as an outcome in and of itself. In Thailand, Park et al. (1994) found that young maternal age and survival of the preceding birth had a strong association with short interpregnancy intervals whereas maternal education and birth order did not show a significant association with interpregnancy interval. In Alabama, Klerman et al. (1998) found mothers under 20 years of age and white women were more likely than mothers in the 30 and older group and nonwhites, respectively, to have a pre-pregnancy to birth interval less than two years. Recently, Kaharuza et al. (2001) showed that Danish women with unplanned pregnancy, higher parity, menstrual irregularity, old age, unemployment, and poor housing had an increased risk of having birth intervals less than nine months.

The findings of these studies have led researchers to ask: "What are the characteristics of women having short interpregnancy intervals in Latin America?" Data from the Latin American and Caribbean Perinatal Information System database were analyzed to determine these characteristics.

Methods

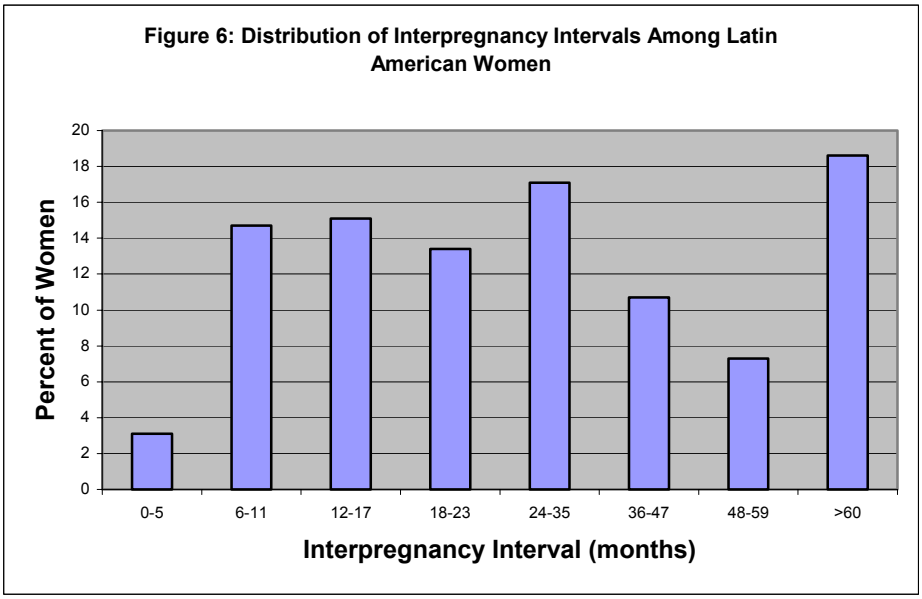
The objective of this study was to identify the maternal sociodemographic and obstetric factors associated with short interpregnancy intervals in Latin America. Retrospective cross-sectional studies were conducted using data from 1,080,650 Latin American pregnancies recorded at the Perinatal Information System database. The independent variables used for the study included: maternal age, menstrual regularity prior to index pregnancy, parity, maternal education, marital status, cigarette smoking, history of spontaneous or induced abortion, history of fetal death and history of neonatal death. The outcome variable was the preceding interpregnancy interval. Short interpregnancy intervals were defined as: less than 6 months, less than 12 months, less than 18 months, and less than 24 months. Previous studies from the United States and Latin America have shown that an interpregnancy interval of 18-59 months has the lowest rates of adverse pregnancy outcomes. Thus, this interval was used as a reference category for interpregnancy intervals less than 6, 12, and 18 months. Interpregnancy intervals less than 24 months were referenced against the 24-59 month interval.

Frequencies of maternal socio-demographic and obstetric factors were calculated for each interpregnancy interval. Odds Ratios (with 95% confidence intervals) were calculated as measures of association between maternal socio-demographic and obstetric factors and short interpregnancy intervals. Adjusted odds ratios were derived through logistic regression analysis. A separate logistic regression model was used for each of the four short interpregnancy intervals.

[10] Demographic and Health Survey asks women about birth-birth intervals. The interpregnancy interval can be estimated by subtracting nine months from the birth interval. This conversion assumes a full term gestation.

Results

As shown in Figure 6, three percent of all women in the dataset (<20, 20-34 and >35 years of age) had an interpregnancy interval less than six months, 17.8% had interpregancy intervals less than 12 months, 32.9% had intervals less than 18 months and 46.3% had intervals less than 24 months. In addition, 18.6% of women experienced interpregnancy intervals longer than 60 months.



Women with short interpregnancy intervals (less than 6, 12, 18 and 24 months) tended to be younger[11], have irregular menstrual periods previous to the index pregnancy, tended to have a history of previous abortion, neonatal and fetal death. There were no significant differences with regard to number of previous deliveries, marital status, mother's education, and cigarette smoking during pregnancy. Start of prenatal care and number of prenatal visits correlated with interpregnancy interval: the shorter the interval, the later care started and the lower number of prenatal visits.

The multivariate analysis showed that, compared with mothers aged 20-34 years, adolescent mothers were 1.6 to three times more likely to have short interpregnancy intervals. Women with irregular menstrual periods prior to the index pregnancy were 30-60% more likely to have short intervals than women with regular periods. Women with history of miscarriage, previous fetal death, and previous early neonatal death faced a 30-100% increase in risk of short interpregnancy intervals than women without such history. There were no significant differences in the effect of parity, marital status, mother's education, and cigarette smoking during pregnancy on short interpregnancy intervals.

Conclusions

Women with a history of irregular menstruation, history of spontaneous or induced abortion, history of early neonatal death or fetal death or younger were more likely to have short interpregancy intervals (<6, <12, <18 or <24 months). Thus, the typical profile of a woman at risk for short interpregnancy intervals is: woman younger than 20 years of age or with a history of irregular menstruation or with a history of spontaneous or induced abortion or with a history of early neonatal death or fetal death.

[11] The results on women <20 years of age appear in the section: *Special Analysis on Adolescents*.

It is important for program planners and health care providers to know the potential profile of a woman who is more likely to have short interpregnancy intervals. Efforts should be made to reach those women and inform them about the risks of short interpregnancy intervals for themselves and for future pregnancies. Program planners and providers should also involve communities in birth spacing and family planning programs in order to support all women, and particularly those who are at higher risk for having short interpregnancy intervals.

ADOLESCENTS: SPECIAL ANALYSIS

A. Maternal and Perinatal Morbidity and Mortality Associated with Adolescent Pregnancy in Latin America.

Background

Adolescent pregnancy is alarmingly common in many countries. Because adolescent childbearing is so frequent and carries such high health risks, pregnancy-related complications are the main cause of death for 15-19 year old girls worldwide. The sexual education needs of adolescents are rarely met, and adolescents seldom have access to reproductive health care or contraceptive services. The biological toll of a pregnancy on a woman's body, already dealing with her own growth needs, is especially challenging for the adolescent population.

Few studies have looked at the birth spacing patterns of adolescents. This has led researchers to as, "What interpregnancy intervals are adolescents experiencing?" and "Do adolescents who have closely spaced pregnancies have increased health risks, as compared to adult women?" Data from the Latin American Center for Perinatology and Human Development were analyzed to determine the impact of closely spaced pregnancy on adolescents.

Methods

The objective of this study was to investigate whether adolescent pregnancy is associated with increased risk for adverse pregnancy outcomes. Retrospective cross-sectional studies were conducted using data from 854,377 adolescent pregnancies (344,626 aged <15-19 years and 509,751 control group aged 20-24 years). Only women aged 10-24 years delivering singleton infants of at least 20 weeks gestation or at least 400g-birth weight were included in the analysis.

Dr. Conde-Agudelo analyzed the effects of age on the following maternal outcomes: anemia, third trimester bleeding, premature rupture of membranes, caesarean delivery, operative vaginal delivery, episiotomy, postpartum hemorrhage, gestational diabetes mellitus, puerperal endometritis, urinary tract infection, preeclampsia, eclampsia and maternal death. The effects of age were analyzed for the following perinatal outcomes: low birth weight (<2500 g), very low birth weight (<1500 g), preterm delivery (<37 weeks), very preterm delivery (<32 weeks), small for gestational age (birth weight below the 10th percentile for the gestational age and gender, according to the Williams et al. reference curve), fetal death (occurring at 20 or more weeks of gestation), neonatal death and low Apgar scores at 5 minutes (less than 7).

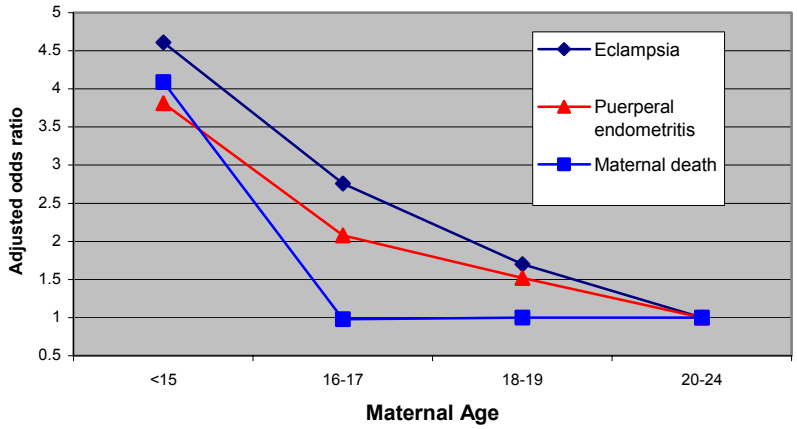
The following confounding factors were taken into account in the multivariate analysis: maternal age, parity, mother's education, marital status, cigarette smoking, interpregnancy interval, pre-pregnancy body mass index, history of spontaneous or induced abortion, history of stillbirth, history of early neonatal death, history of low birth weight, gestational age at first antenatal care visit, number of antenatal care visits, geographic area, hospital type and year of delivery. Neonatal death and low Apgar score were also adjusted for birth weight and gestational age. Preeclampsia, eclampsia, gestational diabetes mellitus and third trimester bleeding were also adjusted for history of chronic hypertension.

The analysis included rates of maternal and perinatal outcomes. Odds ratios were calculated as a measure of association between maternal age and adverse pregnancy outcomes. Adjusted odds ratios were derived through logistic regression analysis.

Interpregancy intervals of adolescents
Seventy-six percent of all adolescents (<15-19 years) had interpregnancy intervals less than 24 months after a previous birth, compared to 55% of women aged 20-24 years old. Eighty-five percent of the youngest adolescents (aged <15 years) had interpregancy intervals less than 24 months after a previous birth. Thus, there is evidence that repeat, closely spaced childbearing is occurring among adolescents.

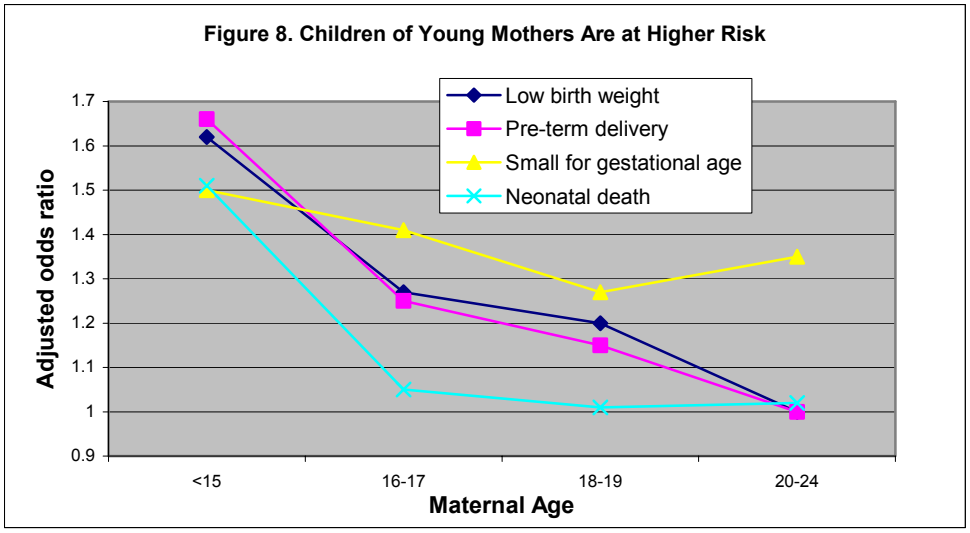
Results for maternal health outcomes
The data show that the youngest mothers (aged <15 years) had the highest rates of adverse maternal outcomes whereas mothers aged 16-17 and aged 18-19 years had smaller but still significant increases. There was a clear trend toward increasing rates of preeclampsia, eclampsia, postpartum hemorrhage, puerperal endometritis, operative vaginal delivery, episiotomy and anemia as maternal age decreased. The youngest adolescents (≤15 years) had the highest maternal fatality rate (18.5 deaths per 10,000 women) whereas the rates for older adolescents were similar to those of adult women (4 deaths per 10,000 women).

Figure 7. Young Mothers are at Higher Risk (Conde-Agudelo, 2002)



As shown in Figure 7, adolescents aged <15 years compared with women aged 20-24 years had odds ratios of 4.09 (95% CI= 3.86-4.34) for maternal death; 4.61 (95% CI= 3.86-5.42) for eclampsia; 3.81 (95% CI= 3.64-4.00) for puerperal endometritis; 1.41 (95% CI= 1.33-1.50) for anemia, and 1.59 (95% CI= 1.50-1.70) for postpartum hemorrhage.

Results for perinatal health outcomes
The data show that rates of low birth weight, very low birth weight, preterm delivery, very preterm delivery, small for gestational age, and neonatal death were highest among infants born to mothers aged ≤15 years. As with maternal outcomes, the risks for adverse perinatal outcomes increased with decreasing maternal age.



As shown in Figure 8, children of adolescents aged <15 years compared with women aged 20-24 years had odds ratios of 1.62 (95% CI= 1.54-1.39) for low birth weight; 1.66 (95% CI= 1.59-1.74) for preterm delivery; 1.50 (95% CI= 1.45-1.56) for small for gestational age, and 1.51 (95% CI= 1.33-1.70) for neonatal death.

No statistically significant differences were found in the effect of young maternal age on fetal death and low Apgar scores at five minutes. When the data were analysed separately for nulliparous and parous women, the results were similar to those obtained in the analyses of the entire population.

Conclusions

Overall, adolescents accounted for 20.2% of all deliveries in the CLAP database. This finding is consistent with population-based studies and estimates by PAHO. The analyses by Dr. Conde-Agudelo indicate that adolescent pregnancy is independently associated with increased risk of adverse maternal and perinatal outcomes. The risks for adverse maternal and perinatal outcomes are most striking among early adolescent pregnancies, in particular to those adolescent aged <15 years.

Adolescents, who are already dealing with the biological challenges of their own growth needs, are at increased risk of adverse health outcomes when pregnant, as compared to adult women. In addition, the data show that many adolescents are not experiencing just one pregnancy, but are experiencing repeat pregnancies. The intervals of adolescents are shorter than their adult counterparts. Furthermore, the data show that the youngest mothers have the shortest intervals.

These findings are disturbing and show that adolescent pregnancy is a major problem facing Latin America. Program planners and providers need to develop innovative, age-appropriate messages so that adolescents that are experiencing these high-risk pregnancies are aware of the risks to both them and their children. Programs that address the family planning and reproductive health needs of adolescents need to know about these risks. Communities need to support optimal birth spacing to save the lives and improve the health of their youngest members. Governments need to prioritize this group and address their needs throughout the health system.

B. Interpregnancy Intervals among Adolescents whose Previous Pregnancy Ended in Abortion in Latin America.

Background

In studies on adult women in Latin America whose previous pregnancy ended in spontaneous abortion (miscarriage) or induced abortion, Dr. Conde-Agudelo found that interpregnancy intervals less than six months are associated with increased risks of maternal anemia, premature rupture of membranes, low birth weight, very low birth weight, preterm delivery and very preterm delivery. In addition, Dr. Conde-Agudelo found that short interpregancy intervals are between 30-100% more likely to occur in women with a history of spontaneous or induced abortion.[12] Due to underreporting of these events to the health care system, adolescents may be at higher obstetrical risk than previously considered. This has led researchers to ask: "What is the effect of a short interpregnancy interval following an abortion for adolescents?" Data from the Latin American and Caribbean Perinatal Information System database were analyzed to determine whether the length of the interval between a spontaneous or induced abortion and the next pregnancy is associated with increased risk of adverse pregnancy outcomes in adolescents.

Methods

Methods for this analysis have been previously described.[13] For this analysis, 21,441 adolescents delivering singleton infants and whose previous pregnancy resulted in a spontaneous or induced abortion were included in the study.

Results

After abortion, fifteen percent of adolescents had interpregnancy intervals less than 6 months, 50% had intervals less than 12 months, nearly 82% had intervals less than 24 months and 95.2% had intervals less than 36 months. Adolescents with interpregnancy intervals less than six months had the highest rates of anemia, premature rupture of membranes, low birth weight infants and preterm delivery. There were no differences in the rates of other maternal and perinatal outcomes.

After controlling for major confounding factors, adolescents with interpregnancy intervals of six months or less compared with those conceiving at 18 to 23 months after a previous spontaneous or induced abortion had odds ratios of 1.27 (95% CI= 1.06-1.62) for anemia and 1.62 (95% CI= 1.30-2.15) for premature rupture of membranes. No significant differences in the effect of interpregnancy interval following an abortion was found on third trimester bleeding, postpartum hemorrhage, puerperal endometritis, preeclampsia, eclampsia, and gestational diabetes mellitus.

Infants conceived six months or less after a previous spontaneous or induced abortion compared with those conceived at 18 to 23 months had odds ratios of 1.51 (95% CI= 1.25-1.97) for low birth weight and 1.40 (95% CI= 1.18-1.69) for preterm delivery. There were no significant differences in the effect of interpregnancy interval following an abortion on small for gestational age, low Apgar score at 5 minutes, fetal death and neonatal death.

In addition, interpregnancy intervals of adolescents whose previous pregnancy ended in an abortion were likely to be shorter than an interpregnancy interval following a live birth. After a live birth 39% of all adolescents (aged <15-19) had an interpregnancy interval less than 12

[12] The results of this study are in the section: *Maternal Sociodemographic and Obstetric Factors associated with Short Interpregnancy Intervals in Latin America.*

[13] Methods for the analysis on adolescents are the same as for the study: *Maternal and Perinatal Morbidity and Mortality Associated with Interpregnancy Intervals Following an Abortion.*

months and 81% had interpregnancy intervals less than 24 months. After an abortion 50% of the adolescent population studied had interpregnancy intervals less than 12 months and 82% had intervals less than 24 months after an abortion. After a live birth 43% of adolescents aged <15 had an interpregnancy interval less than 12 months and 82% had an interpregnancy interval less than 24 months. After an abortion 73% of the youngest adolescents had an interpregnancy interval less than 12 months and 96% had an interpregancy interval less than 24 months.

The results for adolescents are dramatic when compared to all women. In his analyses of adult women, Dr. Conde-Agudelo found that nearly 20% of those whose previous pregnancy resulted in an abortion had an interpregancy interval less than 12 months, for adolescents age 15-19, 43% had an interpregancy interval of this length and 73% of the adolescents under the age of 15 had an interval less than 12 months.

Conclusions

Interpregancy intervals shorter than six months among adolescents whose previous pregnancy ended in a spontaneous or induced abortion, are associated with increased risks of maternal anemia, premature rupture of membranes, low birth weight and preterm delivery.

In addition, compared with interpregnancy intervals of adolescents whose previous pregnancy ended in live birth, interpregnancy intervals of adolescents whose previous pregnancy ended in abortion were more likely to be shorter.

Previously not considered, adolescents who have experienced a spontaneous or induced abortion may be at an even higher risk for adverse obstetric outcomes. Of special concern is the likelihood of underreporting of abortions in this population, which is a barrier to health care. Family planning programs should be more aware of the impact a previous abortion has on an adolescent mother and her subsequent pregnancy.

C. Sociodemographic and Obstetric Factors Associated to Short Interpregnancy Intervals in Latin American Adolescents

Background

Short birth spacing intervals are a relatively common reproductive health problem. In Latin America, prevalence of interpregnancy intervals less than six months were found to be 3%, interpregnancy intervals of less than 12 months were 18%, less than 18 months were 33% and interpregnancy intervals of less than 24 months were 46 %. Dr. Conde-Agudelo analyzed the maternal sociodemographic and obstetric factors associated with short interpregnancy intervals in adult women in Latin America[14]. In that study he found that women with a history of irregular menstruation, history of spontaneous or induced abortion, history of early neonatal death or fetal death or younger were more likely to have short interpregancy intervals (<6, <12, <18 or <24 months). This has led researchers to ask, "What are the characteristics associated with short interpregnancy intervals for adolescents?" Data from the Latin American Center for Perinatology and Human Development were analyzed to determine the maternal sociodemographic and obstetric factors associated with short interpregnancy intervals characteristics in the adolescent population.

[14] The results of the analysis on adult women appears in the section: *Maternal Sociodemographic and Obstetric Factors associated with Short Interpregnancy Intervals in Latin America.*

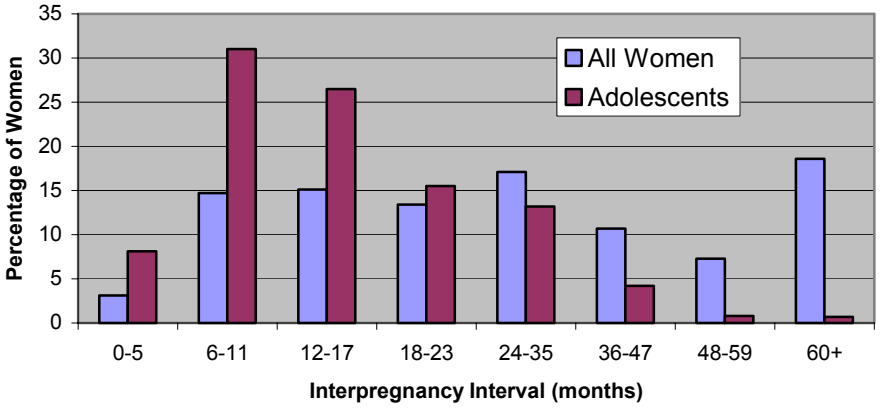
Methods

The objective of this study was to identify the maternal sociodemographic and obstetric factors associated with short interpregnancy intervals among adolescents in Latin America. Retrospective cross-sectional studies were conducted using data from 1,080,650 Latin American pregnancies recorded at the Perinatal Information System database. Methods for this study were the same as for adult women and are described in Section VI of this report.

Results

As shown in Figure 9, adolescents are having very short interpregnancy intervals as a population: 8.1% had interpregnancy intervals less than 6 months, 39.1% had interpregancy interval less than 12 months, 65.6% had interpregancy intervals less than 18 months and 81.1% had interpregancy intervals less than 24 months. Of high significance, adolescents had higher frequency of short interpregnancy intervals than women of all ages.

Figure 9. Distribution of Interpregnancy Intervals in Latin American Women



The multivariate analysis showed that compared to mothers aged 20-24 years, mothers age <20 years had odds ratios of 3.1 (95% CI= 2.9-3.3) for having an interpregancy interval less than six months; 2.6 (95% CI= 2.5-2.7) for having an interpregancy interval less than 12 months; 2.1 (95% CI= 2.0-2.2) for having an interpregancy interval less than 18 months, and 1.6 (95% CI= 1.5-1.8) for having an interpregancy interval less than 24 months. Moreover, adolescents with very short interpregnancy intervals (less than 6 months) were more likely to be younger than 16 years, have low maternal education (less than 6 years), and have two or more previous pregnancies.

Conclusions

The results of the adjusted analysis for adolescents were very similar to those obtained in the analyses of the entire study population. In Latin American women, short interpregnancy intervals were associated with maternal age <16 years, parity greater than or equal two, maternal education less than six years, irregular menstruation prior to the index pregnancy, history of spontaneous or induced abortion, previous fetal death and previous early neonatal death.

Adolescents are at high risk of having short interpregancy intervals. Efforts should be made to reach adolescents with information about the risks of short interpregnancy intervals for themselves and for their children. Program planners and providers should also involve

communities in developing age appropriate birth spacing and family planning programs in order to support the needs their youngest members who are at higher risk for pregnancy related morbidity and mortality.

SUPPORTING RESEARCH FINDINGS ON THE IMPACT OF INTERPREGNANCY INTERVALS

The research from Latin America by Dr. Conde-Agudelo is supported by research on the impact of birth spacing from both developing and developed countries, and data comparing racial and ethnic minorities with non-minority groups. Taken as a group, these studies indicate that too short and too long birth spacing intervals are a key risk factor for perinatal, neonatal, infant, child and maternal morbidity and mortality. The statistical strength and consistency of these findings support the revision of the current birth spacing recommendation from two years to three to five years, and the need for strengthened optimal birth spacing programs and messages.

A. Birth Intervals and Child Mortality from 18 developing countries

Over twenty years of research on the impact of birth spacing by Dr. Shea Rutstein of ORC Macro has shown that the mortality risks for children are lowest when the birth interval is longer than the previously recommended two-year birth interval. In 2002, Dr. Rutstein analyzed Demographic and Health Survey (DHS) data from 25 surveys in 18 counties in Latin America, Asia, Africa and the Middle East to evaluate the impact of birth spacing.

These findings show that a 36-47 month interval between births or a 27-38 month interpregnancy interval[15] is best for children at all developmental stages from birth through five years of age. After controlling for multiple potentially confounding variables such as mother's age at pregnancy, mother's parity at pregnancy, result of previous pregnancy (where known), mother's education, urban-rural residence and country, a birth interval 36-47 months (27-38 month interpregnancy interval) or longer was associated with the lowest risks for child mortality and adverse nutritional outcomes such as stunting and underweight.

The multivariate analysis shows that compared to a birth interval of 36-47 months, those born less than 24 months after a previous birth had a 48% increased risk of perinatal mortality, and 119% increased risk for neonatal mortality.

B. Birth Intervals on perinatal and maternal heath in developed countries

Research from the United States supports the findings from developing countries by Rutstein and Conde-Agudelo, confirming the health benefits of birth spacing longer than the previously recommended two years. A study done by the Centers for Disease Control and Prevention (Zhu et. Al, 1999) examined the impact of interpregancy intervals on perinatal health in two U.S. States. In the first study, Zhu et al evaluated the interpregnancy interval in relation to low birth weight, preterm birth, and small size for gestational age using birth certificate data from 173,205 infants in the state of Utah. The study found that an interpregnancy interval of 18-23 months was associated with the lowest risks of adverse perinatal outcomes. Shorter and longer interpregnancy intervals were associated with higher risks. The researchers controlled for several sociodemographic variables for the analysis of perinatal outcomes, including: age at delivery, marital status, education, race or ethnic group, residence (rural or urban), utilization of prenatal services, and self-report of tobacco and alcohol use during pregnancy. After controlling for major confounding factors with multiple logistic regression, Zhu et al found that infants conceived after

[15] Data on birth spacing in the DHS is collected by either the interpregnancy interval or the birth interval. Data on perinatal mortality, stillbirths, miscarriages and early neonatal deaths is collected by interpregnancy interval. Data on infant mortality, neonatal mortality, under age five mortality, child stunting and underweight is gathered by birth interval.

an interpregnancy interval of less than six months, compared to an interpregnancy interval of 18-23 months, had odds ratios with 95% confidence interval of 1.4 (1.3-1.6) for low birth weight; 1.4 (1.3-1.6) for preterm birth; and 1.3 (1.2-1.4) for small size for gestational age.

In the second CDC study, Zhu et al. (2001) analyzed birth records for over 400,000 white and black women in Michigan, evaluating the interpregnancy interval in relation to adverse perinatal outcomes. The study analyzed vital statistics data for singleton live births during 1993 through 1998, using stratified and logistic regression techniques. The study addressed potentially confounding effects of risk factors such as age, parity, education, tobacco use, and adverse outcome of previous pregnancies. Among women of both races, the risk for delivering low birth weight, premature, and small for gestational age was lowest if the interpregnancy interval was 18-23 months. Among white women, the study found that women who had less than a six months birth spacing had an odds ratio of 1.5 for delivering low birth weight infants, 1.3 odds ratio for delivering a premature infant, and 1.3 odds ratio for delivering a small-for-gestational-age infant. These findings were similar for the group of black women. The researchers found that a interpregnancy interval of 18-23 months was associated with the lowest risk of adverse perinatal outcomes, for both black and white women; confirming the results of the Utah study.

An analysis of the relationship between interpregnancy intervals and the risk of premature infants by study by Fuentes-Afflick and Hessol (2000) from the University of California was undertaken on almost 300,000 infants of both Hispanic and non-Hispanic white origin residing in California. In this analysis nearly 37% of the women had an interpregancy interval of less than 18 months. The analysis of the effects of interpregnancy intervals on prematurity statistically controlled for the following: maternal age, education, place of birth, parity, previous premature or small for gestational age infant, utilization of prenatal services and infant sex. After adjusting for confounding sociodemographic variables women with intervals less than 18 months were 14-47% more likely to have very premature and moderately premature infants than women with intervals of 18-59 months. Women with intervals over 59 months were 12-45% more likely to have very premature and moderately premature infants than women with intervals of 18-59 months. The researchers concluded that an interpregnancy interval of 18-59 months to be associated with the lowest risk of severely and moderately premature infants in both groups.

In order to analyze the effect of long interpregnancy intervals on maternal health, Skjaerven, (2000) analyzed data from the Medical Birth Registry of Norway, a population-based registry that included over 750,000 births. The researchers found that the risk for eclampsia and preeclampsia in a second or third pregnancy was directly related to the time that had elapsed since the preceding delivery. When the birth interval was 10 years or more, the risk of preeclampsia approximated that of nulliparous women. The multivariate analyses showed that women had a 12% increased risk for preeclampsia for each one-year increase in the birth interval.

Research from both developing and developed countries, and data comparing racial and ethnic minorities with non-minority groups, all consistently indicate that too short and too long interpregnancy intervals are a key risk factor for perinatal, neonatal, infant and child morbidity and mortality.

PROGRAMMATIC IMPLICATIONS: WHAT DO WOMEN WANT?

A. Results of CATALYST's focus groups

The findings by Dr. Conde-Agudelo and others clearly demonstrate the health benefits of optimal birth spacing for both mothers and children. To gain an understanding of the extent to which these benefits are understood by clients and providers, in 2002-2003 CATALYST conducted focus groups in Bolivia, Egypt, India, Pakistan and Peru. The focus groups provided important qualitative data on the knowledge, attitudes and practice of birth spacing among women. In addition, focus groups were conducted on individuals that typically influence reproductive health decision-making: male partners, mothers-in-law and health care providers.

Findings varied among countries, but there were a number of beliefs that were common across the cultures included in the study. The two most prominent reasons for spacing were economic considerations and concern for the health of both the mother and the baby. Economics was a significant factor in most countries; in some cases economics was viewed as a barrier to spacing and in others it were not. For example, in Peru an economic rationale was given as a reason for not spacing: economic dependence on men impeded women's decision to space because they feared their partners would leave them if they did not become pregnant. Other participants expressed the opinion that economic stability was a main reason for spacing: with fewer children at one time, families would have more resources for each child.

In all countries, participants believed that birth spacing was of central importance for the emotional and physical health of women, children and families. Providers noted that children who were too closely spaced could suffer multiple deleterious health effects, including a deficit in meeting their emotional and nutritional needs. Women believed they would have more time to dedicate to their children and their own personal development if they had to care for fewer small children at one time. Men felt that their wives would have more time to care for their husbands and maintain the household if they spaced.

Two significant barriers to spacing that were common to all of the countries were gender inequity and misconceptions about contraceptive methods. Gender inequity often inhibited the ability of women to decide to practice birth spacing. In Latin America, husbands and male partners exercised a great deal of control over whether a woman could space. In Bolivia, women said they were pressured into having sexual relations, and that men often did not consider the fact that they could become pregnant. In Peru, both providers and women commented that men had control over sexual decision-making and would also suspect their wives of infidelity if they used a birth control method. In all countries, the support of the husband was considered one of the most important enabling factors for birth spacing.

Local beliefs about contraceptive methods also proved to be a significant barrier to contraceptive use, whether it was a lack of accurate knowledge about correct use of contraceptive methods or difficulties with side effects of various methods. In Peru, one woman reported that she stopped taking pills while breastfeeding because she feared that it would affect her baby boy. Providers in Peru reported that postpartum women would not initiate use of a birth control method until after their period had returned – when they were already fertile. In Bolivia, some women believed that IUDs caused cancer.

Overall, the focus group findings provide three critical implications for health care providers and programmers worldwide. First, health care providers stressed that there was a lack of norms for them to follow. Clients' views reflected the ambiguity about the appropriate spacing interval,

stating that different providers often gave them different guidance. Second, in all countries, cultural and religious beliefs often contradicted the concept of family planning. In Bolivia, for example, women remarked that couples do not decide to have children, "it just happens." In Pakistan, one woman said of birth spacing and use of contraception: "It's not permitted in Islam. It happens with the will of God." Finally, findings from all countries indicate that husbands, partners and, in some cases, mothers-in-law, are pivotal influencers on the decision to space births, acting out gender norms that limit women's perceived ability to make decisions.

These conclusions yield important recommendations for those who plan birth spacing programs. First, in order to address the inconsistencies in birth spacing message, it is important to establish clear guidelines for providers with regard to birth spacing counseling. Secondly, in order to address the impact of cultural and religious beliefs birth spacing messages need to be designed in culturally appropriate ways. Finally, birth spacing messages and programming need to focus on changing the attitudes of influencers like husbands and mothers-in-law. Empowerment programs need to work with women to create an environment that enables them to make informed family planning and birth spacing decisions.

B. Unmet need for birth spacing: an analysis of DHS data from 17 developing countries

Not only are optimal birth intervals important for health, but there is evidence that most women want longer birth intervals than they are actually experiencing. William Jansen (2002) analyzed DHS data from 17 developing countries to evaluate the demand and need for birth spacing. Dr. Jansen had two research questions: "How prevalent is the demand for birth spacing as part of the total demand for family planning?" and "Among potential users of family planning, what are characteristics that distinguish individuals with a desire to space from those that are interested in limiting family size?"

Jansen found that among all women of reproductive age (15-39), between one-third and three-fourths of the total family planning demand was for birth spacing. Among women <29 years of age, between two-thirds and nine-tenths of the demand was for spacing. In the majority of countries examined, family planning need for limiting births was met at a higher rate than the need for spacing births, and the need for spacing was met at a lower rate than the demand for spacing. Jansen also found that there is a substantial unmet need for birth spacing among low-parity and young women, including women who want to delay their first birth.

In order to fully meet existing demand for birth spacing, Jansen suggests that service delivery strategies be designed so that they are relevant to young and low parity women. In addition, these finding show that the specific needs of married zero parity adolescents need to be addressed.

RECOMMEDATIONS FOR PROGRAM PLANNERS

Optimal Birth Spacing is a critical objective of family planning that is often overlooked in favor of the more common practice of limiting births to a certain number of total children. Provision of family planning education and contraceptive methods, including options for both spacing and limiting, should be integrated into reproductive health programs. Reproductive health programs should link to critical social programs to empower women to act on their desired reproductive health choices, such as for birth spacing.

Initiating and maintaining the healthiest birth spacing intervals does not just require actions on the part of the individual woman; her partner, family and community as well as the service delivery and national policy levels must take and sustain correspondent actions if the individual woman's choice is to be realized.

The following tables contain information for policy makers and program planners interested in strengthening the practice of birth spacing in their countries by integrating optimal birth spacing into existing programming. As shown in Table 1, optimal birth spacing can be integrated into a variety of health and non-health programs in both the clinical and community settings. Table 2 contains a list of questions to consider for program development and management.

Table 1. How to Integrate Optimal Birth Spacing (OBS) into Health and Empowerment Programs

Health Programs (Clinical and Non-Clinical)	***Programmatic Response***
Family Planning/Reproductive Health Service Delivery	Include counseling on the health benefits of optimal birth spacing (OBS) into FP/RH services for all women of reproductive age, including young and low parity women. Monitor continuation rates of methods used for OBS. Train health care providers at all levels about the OBSI recommendation. Include counseling for men in order to increase men's support of women's reproductive health and to address the needs of men.
IMCI/IMCH	Include counseling on the health benefits of OBS for child and maternal health and nutrition into all EPI and well-baby visits. Increase community awareness about the health benefits of breastfeeding and optimal birth spacing.
Maternal/Neonatal Health	Include counseling on the health benefits of OBS into Postpartum, antenatal care and LAM services.
HIV/AIDS/Infectious Disease	Include counseling on the health benefits of OBS and dual protection messages in STI/HIV prevention programs.
PAC	Include counseling on the risks associated with a too short birth spacing interval after a miscarriage or abortion.
Empowerment Programs	
Community Mobilization	Educate community leaders on the benefits of OBS and the health risks of closely spaced, repeat pregnancies, as well as how to access FP and OBS information/services. Mobilize communities to support OBS and include OBS messages into outreach programs. Include community leaders in the development of OBS programs, in support of informed choice. Community-based programs can identify women at need for FP/RH and OBS counseling and services.
Gender Programs	Address constraints that affect communication and decision-making about FP and OBS. Include men's perspectives in program design.

Literacy	Include counseling on OBS into literacy and other educational programs for women.
Democracy and Governance	Include counseling on OBS into Democracy and Governance and other leadership programs for women.
Micro credit/ Micro enterprise	Include counseling on OBS into economic empowerment programs for women such as Micro credit and Micro enterprise.
Social Networks	Identify key opinion leaders in the community to include OBS into social-network based communication programs. A social network approach reaches into the community and provides a safe atmosphere for women to discuss their FP needs.
Gender-based Violence	Include counseling on OBS to women in GBV prevention and treatment programs.
Male involvement	Involve husbands and male partners in OBS to create an enabling environment to practice OBS. Use communication tools to promote dialogue both at the household and community levels.

(Adapted from "Birth Spacing: A Call to Action," published by USAID, 2002.)

Table 2. What Questions Should Program Planners Ask When Planning an Optimal Birth Spacing Program?

Magnitude of the Problem	What percent of births are spaced < 6 months, < 24 months, <36months? What percentage of births are spaced longer then 60 months? What percentage of short BI/IPIs occurs with adolescents? What is the MMR, IMR and under 5 MR in your country/region.
Knowledge	What percent of women -- especially young, low-parity women -- and their families, know that spacing births three years or longer reduces the risk of mortality and morbidity for both mothers and their children?
What do women want?	What intervals do women want? How is this different from what they are achieving? Is there an unmet need for FP and for BS? Are there variations in unmet need by age and parity or other social and economic characteristics?
What are the determinants of birth spacing behavior?	What are the religious or cultural beliefs related to childbearing and family planning? What are the fertility preferences (desired number and timing or children) of both women and men? Who makes the FP and BS decisions in the family? What role does the sex of a child play in a couple's decision to use FP? Do women have the negotiation skills to OBS? Is there a supportive environment to OBS?
Program Linkages	Do counseling, education and service programs for family planning, postabortion care, STI, HIV, immunization, safe motherhood, postpartum, antenatal care, MCH, nutrition, child survival and outreach (male, youth and married adolescents) currently inform individuals about the health benefits of OBS and the risks of repeat closely spaced pregnancy? Are key groups for OBS addressed through Post partum, PAC, LAM, STI/HIV, MNH, well child visits?
Education and Training Programs	What messages on optimal birth spacing are included in medical and public health curricula, and other education, mass media and training programs?
Programs and Services for Youth	Are there youth friendly services for married and unmarried adolescents? Do these programs address both delaying onset of childbearing and OBS for those who have already started childbearing?
Access to Quality Services	Are there available and accessible quality FP and OBS services? Have providers and counselors been trained to provide OBS counseling and in the new OBSI recommendation of "Three to Five Saves Lives?"
Continuation Rates	What are contraceptive use/discontinuation rates for all women and also low-parity women and youth?

Method Mix	Is available method mix conducive to achieving desired spacing (i.e., good availability of pills, condoms, injectable, IUDs, LAM, etc.)? Are there strategies that address supply and demand of contraception for FP and OBS?
Estimates of Potential Impact	Have host country analyses been undertaken to estimate infant/child mortality reductions (estimated annual percentage mortality reductions and numbers of deaths averted) if birth spacing intervals were lengthened?
Policymakers' Awareness	Are policymakers and program planners aware of the magnitude of potential reductions in infant/child/maternal deaths in their country if more births were spaced at three-year intervals? Are there initiatives at the national level?
Monitoring and Evaluation	To what extent do planners monitor key outcome, knowledge or behavioral indicators related to FP and OBS? Some potential indicators could be: % of women whose youngest two children are born at least 36 months apart; % of women and men who can name at least three methods for OBS; % of women and men who approve of using contraception for spacing; % of women and men who are not using FP, but what to wait at least three years before the birth of a child; % of people that live near (a reasonable distance from) a FP facility; % of PP and PAC that report discussing FP and OBS with provider.

(Adapted from "Birth Spacing: A Call to Action," published by USAID, 2002.)

Appendix 1. Findings on the statistically significant risks of short (<12 months) interpregnancy intervals for adverse perinatal and maternal outcomes

INDICATOR	Adult Women *(following a previous pregnancy)*	Adult Women *(following a previous abortion)*	Adolescent *(following a previous pregnancy)*	Adolescent *(following a previous abortion)*
Perinatal				
Low birth weight	✓	✓	✓	✓
Very low birth weight	✓	✓		
Preterm delivery	✓	✓	✓	✓
Very preterm delivery	✓	✓	✓	
Small for gestational age	✓		✓	
Fetal death	✓			
Neonatal death	✓		✓	
Maternal				
Maternal death	✓		✓	
Third trimester bleeding	✓		✓	
Premature rupture of membranes	✓	✓	✓	✓
Puerperal endometritis	✓		✓	
Anemia	✓	✓	✓	✓
Eclampsia			✓	
Preeclampsia			✓	
Post-partum hemorrhage			✓	

Data from multiple studies on the Latin American Center for Perinatology and Human Development (CLAP), Dr. Conde-Agudelo, 2002.

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