World Health Organization

Position paper on mainstreaming adolescent pregnancy in efforts to make pregnancy safer

Department of Making Pregnancy Safer

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Acronyms and Abbreviations

CAH	Child and Adolescent Health Department, WHO
CEMD	Confidential enquiries into maternal death
DALY	Disability-adjusted life-year
DHS	Demographic and Health Survey
GWH	Gender, Women, and Health Department, WHO
HIV	Human immunodeficiency virus
IEC	Information, education, and communication
IHTP	Integrated Technology Healthcare Package
IMPAC	Integrated management of pregnancy and childbirth
MPS	Making Pregnancy Safer Department, WHO
NGO	Nongovernmental organization
PMTCT	Prevention of mother-to-child transmission of HIV
RHR	Reproductive Health and Research Department, WHO
STI	Sexually transmitted infection
UN	United Nations
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
UK	United Kingdom
US	United States
USAID	United States Agency for International Development
WHO	World Health Organization

Glossary of Technical Terms Used in this report

Abortion rate. Number of (induced) abortions per 1000 women of a specific age.

Abortion ratio. The percentage of pregnancies ending in (induced) abortion.

Adolescent. Person 10-19 years old

Adolescent pregnancy. Pregnancy in a female 10-19 years old. A birth to a woman who becomes pregnant at age 19 but gives birth at age 20 is *not* defined as an adolescent birth.

Adolescent fertility rate. Live births per 1000 women in a specified adolescent age group (typically the 15-19 age group) (Population Reference Bureau, 2004)

Adult lifetime risk of maternal death. The probability of dying from a maternal cause during a woman's reproductive lifespan (World Health Organization *et al.* 2007).

Infant mortality. Mortality of live-born infants in the first year of life.

Low birth weight. A baby born weighing less than 2500 grams.

Maternal mortality ratio. Number of maternal deaths during a given time period per 100 000 live births during the same time-period (World Health Organization *et al.* 2007).

Maternal mortality rate. Number of maternal deaths in a given period per 100 000 women of reproductive age during the same time-period (World Health Organization *et al.* 2007).

Neonatal mortality. Infant deaths occurring during the first four weeks after birth (World Health Organization MPS Department, 2005).

Perinatal mortality. Includes both infant deaths in the first week of life and fetal deaths (stillbirths) (World Health Organization MPS Department, 2005).

Pregnancy rate. Expressed as an outcome per thousand woman, includes pregnancies ending in live birth plus pregnancies ending in induced abortion, miscarriage, or stillbirth.

Preterm birth. Giving birth before 37 completed weeks of pregnancy (National Institute of Child Health and Development)

Primipara. A woman giving birth for the first time.

Reproductive Age. Among women, reproductive age includes the years in which childbearing is generally physically possible: ages 15 to 49 (Leahy, 2007).

Statistically significant result. A result is called statistically significant if it is unlikely to have occurred by chance. A statistically significant difference means there is statistical evidence that a difference exists. The significance level of a test the probability of making a decision to reject the null hypothesis when the null hypothesis is actually true The decision is often made using the p-value: if the p-value is less than the significance level, then the null hypothesis is rejected. The smaller the p-value, the more significant the result is said to be (www.wikipedia.org).

Unmet need for contraception. A woman has an unmet need if she is married, in a union or sexually active; is fecund (able to conceive a pregnancy); does not want to have a child in the next two years; and is not using any contraception, either modern or traditional (Sedgh *et al.* 2007).

Unplanned pregnancy. Unplanned pregnancies include both those that are mistimed (i.e., the woman wanted to become pregnant at some point in the future, but not yet) and those that are unwanted (the woman did not want to become pregnant now or in the future). Researchers generally use the terms "unplanned" and "unintended" interchangeably (Finer & Henshaw, 2006).

Executive summary

This position paper aims to summarize the state of knowledge on adolescent pregnancy and detail an action plan to guide the World Health Organization (WHO) in mainstreaming adolescent concerns within the work of its Making Pregnancy Safer (MPS) Department. The paper reviews and summarizes recent evidence on pregnancy in women under 20, building on the findings of previous WHO-commissioned reviews. The paper's focus on pregnancy care rather than prevention is not meant to diminish the importance of preventing or delaying adolescent pregnancy, an approach that is very effective in reducing maternal and newborn health risks. The paper has benefited from the input of many people, and was reviewed and discussed extensively at a WHO expert group meeting held in February 2009. Its main audiences are WHO headquarters, regional office, and country staff, and the range of institutions and individuals working on maternal and newborn health and adolescent pregnancy issues.

The scope of adolescent pregnancy

About 15 million adolescents under age 20 give birth each year, roughly 11 percent of all births worldwide. The vast majority of these births—almost 95 percent—occur in developing countries. However, global averages mask important regional differences. Births to adolescents as a percent of all births ranges from about 3 percent in Eastern Asia to 18 percent in Latin America and the Caribbean. Half of all births to adolescents occur in just seven countries: India, Nigeria, Democratic Republic of Congo, Brazil, Bangladesh, China, and Ethiopia. Of the roughly 26 million pregnancies to adolescents each year, about 6 million end in induced abortion, and 4 million end in miscarriages or stillbirths.

The adolescent fertility rate worldwide was 52.0 per thousand for the 2000-2005 period, meaning that on average about 5.2 percent of adolescents give birth each year. However, the adolescent fertility rate is highly variable between regions and countries, and often within the same country. Adolescent fertility rates in the less developed countries are more than twice as high compared to rates in more developed countries. The adolescent fertility rate in the least developed countries is almost five times the rate in the more developed countries. The variations are also striking at the country level. The percentage of girls 15-19 giving birth ranges from less than 1% per year in places like Japan and Korea, to over 20% per year in the Democratic Republic of Congo.

Scattered evidence shows that very early childbearing—to those mothers under 15—occurs on a significant scale in some countries. Because the health risks of early childbearing appear to be magnified for the youngest mothers, these very early births are a major concern. An analysis of DHS data from surveys carried out in 51 developing countries from the mid-1990s to the early 2000s showed that almost 10% of girls were mothers by age 16, with the highest rates in sub-Saharan Africa and South-Central and South-Eastern Asia.

Rates of adolescent childbearing have dropped significantly in most countries and regions in the past two to three decades, and this trend continues in most developing countries. In 35 out of 40 countries with a Demographic and Health Survey (DHS) since 2000, adolescent fertility rates have fallen in the interval between 15-19 years before the survey and 0-4 years before the survey. All developing country regions show similar patterns. The magnitude of the declines is notable, ranging from an average decline of 16% in Eastern and Southern Africa, to 50% in North Africa/West Asia/Europe. Moreover, childbearing for younger adolescents also appears to falling faster than for older adolescents.

The context for adolescent pregnancy

In developing countries, about 90% of births to adolescents occur within marriage, although this percentage varies somewhat by region. The proportion is close to 100% in Western Asia/Northern Africa, the former Soviet Asia, and South-Central and South-Eastern Asia, while between 70-80% in South America and in sub-Saharan Africa. The overall trend for percentage of first births within marriage is slightly downward, with declines most notable in South America and Eastern/Southern Africa.

Results from 37 recent DHS show a median of about 75% of pregnancies to adolescents are planned, with the proportion intended ranging from 42% in Colombia to 93% in Egypt. These figures should be interpreted with caution, because many adolescents who report their pregnancies as planned may simply be succumbing to family or community pressure to become pregnant rather than acting according to their own wishes. Worldwide, births to unmarried adolescent mothers are far more likely to be unplanned. Unplanned pregnancies that occur outside the context of marriage are more likely to end in abortion.

A small but significant percent of adolescent pregnancies result from nonconsensual sex. Recent studies report rates of coerced first sex of between 10 and 45% of girls who first had sex before age 15.

Important trends in underlying social and economic factors may be influencing the decline in adolescent fertility rates. Age at first marriage is increasing in many countries, as are rates of contraceptive use among both married and unmarried adolescents. Educational levels for girls, which are closely associated with early childbearing, have also risen in most countries, and job opportunities have expanded.

The impact of adolescent pregnancy

The examination of the potential impacts of adolescent childbearing has focused on three dimensions: health of mothers and their newborns; individual social and economic effects; and societal level impacts.

Health impact. Several studies show that the risk of dying from maternal causes is substantially higher for women under 20 versus women in their 20s and 30s. Although some of this risk can be attributed to reasons other than young age that are known to raise health risks, such as giving birth for the first time, inadequate care, or poverty, there appears to be an independent effect of young maternal age on pregnancy risk to the mother and her newborn.

There is fairly strong evidence that, compared with older mothers, adolescent mothers have higher rates of underlying health behaviors or existing health problems that affect maternal and newborn health outcomes, including substance abuse, maternal smoking, poor nutrition, anemia, malaria, and HIV and other sexually transmitted infections. A pregnant adolescent also faces higher risk of poor nutrition during pregnancy, unsafe abortion complications, mental illness, and post-partum hemorrhage.

Combining the death and disability from too-early pregnancy leaves women under 20 bearing a disproportionate burden of pregnancy-related death and illness. Although accounting for about 11 percent of all births in the world, maternal conditions in adolescents produce 13% of all deaths from maternal conditions and 23 percent of all disability-adjusted life-years (DALYs) from maternal conditions.

Too-early childbearing also has a negative impact on the survival of newborns. A large U.S. study found a 55% higher risk of neonatal death to babies of mothers ages 10-15, a 19% higher risk in babies of 16-17 year-olds, and a 6% higher risk in babies of 18-19 year-olds. A study in Latin America found a 50% higher risk of neonatal death to babies of mothers under 16. Large national surveys show neonatal death risk levels are typically 50-100% higher in newborns of adolescents versus newborns of older women. Studies have shown an independent adverse effect of early pregnancy on newborn health conditions such as preterm birth, low birth weight, small for gestational age, asphyxia, malformations.

Risks are highest for the youngest adolescent mothers. An adolescent who gives birth before age 16 faces a much higher risk of health complications to herself and her baby—almost four time as high in some studies—compared with a women in her 20s. Giving birth between 16 and 17 still carries a higher risk to the newborn and may raise the risk to the adolescent mother. If an 18 or 19-year-old gives birth, she probably faces the same risk as someone in her 20s. However, the health risk to her baby appears to be somewhat higher.

Socioeconomic impact. Numerous studies have shown an association between adolescent pregnancy and negative social and economic effects on both the mother and her child. However, the evidence is inconclusive about the whether adolescent pregnancy is the cause or consequence of adverse socioeconomic factors. There is some evidence that early childbearing increases household poverty, but this effect works mainly via the negative health impacts.

Societal impact. Population momentum—largely a function of age at childbearing—is a major driver of population growth in developing countries. Studies have shown that delaying births to adolescents could significantly lower population growth rates, potentially generating broad economic and social benefits.

Adolescent Use of the Essential Package of Pregnancy Care

For women of all ages, use of pregnancy care services such as antenatal care and skilled delivery assistance is a key proximate determinant of maternal and infant outcomes. Evidence from most studies shows that adolescents are disadvantaged in their use of antenatal care relative to older women. There is also evidence that adolescents are less knowledgeable about AIDS transmission, less likely to know about ways to prevent maternal-to-child

transmission of HIV, and less likely to counseled and tested for HIV. For other elements of antenatal care such as tetanus toxoid vaccination the data is less clear about whether adolescents are more less likely to be vaccinated.

One element of pregnancy care for which there appears to be clear evidence that adolescents are relatively disadvantaged compared to older women is use of abortion and postabortion care. Several small-scale studies show that compared to older women, a young woman is more likely to wait until the later stages of pregnancy to seek abortion, resort to an unskilled abortion provider or use dangerous methods to self-abort, and delay seeking care for complications.

With respect to use of skilled delivery care and the likelihood that an adolescent will delivery her baby in a health institution, evidence does not give a clear answer as to whether adolescents are relatively disadvantaged. In some countries, adolescents are more likely to use such services, while in others they are less likely or use about the same as older women.

For other important elements of pregnancy care, including postpartum maternal care, most aspects of newborn care, breastfeeding, and postnatal newborn care, not enough information is available to say whether adolescents are relatively disadvantaged with regard to use.

Determinants of pregnancy care-seeking behavior of adolescents

A wide range of demand and supply side determinants influence use of pregnancy care. The extent to which these determinants differ in adolescents versus older woman is somewhat mixed. On the demand side, some evidence shows that adolescents have relatively less personal autonomy in making health care decisions, are more economically disadvantaged, have less authority over use of economic resources, have less mobility (particularly married adolescents), and are more affected by domestic violence. However, there is no evidence that educational level or social and cultural factors such as traditional beliefs differentially affect adolescents' use of pregnancy care. On the supply side, evidence shows that the treatment adolescent women receive at the hands of health care workers can be an important barrier to use of services. The existence of parental consent laws, abortion laws, the degree to which national health policies include language on adolescents, the legal framework addressing coercion and violence, school pregnancy policies, minimum age at marriage laws, and laws and policies affecting girls' access to education and jobs are all important in determining use of pregnancy care.

Interventions to make adolescent pregnancy safer

The underlying reasons why young maternal age may raise the risk of maternal and newborn health problems are greatly intertwined, and many of the causal pathways are still unclear. However, it appears that biological, behavioral, and social and economic factors combine with inadequate use of care to exacerbate health problems that underlie health risks and to directly raise the risk of maternal and newborn health problems.

Thus, meeting the needs of the pregnant adolescent requires a multi-pronged, flexible, and locally-tailored approach that incorporates both prevention of pregnancy and care for pregnant adolescents and their newborns. Much of the focus to date has been on prevention of unplanned pregnancies, for which several strategies have been tried and proven effective. Strategies to delay "planned" pregnancy that generally occurs within marriage have focused on postponing marriage and childbearing within marriage, but are less well articulated and proven. Also, little is known about interventions to prevent coercive sex that leads to unplanned pregnancy.

The paper reviewed in depth the effectiveness of pregnancy care programs aimed specifically at adolescent mothers. The analysis covered 37 studies of program effectiveness published in 2003-2008, plus an additional 5 reviews or meta-analyses that encompass a total of 81 interventions. Four-fifths of these studies (30 of 37) were carried out in developed country settings, mostly in the U.S. Almost all programs were effective in improving at least one key outcome of health-seeking behavior, maternal and newborn health, parenting skill, or child development. However, many programs were not able to influence other key outcomes. Little is known about the costs, cost-effectiveness, or cost-benefit of adolescent pregnancy care programs. The small amount of information on the scope of adolescent-specific pregnancy care points to a general lack of such programs in the developing world.

Implications for Content and Organization of Pregnancy Care

For a safe pregnancy, childbirth, and postnatal experience, mothers of all ages and their babies need a continuum of care that starts in the household and community and extends into health care system, including obstetric

care for complications. The international community has identified many key interventions along this continuum. A number of lessons have emerged on how to make these interventions work better for adolescent mothers and their newborns and what unique interventions adolescents might need. The recommended adolescent-specific interventions are laid out according to three main categories that correspond to the structure of WHO's *Recommended Interventions for Improving Maternal and Newborn Health*: (1) interventions by individuals, families, and communities; (2) interventions by the health services; and (3) health systems features.

Individual, family, and community interventions. Ensuring good pregnancy outcomes starts with home-based care practices that support the mother and their newborn before, during, and after the pregnancy. The current consensus supports five adolescent-specific interventions in this category. These interventions generally aim to deal with adolescent mothers' lack of knowledge, education, experience, income, and decision-making power relative to older mothers. Programs should involve the community; disseminate knowledge of pregnancy complications widely; provide adolescent mothers with life skills and sexuality education; empower adolescent girls to deal with domestic violence; and keep girls in school after getting pregnant.

Clinical and outreach interventions by health services. Skilled health workers provide a range of services in clinical settings or outside the clinic walls that help save the lives of pregnant mothers and their newborns. The current consensus supports 14 clinical or outreach interventions adapted to better serve adolescent mothers and their newborns. When adolescent girls first contact health services, they should receive pregnancy tests, counseling, and options to continue or terminate the pregnancy. Prenatal care services should place special attention on diagnosing and treating anemia in pregnant adolescent; improve their nutritional status; prevent and treat sexually transmitted infections; treat for malaria; emphasize developing the plan for birth; detect gender-based violence; prevent mother-to-child transmission of HIV; reduce smoking and drug abuse; and reach adolescents through information, education, and communication activities. During the post-partum period, health services should pay special attention to counseling on and providing support for breastfeeding; delaying or preventing repeat pregnancy; and visiting adolescents at home. The youngest adolescent mothers, those under 16, should receive special attention throughout pregnancy, in childbirth, and during the postpartum period.

Health systems features. Well-functioning health systems are critical to provision of pregnancy care for women of all ages. The current consensus encourages countries to incorporate five features into their health systems to improve adolescent use of care and the quality of care that they do receive. Countries should develop health worker competencies in meeting the special information and psychosocial needs of adolescents mothers; adapt the timing, location, and physical environment of their pregnancy care services to ensure that they are more responsive to adolescents' needs; foster a more conducive legal and policy environment; reduce the cost of pregnancy care for adolescents; and involve adolescents in program design, implementation, and evaluation.

An action plan to mainstream adolescents in efforts to make pregnancy safer

The evidence supports a clear rationale for action by WHO and partners to address adolescent pregnancy, in particular the health risks associated with early childbearing. The paper proposes an action plan to better incorporate adolescent concerns into ongoing work, organized in five categories.

Advocate for attention to adolescent pregnancy. Despite the increasing interest in adolescent pregnancy by governments and WHO regions, there remains a large need to secure high-level political support for action on adolescent pregnancy specific to maternal health issues. The following actions can help further this objectives:

- Help governments to analyze the scope of adolescent pregnancy and its impact on health and well-being
- Mainstream adolescent pregnancy concerns into efforts to increase community awareness and demand for quality pregnancy care
- Pilot adolescent-specific advocacy approaches at the country level
- Develop a consistent policy framework on adolescent pregnancy
- Support changes in the legal and policy environment.

Provide technical support. Those countries that want to act on adolescent pregnancy need the best advice possible from WHO and other international organizations. Some of the actions that WHO could take include the following.

- Review MPS-related national policy documents
- Disseminate information on adolescent pregnancy through various channels
- Review all IMPAC tools and guidelines with an adolescent lens, and revise according to evidence base
- Support implementation of adolescent-friendly care for pregnant adolescents
- Review preservice curricula and support needed changes
- Develop a tool to enable an adolescent-focused review of MPS-related policy documents and promote consistency with care recommendations

Monitor progress. Much of the information on adolescent pregnancy needed by decision makers is still lacking at the country level. WHO and partners can undertake several actions to improve data availability and use, including the following

- Promote the collection and use of data on the scope of adolescent pregnancy
- Promote better age-specific data on health impacts, including on maternal and newborn mortality, and on cause of maternal death
- Encourage collection, synthesis, and analysis of better age-specific information on use of key maternal health services
- Catalog coverage of adolescent pregnancy care programs

Support research. Several gaps exist in knowledge about the scope of adolescent pregnancy, the context in which adolescent pregnancy occurs, health, social, economic, demographic, and societal impacts of adolescent pregnancy, and effective interventions. Expanding and improving on the evidence base is crucial to a more effective national response. Actions include the following.

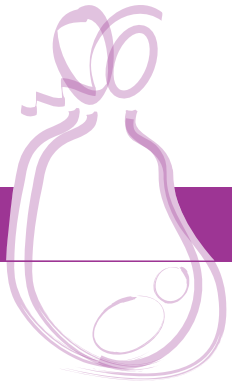
- Define and support a research agenda on adolescent pregnancy
- Pilot adolescent-specific technical and program approaches at the country level
- Improve the evidence base on costing of adolescent-focused approaches

Build effective partnerships. Partnership on adolescent pregnancy is critical because of the cross-cutting nature of the issue. Some of the actions to encourage collaboration include the following.

Overall, the intervention effectiveness data for many of the recommended interventions is weak. Of the 24 recommended interventions, 5 have some direct evidence from evaluation of adolescent-specific pregnancy care interventions, 5 rely only on indirect evidence from the broader adolescent reproductive health literature, 4 combine both direct and indirect evidence, and 10 have no supporting quantitative evidence of any type.

- Harmonize the actions of the various WHO departments dealing with adolescent pregnancy
- Harmonize and collaborate with outside partners
- Ensure consistency in data and on recommendations for interventions
- Use or adapt existing tools and guidelines as appropriate
- Provide expertise to partner organizations on adolescent pregnancy issues
- Mainstream adolescent pregnancy issues in other safe motherhood and adolescent health awareness-raising and advocacy initiatives

Parallel to this generic action plan, regional and country action plans are being elaborated based on recent consultations among WHO and its partners.



1 Introduction

1.1 Background, purpose, and audiences

Through the leadership of its Making Pregnancy Safer (MPS) Department, the World Health Organization (WHO) is committed to helping countries improve maternal and perinatal health and to achieve internationally agreed-upon goals such as the Millennium Development Goals and the goals and targets set at the 1994 International Conference on Population and Development and the 1995 Fourth World Conference on Women.

In recent years, governments and WHO country and regional offices have shown strong interest in receiving guidance on addressing pregnancy in women under 20. Countries increasingly recognize the need to adequately address adolescent pregnancy as a means to improving maternal and newborn health.

To help meet the need for guidance, the position paper aims to summarize the state of knowledge on adolescent pregnancy. To that end, the paper reviews and summarizes recent evidence on adolescent pregnancy, building on previous WHO-commissioned reviews (World Health Organization, 2004; World Health Organization, 2007a).

A second aim of the paper is to use this evidence for an action plan to guide WHO and its partners in mainstreaming adolescent concerns within their work on making pregnancy safer.

Because this paper is aimed principally at informing the various efforts to make pregnancy safer, its focus is on pregnancy care rather than prevention. This focus on care does not mean to diminish the importance of prevention, perhaps the most important strategy to reduce death and illness from adolescent pregnancy. WHO plans to examine the full range of issues related to adolescent pregnancy, including prevention, in a forthcoming comprehensive publication.[1]

The main audiences for the position paper include WHO headquarters, regional office, and country staff, and a range of institutions and individuals working on maternal and newborn health and adolescent pregnancy issues. These include national governments, nongovernmental organizations (NGOs), researchers, and program staff, international partner organizations such as United Nations Children's Fund (UNICEF), World Bank, and United Nations Population Fund (UNFPA), and bilateral aid agencies.

The position paper aims to be a starting point for action. Subsequent dissemination efforts will likely include print and electronic resources tailored for specific audiences. While not meant to be an advocacy document, it is expected that the conclusions and recommendations of the position paper will feed into ongoing advocacy to improve maternal and newborn health.

Although a product of the MPS Department, the paper deliberately aims to incorporate a regional perspective and the viewpoints of the various departments within WHO that address the needs of adolescents and of pregnant women. Through this process, it is hoped to further the goal of WHO speaking with a consistent voice on matters related to adolescent pregnancy.

1.2 Conceptual framework for addressing adolescent pregnancy

Underlying the position paper is a simple conceptual framework (Figure 1) that shows the various pathways via which adolescents can safely achieve their reproductive intentions. In this framework, the two primary end goals are for adolescents either to (1) be not pregnant and healthy or (2) be a healthy mother with a healthy baby.

The framework reflects the lengthy list of factors that provide the context for the reproductive intentions of adolescents, including marriage norms, levels of education, cultural expectations, the consensual nature of sex, job opportunities, and levels of poverty.

1 Tentatively titled, Preventing too early pregnancies and poor reproductive outcomes among adolescents in developing countries.

The framework further tries to capture the rather blurry nature of pregnancy intentions. Some adolescents are quite sure they do not want to get pregnant while others are absolutely certain that a pregnancy is the best thing for them. For many other adolescents, however, their intentions lie somewhere between these two extremes. Many adolescents who report their pregnancy as "intended" may simply be succumbing to family or community pressure rather than acting according to their own wishes. The vast range of social and psychological development that the adolescent years encompass further complicates the determination of when an adolescent pregnancy is truly intended. Almost all girls under 15 lack the cognitive capability to make safe, informed, and voluntary decisions about sex, marriage, and childbearing. Many girls 15-17 may have a greater cognitive capability to make such decisions, but they still may not be voluntary, because of the community and other pressures noted above. By contrast, the vast majority of the oldest adolescents—those 18-19 years old—are clearly ready for childbirth, and many want to have children (Dixon-Mueller, 2008).

The rest of the framework describes the strategies for meeting the needs of individual adolescents, depending on their pregnancy intentions. One set of programs can help adolescent who do not want to be pregnant now through provision of contraception, by preventing rape, and by providing reproductive health information and life skills education. A second set of programs are aimed at adolescents who are uncertain about whether to get pregnant or who may lack the ability to make informed, safe, and voluntary decisions about childbearing. These interventions this too-early "wanted" pregnancy generally occur within marriage and focus on delaying marriage and delaying childbearing within marriage. They include interventions like enrolling and keeping girls in school; providing livelihoods opportunities to young women; legal reforms to raise the age of marriage; and contraceptive information and services targeting married couples. A third set of programs are for those adolescents who find themselves with an unplanned pregnancy, and include interventions such as adoption services, programs to help rape victims, safe abortion, and postabortion care. A fourth set of interventions are for all those adolescents who are pregnant and want to take their pregnancy to term, regardless of whether the pregnancy is planned or unplanned. These include programs starting from antenatal care, through birth, postpartum, and preventing a second too-early pregnancy. Whether or not adolescents will use any these interventions depend on a set of determinants or factors that influence either the supply or demand for services.

Although the framework purposely focuses narrowly on adolescent *pregnancy*, it is important to state that pregnancy is but one facet of adolescent sexual and reproductive health, which is itself part of broader adolescent health and development concerns. As WHO and many others have noted, governments should be taking a comprehensive approach to adolescent health and development (WHO/UNFPA/UNICEF Study Group, 1999).

1.3 Scope and structure of the paper

Reflecting the focus on initiatives to make pregnancy safer, the paper deals primarily with the elements of the conceptual framework that concentrate on pregnancy care. The structure of the paper roughly parallels this underlying framework. Chapter 2, *The Scope of Adolescent Pregnancy,* gives an overview of the latest numbers and trends. Chapter 3, *Context for Adolescent Pregnancy,* corresponds to the box at the top of framework. Chapter 4, *Impact of Adolescent Pregnancy on Health Outcomes for Mothers and Newborns*, reviews the evidence linking early pregnancy with a range of health problems, and corresponds to the framework's boxes on unsafe abortion and adverse pregnancy outcomes. Chapter 5, *Social and Economic Impact of Adolescent Pregnancy*, looks at the evidence for impact of adolescent pregnancy on non-health outcomes including education, child development outcomes, poverty, and other social and economic indicators. Chapter 6, *Adolescent Use of the Essential Package of Pregnancy Care*, looks at the extent to which adolescents use the pregnancy care interventions included in the framework's box on pregnancy care for mothers and newborns. Chapter 7, *Determinants of Pregnancy Care-Seeking Behavior of Adolescents*, examines those factors that influence whether adolescent use services and corresponds to the framework's box on determinants of pregnancy care seeking. Chapter 8, *Program Interventions,* reviews the evidence on the effectiveness of pregnancy care interventions for mothers and newborns. Chapter 9, *Implications for the Content and Organization of Pregnancy* Care, synthesizes the findings. Chapter 10, *Action Plan to Address Adolescent Pregnancy*, lays out guidance for WHO and its partners in mainstreaming adolescent concerns within the initiatives to make pregnancy safer. Appendix 1 summarizes the key findings from each section of the report.

1.4 Methodology to develop the position paper

The position paper is meant as an update of two previous WHO-commissioned reviews,[2] with the aim of reassessing earlier findings and recommendations. It draws on a review of recent literature, scrutiny of WHO tools and guidelines, and interviews with key individuals inside and outside WHO. The paper also relies on recent findings

2 WHO, 2004, Adolescent Pregnancy: Issues in Adolescent Health and Development; and WHO, 2007, Adolescent pregnancy – Unmet needs and undone deeds. A review of the literature and programmes

from the Demographic and Health Surveys and from the 2008 Revision of the World Population Prospects from the United Nations Population Division. For the updated literature review, the Pubmed and Popline databases were searched for the term "adolescent pregnancy" for the period January 2003 to December 2007, yielding roughly 2000 citations. A smaller number of citations were added from 2008 and 2009 in the process of updating earlier versions of the paper. This literature was used to inform the discussion in chapters 2, 3, 4, 6, 8, and 9. A decision was made early in the process of developing the paper to not fully update the literature for the material discussed in chapters 5, *Social and Economic Impact of Adolescent Pregnancy, and 7, Determinants of Pregnancy Care-Seeking Behavior of Adolescents.* These two chapters, therefore, draw primarily on previous reviews, with only selected references to newer information.

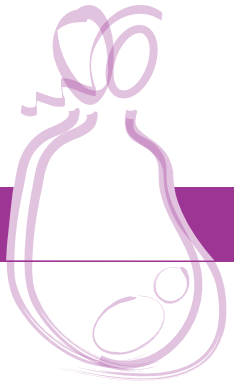
The position paper examines adolescent pregnancy in both developed and developing countries. However, because the vast majority of maternal and newborn death and illness occurs in developing regions, the focus of the paper is on those less wealthy regions of the world. A limitation of the paper, however, is that the bulk of the evidence on programs for pregnant adolescents comes from research in developed countries with well-established health care systems.

A further methodological limitation is that the paper is not a systematic review of the evidence on the impact of adolescent pregnancy or of the effectiveness of interventions to address adolescent pregnancy. In an upcoming publication,[3] WHO plans to use the more rigorous techniques of a systematic review to examine the evidence on intervention effectiveness.

1.5 Defining adolescence

The paper uses the standard WHO definition of adolescence as encompassing ages 10-19, recognizing that adolescence is as much a life stage as it is a chronological age. As has been pointed out (Dixon-Mueller, 2008), the early years of the second decade of life are typically vastly different from the later years—emotionally, physiologically, sexually, and in terms of life experience. To accommodate these differences, to the extent possible given the available evidence, the position paper differentiates between younger and older adolescents in terms of the pregnancy experience, the programmatic response, and recommended actions.

3 Preventing too early pregnancies and poor reproductive outcomes among adolescents in developing countries.



2 The scope of adolescent pregnancy

2.1 Current numbers of adolescents and projected growth in numbers of adolescents

Part of the reason for the increase in concern over adolescent pregnancy (and for adolescent health more broadly) are the sheer numbers of adolescents alive today. About one of every five people alive (18%) is an adolescent. The current world population of adolescents ages 10-19 is about 1.2 billion, the largest cohort of adolescents ever. About 90% live in developing countries. This total is projected to peak in the year 2030 at about 1.3 billion, and the proportion of the population in the adolescent age group is projected to slowly decline to about 13% by 2050. Females represent about 48% of the total in the 10-19 cohort, or currently about 600 million worldwide (Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, 2009).

As Figure 2 shows, trends in the growth of the adolescent age group vary markedly by region. The population of adolescents has already peaked in the developed world and in Eastern and South Eastern Asia, while the adolescent population is not projected to peak until 2010 in Latin America and the Caribbean, and until 2025 and 2030 in South Central Asia and West Asia respectively. In sub-Saharan Africa, the population of adolescents is projected to still be growing in 2050 (Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, 2009).

2.2 Numbers of adolescents giving birth

About 15 million women under age 20[4] give birth each year globally. A small, but unknown number of these births occur to the adolescents under age 15 (see section 2.3.4). Almost 95% of births to adolescents occur in developing countries (Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, 2009). Projections show the number of adolescent births in both developed and developing countries steadily falling worldwide to slightly under 8 million per year by 2050 (Figure 3). In absolute terms, the projected number of adolescent births is downward in all regions (Figure 4). These projections reflect both the projected decrease in the number of adolescents (section 2.1) and the projected fall in adolescent fertility rates (section 2.3.5)

Not only are absolute numbers of births projected to fall, but also births to adolescents as a proportion of all births are projected to decline, from current levels of 12% in developing countries to 7% by 2050, and from 6% to 1% in developed countries (Figure 5). However, these global averages mask important regional differences. Births to adolescents as a percent of all births ranges from about 3% in Eastern Asia to 18% in Latin America and the Caribbean (Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, 2009) (Figure 6).

Moreover, a relatively small number of large countries account for most of adolescent births. Half of all births to adolescents occur in just seven countries: India, Nigeria, Democratic Republic of Congo, Brazil, Bangladesh, China, and Ethiopia; just 15 countries account for two-thirds of all births to adolescents (Figure 7).

4 Although the paper defines adolescent pregnancy as pregnancy to any woman under age 20, many data sources report only for the 15-19 age group. Thus, whenever possible, the paper reports data for the entire 10 years of adolescence. The paper reports information for other age ranges (for example 15-19 years old) where information on the complete adolescent age span is not available.

2.3 Fertility rates in adolescents

Current adolescent fertility rates

Fertility rates, which measure live births per 1000 women in a specified age group, are one common way to look at the scope of adolescent pregnancy. As Table 1 shows, the adolescent fertility rate worldwide was estimated to be 52.0 per thousand for the 2005-2010 period. This means that on average about 5.2% of adolescents 15-19 years old give birth each year. By comparison, about 15% of women ages 20-24 give birth each year (Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, 2009). As both Table 1 and Figure 8 show, the adolescent fertility rate is highly variable between regions and countries. Adolescent fertility rates in the less developed countries are more than twice as high as rates in more developed countries. The adolescent fertility rate in the least developed countries is almost five times the rate in the more developed countries.

The variations are also striking at the country level. The proportion of girls 15-19 giving birth ranges from less than 1% per year in places like Japan and Korea, to 20% per year in Democratic Republic of Congo (Table 2). Even within countries, adolescent fertility rates can vary widely by geographic region. For example, the adolescent fertility rate in India ranges between 25 in the state of Goa and 128 in the state of Bihar (Figure 9).

2.3.2 Proportion of women who give birth in adolescence

Another way to look at how widespread childbearing is during adolescence is to examine the proportion of women who have become pregnant and given birth in their adolescent years. By this measure, in the developing countries, roughly half of women have already given birth by age 20 (National Research Council & Institute of Medicine, 2005). This proportion is significantly lower in developed countries.

2.3.3 Age distribution of births to adolescents

It is important to understand the age pattern of births within the adolescent age group because health risks associated with adolescent pregnancy apparently increase as age decreases (see section 4.7).

A closer look at the data from recent Demographic and Health Surveys (DHS) on births in the 15-19 age category shows that adolescent pregnancy in most countries is concentrated among older adolescents. For example, in sub-Saharan Africa on average slightly more than three-quarters of births to adolescents (77%) are to 17-19 year-olds. This proportion varies quite a bit among countries, from 92% in Eritrea to 61% in Niger (Figure 10). The proportion of adolescent births to 17-19 year-olds is higher on average in North Africa/West Asia/Europe (88%) and South and Southeast Asia (84%), and slightly lower in Latin American and the Caribbean (75%).

Another way to understand the age patterns of births is to examine the percentage of adolescents who are pregnant or have given birth by specific ages. An analysis of DHS data from surveys carried out in 51 countries from the mid-1990s to the early 2000s shows that, in some regions, significant proportions of adolescents are mothers by age 16. This percentage was as high as 13.4% in Western and Middle Africa (Table 3). Information from the most recent DHS also show that significant proportions of adolescents are already mothers or pregnant by ages 15 (Figure 11) and 16 (Figure 12). This proportion varies considerably across countries, even within regions. For example, the proportion pregnant by age 15 in sub-Saharan Africa ranges from 0.3% in Rwanda to 12.2% in Mozambique (Figure 11).

2.3.4 Births to adolescents under 15

Outside of developed countries, most of which have relatively good systems of birth registration, little is known about the number of births and fertility rates to adolescents under 15 years old. Previous reviews[5] found scattered evidence that births to adolescents under 15 are a problem in some countries, although their numbers are relatively small as a proportion of all births to adolescents. The current review found four studies reporting on births in the under 15 age group, including from Chile, French Guiana, the U.K. and the United States (Table 4).

Throughout this paper, "previous reviews" refer to WHO, 2004, *Adolescent Pregnancy: Issues in Adolescent Health and Development; and* WHO, 2007, *Adolescent pregnancy – Unmet needs and undone deeds. A review of the literature and programmes.*

2.3.5 Trends in fertility rates to adolescents

Rates of adolescent childbearing have declined in most countries and regions in the past three decades (Bearinger *et al.* 2007). Recent data from the DHS show that this trend continues unabated in most developing countries.

In 35 out of 40 countries with a DHS since 2000, adolescent fertility rates have fallen over a 15-year period. These patterns appear across all regions (Figure 13 to Figure 18). Data from the UN Population Division also show declines in adolescent fertility rates in every region in the period 1995-2000 to 2005-2010. The magnitude of the declines during recent years is notable, ranging from an average decline of 12% in sub-Saharan Africa, to between 25 and 30% in Asia and Europe. Adolescent childbearing is also declining at similar rates in both more and less developed countries (Table 1).

Reasons for the decline in adolescent fertility rates vary from country to country, and reflect a combination of rising age at marriage, increases in girls' educational attainment, greater job opportunities for women, urbanization, and rising rates of contraceptive use (National Research Council & Institute of Medicine, 2005).

Childbearing for younger adolescents also appears to be falling. In a recent analysis of data using DHS surveys from the mid-1990s to the early 2000s, in 42 of 51 countries the percentage of women giving birth by age 16 has fallen, in some cases by substantial absolute and percentage terms (Figure 18). South America is the only region for which the percentage of women giving birth by age 16 has risen on average (Figure 19).

Childbearing for younger adolescents also appears to falling faster than for older adolescents. In 38 of the 42 countries where the proportion of women giving birth by age 16 had fallen, it fell by a larger percentage than the proportion of women giving birth by age 18 (Figure 20). This means that while fertility rates for adolescents as a whole have been falling, the decline in most countries has been concentrated amongst the youngest adolescents. A similar pattern whereby childbearing for younger adolescents is falling faster than for older adolescents is also seen in the weighted regional averages (Figure 19).

2.4 Abortion and abortion rates in adolescents

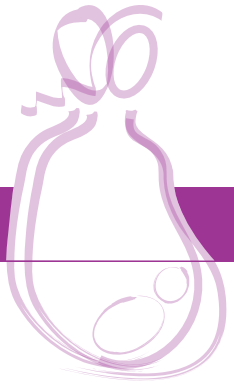
Previous reviews found relatively little information on the numbers of abortions to adolescents or rates of abortion compared to older women. Information on abortion is generally available only from developed countries and unavailable or greatly under-reported in most developing countries (National Research Council & Institute of Medicine, 2005). Recent analysis from the U.S. shows an abortion rate in 2004 of 20.5 in women under age 20 versus a rate of 39.9 in 20-24 year-olds and 29.7 in 25-29 year olds (Henshaw & Kost, 2008).

Almost all of the serious health problems from abortion result from unsafe abortion. Global estimates on unsafe abortion show that in 2003, 14% of all unsafe abortions were to adolescents 15-19, about 2.5 million abortions per year (World Health Organization, 2007c). As Figure 21 shows, unsafe abortion is far more concentrated among adolescents in Africa than in other developing country regions; adolescents 15-19 in Africa account for about 25% of unsafe abortions in the regions versus less than 10% in Asia and about 15% in Latin America and the Caribbean. This higher proportion in Africa reflects earlier sexual debut and higher exposure to pregnancy, especially unwanted pregnancy that often ends in abortion (Shah & Ahman, 2004).

2.5 Number of pregnancies and pregnancy rates in adolescents

The pregnancy rate includes pregnancies ending in live birth plus pregnancies ending in induced abortion, miscarriage, or stillbirth. Because of the large uncertainty over rates of adolescent abortion, country-level information on the number of adolescent pregnancies and pregnancy rates is sketchy at best. The information presented in previous reviews is available either from developed countries or from small-scale studies in developing countries. The current review found three studies reporting on number of pregnancies and pregnancy rates, one from the U.S., one from the U.K., and one from Africa (Table 5).

The number of adolescent pregnancies can be estimated indirectly from global averages for pregnancy outcomes in all women, combined with data on unsafe abortion in adolescents. WHO 2005 reports that 63% of pregnancies end in live birth, 15% in miscarriage or stillbirth, and 22% in induced abortion. Using these figures, we can estimate that, for the period 2000-2005, about 25.9 million women 15-19 yearly got pregnant (some small proportion of those are pregnancies to 10-14 year olds, see section 2.3.4). Of this total, about 16.3 million produced live births, 5.7 million ended in induced abortion, and 3.9 million ended in miscarriages or stillbirths (Figure 22). The estimate of 25.9 million pregnancies means that about 8.6% of all women ages 15-19 become pregnant in a given year.



3. Context for adolescent pregnancy

The context in which each adolescent becomes pregnant is the product of a unique set of factors. To simplify, however, it is useful to think about the broad circumstances under which an adolescent may become pregnant. As explained above in the discussion on the conceptual framework (section 1.2), adolescent pregnancy can be either planned or unplanned. Planned pregnancy can happen when there is either sex within marriage or sex outside of a recognized union. Unplanned pregnancy can occur either when consensual sex occurs within or outside marriage or when there is non-consensual sex. The following sections examine the extent to which these various circumstances apply to adolescents, and the proximate and underlying factors influencing this context.

3.1 Planning status of adolescent pregnancy

Previous reviews reported a wide variation across countries in the proportion of adolescent pregnancies that are planned.[6] Previous reviews also found that unmarried adolescent mothers are roughly twice as likely as married adolescent mothers to report that their recent pregnancies were unplanned.

Recent data confirm that a wide variation in planning status exists across developing countries. Results from 37 recent DHS surveys show a median of about 75% of pregnancies to adolescents are planned (the data are not disaggregated by marital status). However, the percentage of pregnancies to adolescents that are planned varies widely, from a low of 42% in Colombia to a high of 93% in Egypt (Figure 23). Important regional variation also occurs (Figure 24), with a median of only about half of pregnancies planned in Latin America and the Caribbean versus 69% in sub-Saharan Africa, and between 80% and 90% in North Africa/West Asia/Europe and South and Southeast Asia.

No clear pattern emerges when comparing planning status of pregnancy in adolescents versus older women. In about half of countries of 37 countries with a recent DHS, adolescents under 20 have higher rates of planned pregnancies compared with women 20-24 years old (Figure 25).

Data from recent studies bolster findings from previous reviews that adolescents in developed countries have relatively high rates of unplanned pregnancies compared to their counterparts in developing countries. In the U.S. a 2002 national survey found that only 21.6% of births to women under 20 years older were planned, compared to 55.8% of births to women ages 20-24 (Chandra *et al.* 2005).

3.2 Pregnancy within and outside of marriage

In developing countries, about 90% of births to adolescents occur within marriage, although this percentage varies somewhat by region. The proportion is close to 100% in Western Asia/Northern Africa, the former Soviet Asia, and South-Central and South-Eastern Asia, while between 70-80% in South America and in sub-Saharan Africa (Figure 26). In only a few developing countries do less than 60% of births to adolescents occur within marriage (Figure 27). The overall trend for percentage of first births within marriage is slightly downward, especially in South America and Eastern/Southern Africa (Figure 28). The percentage of first marital births that were conceived before marriage appears to be rising slightly, to a current level of about 15% (National Research Council & Institute of Medicine, 2005).

Previous reviews found that most adolescent pregnancies in developed countries occur outside of marriage. This review found studies that bolster those earlier findings. Evidence from a 2002 national survey in the United States found that only 48.3% of births to women under age 20 were to married or cohabitating women (Chandra *et al.* 2005). Data from 2005 for England and Wales show that only 5% of pregnancies to women under 20 occurred within marriage (Office for National Statistics, 2007).

6 Surveys that generate information on planning status usually ask women whether recent pregnancies were planned or unplanned. Unplanned pregnancies include both those that are mistimed (i.e., the woman wanted to become pregnant at some point in the future, but not yet) and those that were unwanted (the woman did not want to become pregnant now or in the future). Researchers generally use the terms "planned" and "intended" interchangeably.

3.3 Coerced sex and pregnancy

Previous reviews describe studies reporting significant rates of non-consensual sex for adolescents, and a correlation between non-consensual sex and higher rates of pregnancy in adolescents. The current review found new information confirming these earlier findings.

3.3.1 Rates of sexual abuse

A recent WHO study carried out in 15 developed and less developed country settings rates of reported sexual abuse among girls before age 15 were between 1-21% (Figure 29). Other studies have shown similar results in a wide range of settings (Interagency Gender Working Group, 2006).

3.3.2 Rates of coerced first sex

Many young women's first sex is coerced. In the WHO study, rates of coerced first sex for all women ranged between 0.4 and 29.9% (World Health Organization, 2005b). The data also show that the likelihood of coerced sex increases greatly as the age at which the woman first has sex declines. In three-quarters of the sites, more than 30% of women who had first sex before 15 reported being coerced (Figure 30).

3.3.3 Physical and sexual violence by intimate male partners.

Rates of physical and sexual violence by intimate male partners against adolescent women are also high. In the recent WHO study, between 3.6 and 50.0% of young women ages 15-19 report being subject to at least one act of physical violence in the past year; the average was 32.8% over the 15 study sites. Moreover, 11 of the 15 study sites, rates of current physical violence are highest in the 15-19 age group compared to women 20-49 years old (World Health Organization, 2005b) (Figure 31).

Data on coercive or unwanted sex within marriage is generally unavailable. However, one recent study of young married women in India found that of the 1,664 young women who reported that they indicated to their husbands when sex was unwanted, 12% had experienced unwanted sex frequently, and 32% had experienced it occasionally (Santhya *et al.* 2007).

3.3.4 Coerced sex and pregnancy

Previous reviews found scattered information, mainly from the U.S., on the proportion of unplanned pregnancies that result from coerced sex. These studies reported that 30%-60% of pregnancies were the result of non-consensual sex.

3.4 Proximate factors influencing the context for adolescent pregnancy

Important proximate factors influence the context in which adolescents become pregnant, discussed briefly below.

3.4.1 Trends in puberty/menarche

All over the world, both boys and girls are experiencing puberty at an earlier age (National Research Council & Institute of Medicine, 2005).

3.4.2 Age at first marriage

Age at first marriage has gradually increased in most countries and regions, with the exception of Latin America (Mensch, Singh & Casterline, 2005). Nonetheless, significant proportions of adolescents are already married and parents (Table 6). As noted above, adolescent childbearing remains tightly linked with marriage. In fact, the average time between marriage and first birth is declining in all parts of the world ((National Research Council & Institute of Medicine, 2005)

3.4.3 Initiation of sexual activity

The majority of young people initiate sexual activity during adolescence (Table 6). Contrary to popular belief, today's adolescents are not having sex at earlier ages than before (National Research Council & Institute of Medicine, 2005). There is even recent evidence that very early sexual initiation is on the decline in sub-Saharan

Africa (UNAIDS, 2006). However, premarital sex is increasing in most developing countries where data is available, largely because of increases in the age at first marriage (National Research Council & Institute of Medicine, 2005).

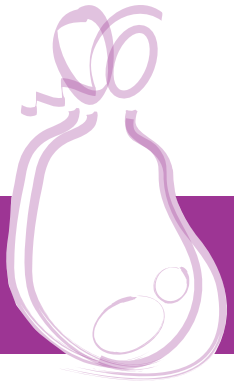
3.4.4 Contraceptive use

Rates of contraceptive use among both married and unmarried adolescents are still quite low (Table 6). Moreover, substantial proportions of young women are not using contraception even though they are sexually active and do not want to have a child. A study of women in 53 developing countries found that this unmet need for contraception was highest in the youngest women, averaging 23.3% of women in the 15-24 age group (Figure 32).

3.5 Underlying social, economic, and cultural factors influencing the context for adolescent pregnancy

Previous reviews extensively discussed several well-established associations between exposure to adolescent pregnancy and underlying and inter-related contextual factors such as level of education, urban/rural residence, socioeconomic status, ethnicity, cultural values and norms. These factors are very similar to those that influence patterns in childbearing for older women as well.

More recent data from the DHS confirm these associations. In 33 of 35 countries, greater educational attainment was associated with lower rates of ever-pregnancy in 15-19 year-olds. In 33 of 38 countries, the percentage of teens reporting ever having been pregnant was higher in rural than in urban areas. In 31 of 38 countries, adolescents who are currently employed are less likely to be ever-pregnant. In 35 of 37 countries, rates of ever-pregnancy were higher in teens reporting less exposure to sources of mass media. Furthermore, there is a clear association between higher rates of ever-pregnancy and lower socioeconomic status. In 33 of 37 countries, adolescents in the highest wealth quintile have lower rates of ever-pregnancy compared with adolescents in the lowest wealth quintile (Khan & Mishra, 2008). Such rich-poor differentials are generally higher on average for adolescents than for older women (Rani & Lule, 2004; Rosen, 2004).



4. Impact of Adolescent Pregnancy on Health Outcomes for Mothers and Newborns

Most women experience pregnancy and give birth without serious health problems. But pregnancy can be hazardous for a significant proportion of mothers. Worldwide, about 500,000 women die from pregnancy-related causes each year (World Health Organization *et al.* 2007). Furthermore, about 7 million babies each year are either stillborn or die within the first four weeks of life (World Health Organization MPS Department, 2005). To effectively direct scarce resources to these problems, it is important to understand whether young maternal age differentially affects the health risks of pregnancy. If becoming pregnant as an adolescent does create greater health problems, then understanding the reasons why can help guide the appropriate programmatic responses. These are the main questions this chapter seeks to answer.

To structure the examination of the evidence on health impacts, the chapter categorizes the health problems associated with poor pregnancy outcomes in the following way:

- *Health behaviors that influence maternal and newborn health outcomes.* First, some women exhibit health behaviors or status that are not a result of pregnancy itself, but that can lead directly to many of the proximate causes of pregnancy-related death and disability (for example, smoking as a cause low birth weight and preterm labor) or indirectly through their contribution to underlying health problems (such as the role poor nutrition plays in anemia and malaria).
- *Existing health problems affecting maternal and newborn health outcomes.* Second, women bring to pregnancy health problems such as anemia, infection with HIV and other STIs, malaria, and FGM. These health problems underlie many of the proximate causes of pregnancy-related death and disability
- *Proximate causes of maternal and newborn morbidity and mortality.* Third, women and their newborns suffer directly from proximate conditions that cause maternal and newborn morbidity and mortality.

The analysis aims to answer the question of whether these pregnancy-related behaviors, existing health problems, or health outcomes affect adolescents differentially compared to older women (typically those in their twenties).

This analysis derives from two sources of evidence: the findings of previous reviews[7] and an updated review of literature from 2003-2008. Appendix 3 contains details on each of the studies examined for the updated literature review, including the country, study design, analytic methods used, adolescent age group (or groups) studied, the reference age group against which the adolescent age group was compared, and the possible confounding factors that the study controlled for (where applicable).

The section further looks at the evidence on two related questions. The first is whether adolescents of the same age might face different health risks from pregnancy depending on whether they live in a developed versus a developing country. The second is the extent to which the severity of adverse health impacts may increase as adolescent maternal age decreases.

7 Throughout this section, "previous reviews" refer to WHO, 2004, *Adolescent Pregnancy: Issues in Adolescent Health and Development;* and WHO, 2007, *Adolescent pregnancy – Unmet needs and undone deeds. A review of the literature and programmes.*

4.1.1 Health behaviors that influence maternal and newborn health outcomes

Some health behaviors are not a result of pregnancy itself, but can lead directly to many of the proximate causes of death and disability (for example, smoking as a contributor to low birth weight and preterm labor) and indirectly through their contribution to underlying health problems (such as the role poor nutrition plays in anemia and malaria).

4.1.2 Smoking and substance abuse

Previous reviews found that pregnant adolescents are more likely to smoke and abuse other substances compared to older women. New evidence from 7 of 8 studies support this finding (Table 14).

4.1.3 Nutritional status

The dietary habits and nutritional status that women bring to pregnancy can affect birth outcomes. Previous reviews did not report studies that directly compared nutritional status of pregnant adolescent versus older pregnant women (for indirect comparison, see section 4.2.1 below on anemia). In the recent review, a study from Malawi found that adolescent mothers were more likely to be malnourished than older mothers (Kalanda, Verhoeff & Brabin, 2006).

4.2 Existing health problems affecting maternal and newborn health outcomes

Certain health problems are not a result of pregnancy but can have a profound impact on birth outcomes for the mother and child.

4.2.1 Anemia

Previous reviews found some evidence that anemia, a condition caused in large part by underlying nutritional deficiencies, is a greater problem in pregnant adolescents compared with older women. New evidence supports the association between maternal age and anemia. 15 of 23 studies (including 4 of 6 studies that controlled for confounding factors) found a higher risk of anemia in adolescents (Table 14).

4.2.2 Malaria

Previous reviews found some evidence that malaria is a particular problem in adolescent pregnancies, mainly because malaria is more of a problem in first pregnancies compared to second or later pregnancies (World Health Organization, 2007a). The current review found one of one study that supports the association between maternal age and greater susceptibility to the health consequences of malaria in pregnancy (Table 14).

4.2.3 HIV/AIDS and other sexually transmitted infections

Previous reviews found adolescent mothers at increased risk of contracting HIV infection and other sexually transmitted infections (STIs). The recent review found two studies, both of which found an association between maternal age and STI acquisition (Table 14).

4.2.4 Female genital mutilation

Although research has established the negative health impact of female genital mutilation on pregnancy outcomes, neither previous reviews nor the current review found any studies examining whether female genital mutilation is a particular problem in adolescent pregnancies.

4.3 Impact of adolescent pregnancy on the health of mothers

This section provides an overview of the evidence and then examines impacts of adolescent pregnancy on specific maternal health problems.

4.3.1 Overview of health impacts on mothers

Several studies published in 2003-2008 have compared the health impact of adolescent pregnancies with impact of pregnancies in older women[8]. As Table 7 shows, of the 59 studies that reported maternal health outcomes, 35 studies found a significantly higher risk[9] of at least one adverse outcome in adolescents. Although the quality of these studies varies greatly, 11 of 19 (58%) of the recent studies that controlled for factors that earlier had been identified as potential confounders (for example, giving birth for the first time, socioeconomic differences, and use of prenatal care) report that young maternal age was independently associated with higher risk of at least one health problem.

Looking at the entire range of maternal outcomes measured (Table 8), recent studies reported higher risks for adolescents in 34% of outcomes, the same risk in 43% of outcomes, and a lower risk in 23% of outcomes. These proportions were similar for outcomes that were adjusted taking into account possible confounding socioeconomic and other factors.

The following sections disaggregate the general findings presented in Table 7 and Table 8 to look at the impact of adolescent pregnancy on specific maternal health outcomes that contribute to maternal death and illness. For each outcome, the analysis tries to answer the question of whether these pregnancy-related health problems affect adolescent mothers differentially compared to older women. Table 9 and Table 10 summarize these findings.

4.3.2 Maternal deaths in adolescents

Very few studies attempt to compare maternal death rates in adolescents versus older women, in part because of measurement difficulties such as low rates of maternal death in developed countries; lack of age-specific data in developing countries; and a reliance on hospital-based versus population-based studies. Owing to these data limitations, previous reviews did not provide a clear-cut answer to the question of whether early childbearing puts mothers at higher risk of death compared with childbearing at older ages. These reviews cited studies showing higher levels of maternal mortality in adolescents versus in women in their 20s and 30s. However, the designs of these studies did not allow a determination of whether these higher death rates stem from young age or from other factors that are known to raise health risks, such as giving birth for the first time, inadequate pregnancy care, or low socioeconomic status.

The current review found 13 new studies[10] that attempt to measure the impact of young maternal age on risk of maternal death (Table 11). Using different analytical methods and age groups, five studies found higher rates in adolescents, six found no difference, and two found lower rates of maternal mortality in adolescents compared with older women. Only one study that adjusted for various confounding factors found a higher rate of maternal death in adolescents, and that was for the under 16 age group (Conde-Agudelo, Belizan & Lammers, 2005).

Figure 33 combines recent findings with evidence presented in earlier reviews comparing risk of maternal death among adolescents and older women. The figure combines various adolescent age groups, adult reference groups, countries, years, and regions (section 4.7 discusses results by age group). Five of the 29 studies reported significantly higher rates of maternal death for adolescents. One study found significantly lower rates. Two of the six studies that reported adjusted odds ratios found significantly higher rates of maternal death in adolescents.

Some information on the scope of maternal death in adolescence has begun to emerge in recent years, but overall the picture remains hazy:

- *Number of adolescent maternal deaths.* Estimates from 2002 (Mathers, 2008) find that there were 66,000 deaths due to maternal conditions worldwide among adolescents 10-19.
- *Number of adolescent maternal deaths as a percentage of all maternal deaths.* The estimated 66,000 adolescent girls who died from maternal causes in 2002 represents 12.9% of all deaths from maternal conditions (510,000) (Mathers, 2008).

8 Almost all these studies compare adolescents with women in their twenties or early thirties, generally considered the lowest-risk childbearing ages.

9 A finding that this paper characterizes as "higher/lower," "significantly higher/lower" "different" or "significantly different" means the researcher reporting the finding used a statistical significance test that showed differences between an adolescent group and a group of older women (typically women in their twenties) that were significant at the $p<.05$ level.

10 In the subsequent discussion, the number of studies includes the sum of all separate analyses undertaken by researchers. Therefore, if one researcher reports results for two different age groups, this counts as two studies. Similarly, if a researcher reports both unadjusted and adjusted odds ratios, this counts as two studies.

- *Causes of adolescent maternal death.* Information on cause of maternal death in adolescents is similarly scarce. Previous reviews found scattered information that did not paint a comprehensive picture of causes of maternal death and whether they differ from causes of maternal death in older women. There continues to be very little evidence about cause of maternal death in adolescents, and how it might compare with cause of death in older mothers. The most recent systematic global review of causes of maternal death does not give an age breakdown (World Health Organization *et al.* 2007).

One cause of maternal death for which some information exists by age is unsafe abortion. For women of all ages living in developing countries, unsafe abortion accounts for about 13% of maternal deaths (World Health Organization, 2007c). WHO estimates the number of maternal deaths from unsafe abortion in adolescents to be 11,800 in 2003 (World Health Organization, 2007c). This figure represents 18% of the total 66,000 maternal deaths in adolescents.

A few recent hospital-based studies in developing countries report cause of maternal death in adolescents. A study in a hospital in Nigeria reported 25 maternal deaths in adolescents 10-19. Abortion was the leading cause, accounting for just over one-third of deaths (Ujah *et al.* 2005) (Table 12). Another hospital-based study of 52 deaths among adolescents ages 12-19 in Nigeria found that eclampsia and prolonged and obstructed labor were responsible for 76% of deaths. Abortion was an uncommon cause of maternal death in adolescents (Airede & Ekele, 2003) (Table 13).

- *The burden of disease related to adolescent pregnancy.* Pregnant women under 20 bear a disproportionate burden of pregnancy-related death and illness. Although the roughly 15 million adolescents who give birth each year only account for about 11% of all births worldwide (section 2.2), maternal conditions in adolescents account for 23% of all disability-adjusted life-years (DALYs) from maternal conditions for women of all ages (Mathers, 2008). Total pregnancy-related global burden of disease was estimated at 7,787,000 DALYs for adolescents ages 10-19 in 2002, making it the leading cause of DALYs among women for that age group (Mathers, 2008). Almost no information exists on the extent of adolescent pregnancy-related morbidity, for example related to fistulae, or on the extent of adolescent illness relative to maternal illness overall.
- *Correlation between maternal mortality ratio and adolescent fertility rate.* Those countries with high maternal mortality ratios are generally the countries where adolescent fertility rates are high. A scatter plot of maternal mortality against adolescent fertility rates shows a fairly strong correlation (Figure 34).

4.3.3 Pregnancy-related nutritional status

A study in Finland found that adolescent mothers were less likely than older mothers to be overweight during pregnancy (Raatikainen *et al.* 2006). By contrast, a U.S. study found that adolescent mothers were more likely than older mothers to have excessive weight gain during pregnancy (Howie *et al.* 2003) (Table 15 and Table 16).

4.3.4 Complications from abortion

As noted above, a significant proportion of adolescents choose to terminate their pregnancies through safe or unsafe abortion. In countries where abortion is legally restricted, unsafe abortion is an important source of mortality and morbidity for young women.

Previous reviews found evidence, mostly in hospital-based studies, that abortion complications disproportionately affect adolescents compared to older women. Delays in seeking care may cause this disparity. One recent publication, (de Bruyn M. & Packer, 2004), cites studies that show the disproportionate burden of unsafe abortion-related complications borne by adolescents. The recent review did not find additional studies examining this question.

4.3.5 Hypertensive disease

Previous reviews pointed to a lack of association between young maternal age and increased incidence of hypertensive disease, including eclampsia, pre-eclampsia, and pregnancy-induced hypertension. In the current

review, 12 of the 31 studies that measure this outcome found a higher risk in adolescents, 17 found the same level of risk, and 2 found lower risk. However, in the 4 studies that adjusted for confounding factors, risk levels were the same regardless of maternal age (Table 15 and Table 16).

4.3.6 Iodine deficiency

Previous reviews did not find an association between adolescent pregnancy and higher risk of iodine deficiency or other thyroid disorder. The current review did not find any studies on this topic.

4.3.7 Violence against pregnant women

Violence against pregnant women affects between 4% and 29% of pregnant women in developing countries (Nasir & Hyder, 2003) and has a negative impact on pregnancy outcomes (Chambliss, 2008; Sharps, Laughon & Giangrande, 2007). We know little, however, about whether adolescents are any more vulnerable to violence in pregnancy relative to older women. Neither previous reviews nor the current review found any evidence on the relative prevalence of violence against pregnant woman by age.

4.3.8 Prolonged and obstructed labor

Previous reviews found that adolescents are not any more likely to have prolonged or difficult labor than older mothers, and may even have an easier course of labor, including less likelihood of c-section. The current review confirmed these findings. Of 8 studies that measured duration of labor, 3 found longer duration in adolescents, 4 the same duration, and 1 shorter duration. 27 of the 29 studies that reported c-section rates found c-section rates the same or lower in adolescents compared with older mothers. The six studies reporting adjusted odds ratios all reported lower rates in adolescents (Table 15 and Table 16).

4.3.9 Obstetric fistulae

Previous reviews found evidence that adolescents are at higher risk than older mothers of obstetrics fistulae because of obstructed labor. The current review found 11 new studies on this topic (Table 17). Findings from these recent studies do not appear to provide clear-cut support to the existence of an independent effect of maternal age on risk of fistula. Of the 6 studies reporting age at which fistula occurred, only one study (Tsui, Creanga & Ahmed, 2007) reported odds ratios (using prolonged labor as a proxy for risk of fistula). This study found that, after controlling for parity, birth at age <18 was not significantly associated with higher risk of fistula. The other 5 studies reported that between 35% and 65% of women with fistula had first developed fistula as adolescents. Notably, these proportions are similar to the proportions of women in these countries who have given birth before age 20. Another recent study examined whether early sexual debut (as a proxy for early pregnancy and childbearing) was associated with symptoms related to the development of fistulae. The study found an elevated risk of fistula symptoms in 3 of the 5 countries studied in women whose first sexual experience was at age 15 or younger (Johnson & Peterman, 2008).

4.3.10 Ante- and post-partum hemorrhage

Previous reviews did not report findings on risk of ante- and post-partum hemorrhage in adolescents. The current review found 8 studies that reported rates of ante-partum hemorrhage. Two of the five studies that measured unadjusted risk found higher rates of ante-partum hemorrhage in adolescents. However, the 3 studies that accounted for confounding factors found a lower risk in adolescents. The current review found 8 studies that reported rates of post-partum hemorrhage. The four studies that measured unadjusted risk found no link between early childbearing and risk of post-partum hemorrhage. However, the 3 studies that accounted for confounding factors found a higher risk in adolescents (Table 15 and Table 16).

4.3.11 Diabetes

Previous reviews did not report evidence on risk of diabetes. The current review found nine studies reporting diabetes complications. Of the six reporting unadjusted risk, 4 reported the same risk in adolescents, and 2 reported lower risk levels. The three studies reporting adjusted risk found lower risk in pregnant adolescents (Table 15 and Table 16).

4.3.12 Mental illness among pregnant adolescents

Previous reviews did not examine evidence on mental illness in pregnant adolescents. The current review found some evidence that adolescent mothers may suffer greater rates of depression compared to older mothers. The study reporting adjusted risk levels found higher risk of depression in adolescents, both during pregnancy and post-partum (Table 15 and Table 16). A few studies report previous findings supporting evidence for higher rates of mental illness, especially depression, in adolescent mothers compared to older mothers (Eshbaugh, 2006); (Logsdon *et al.* 2005).

4.4 Impact of adolescent pregnancy on newborn health

This section provides an overview of the evidence and then examines impacts of adolescent pregnancy on specific newborn health problems.

4.4.1 Overview of health impacts on newborns

Previous WHO reviews found substantial evidence of the adverse effects of early pregnancy on perinatal and newborn health. In fact, previous reviewers judged the association as more definitive than that of the effect of early maternal age on maternal health.

New literature reviewed bolsters the findings of earlier reviews. Several studies published in 2003-2008 have examined the health of children of adolescent mothers and compared their health with children of older women, typically those in their twenties. Table 7 summarizes the finding from these studies. Of the 72 studies that examine newborn health outcomes, 66 found a higher risk of at least one adverse outcome in offspring of adolescents. Although the quality of these studies varies greatly, a large proportion (32 of 39, or 82%) of the recent studies that controlled for factors that earlier had been identified as potential confounders (for example, giving birth for the first time, parity, socioeconomic differences, use of prenatal care) report that young maternal age was independently associated with higher risk of at least one newborn health problem.

Looking at the range of measured newborn outcomes (Table 8), recent studies reported higher risks for adolescents in 66% of outcomes, the same risk in 34% of outcomes, and a lower risk in less than 1% of outcomes. Studies that adjusted for possible confounding socioeconomic and other factors found higher risks in adolescents for 55% of the outcomes measured.

The following sections disaggregate the general findings presented in Table 7 and Table 8 to look at the impact of adolescent pregnancy on specific newborn health outcomes that contribute to newborn death and illness. For each outcome, the analysis tries to answer the question of whether these pregnancy-related health problems affect offspring of adolescents differentially compared to offspring of older women. Table 9 and Table 10 summarize these findings.

4.4.2 The effect of early childbearing on newborn mortality

Previous review found strong evidence linking early childbearing with higher perinatal and neonatal death rates. The current review found 33 studies that compared rates of perinatal and neonatal death. 12 of 19 studies reported higher unadjusted rates of death in newborns of adolescent mothers; rates were the same in the other 7 studies. In the 14 studies that reported adjusted risk, 8 reported higher rates of death to newborns of adolescent mothers and 6 reported the same levels of risk. 7 of the 10 studies that reported adjusted risk rates of stillbirth showed no difference in stillbirth rates by maternal age (Table 18 and Table 19).

In addition to the mainly hospital-based studies used to construct Table 18 and Table 19, national-level survey data show clearly that infants born to adolescent mothers have far higher chance of dying. An examination of the DHS data from 23 surveys carried out in 2002-2006 shows that, in most countries, rates of perinatal mortality are higher to mothers under 20 versus mothers in the 20-29 age range, typically by 50% or higher. In 20 of 23 countries with recent surveys, newborns of adolescent mothers are at higher risk of death in the perinatal period (Figure 35). Similarly, rates of neonatal mortality are higher to adolescent mothers versus mothers in their 20s in almost all the DHS countries (Figure 36).

Relatively little analysis has been carried out on further aspects of deaths to newborns of adoleescents:

- *Number of newborn deaths to adolescent mothers.* The current review could not find information on the number of newborn deaths to adolescent mothers.

- *Newborn deaths to adolescent mothers as a percentage of all newborn deaths.* An estimated 4 million babies yearly die in the first four weeks of life (the neonatal period); 3.3 million are stillborn (World Health Organization MPS Department, 2005). The current review could not find any information on the proportion of these newborn deaths that are to adolescent mothers. The latest WHO publication on neonatal mortality does not give a breakdown by age of mother (World Health Organization MPS Department, 2005).
- *Main causes of newborn deaths to adolescent mothers.* Globally, the main direct causes of neonatal death are estimated to be preterm birth (28%), severe infections (26%) and asphyxia (23%). Neonatal tetanus accounts for a smaller proportion of deaths (7%) but is easily preventable (de Francisco, Dixon-Mueller & d'Arcangues, 2007). The current review could not find any information on the causes of newborn deaths to adolescent mothers, or how these causes compare to main causes of newborn death to adolescent mothers to main causes of newborn death for older mothers.

The following sections examine some of the evidence on the impact of adolescent pregnancy on specific neonatal health outcomes. Table 18 and Table 19 summarize these findings.

4.4.3 Preterm birth

Previous reviews found overwhelming evidence that adolescents are at higher risk of preterm birth (defined as giving birth before 37 completed weeks of pregnancy), with the risk increasing for the youngest mothers. The current review found 61 studies comparing preterm birth. In 45 of the 61 studies (including in 16 of 22 studies that reported adjusted odds ratios), rates of preterm birth were higher among adolescents (Table 18 and Table 19).

4.4.4 Low birth weight babies

Previous reviews also reported strong evidence that incidence of low birth weight is higher in adolescent mothers. In 37 of 51 studies found by the current review (including 13 of 19 that reported adjusted odds ratios), risk of low birth weight was higher in newborns of adolescents compared with newborns of older mothers (Table 18 and Table 19).

4.4.5 Small for gestational age infants

Previous reviews found mixed evidence on the association between adolescent childbearing and small for gestational age infants. The current review found 15 studies that report infant size. In 10 of those studies, babies born to adolescents were smaller than babies born to older mothers (including 4 of 7 that controlled for confounding factors) (Table 18 and Table 19).

4.4.6 Asphyxia

Previous studies do not report information on risk of asphyxia in newborns of adolescent mothers. The current review found two studies that report higher unadjusted risks for asphyxia in newborns of adolescents (Table 18 and Table 19).

4.4.7 Apgar scores

Previous studies do not report information on risk of low Apgar scores in newborns. In the current review, of 19 studies that report Apgar scores, 9 found a higher risk of low Apgar scores in newborns of adolescents and 10 found the same level of risk. Three of the ten studies that report adjusted odds ratios found a higher risk in newborns of adolescents (Table 18 and Table 19).

4.4.8 Malformations

Previous studies do not report information on risk of congenital malformations. The current review found 9 studies that reported malformations. In 5 of these, the risk was higher for newborns of adolescents; in 4 it was the same. However 2 of the 3 large-scale studies that reported adjusted odds ratios found significantly higher risk in the newborns of adolescents (Table 18 and Table 19).

4.5 Other health impacts of adolescent pregnancy

Some recent studies have examined associations between early childbearing and other medium and long-term health problems for adolescent mothers and their offspring, as well as for fathers of babies born to adolescent mothers. For example, 12 of 16 studies from the recent review show offspring of adolescent mothers having higher risk of infant mortality (Table 18 and Table 19). Two studies find that early maternal age exerts an independent effect on the likelihood of premature death in older women (Anonymous, 2007; Henretta, 2007; Otterblad *et al.* 2004). One study shows that fathers of babies born to adolescent mothers are more likely to be depressed (Quinlivan & Condon, 2005). Two studies found an association between adolescent pregnancy and obesity later in life (Gigante, Rasmussen & Voctora, 2005; Kac, Velasquez-Melendez & Valente, 2003) . A study in India found a negative correlation between final adult height of women and number of births as teenagers (Brennan, McDonald & Shlomowitz, 2005). A study in Sweden found that children of adolescent mothers were more likely to have mental illness as teenagers (Ekeus, Olausson & Hjern, 2006). Adolescent pregnancy does not appear to have long-term negative effects on maternal bone growth (Ward, Adams & Mughal, 2005).

4.6 Developed versus developing country health impacts

This paper noted in previous sections the difference in the context of adolescent pregnancy in developed versus developing countries. Factors such as higher levels of poverty, greater lack of education, and greater difficulties in accessing appropriate maternal care place a developing country adolescent, on average, at much higher risk than their adolescent counterpart in the developed world. However, what if two adolescents had exactly the same age, socioeconomic status, level of education, and use of maternal care, but differed only in that one lived in a developed country and the other lived in a developing country. Would their health risk be the same or might other factors cause one or the other to be at higher risk? One reason might be differences in their degree of physical development. Some studies shows that adolescents physically mature later in developing countries, and strong evidence shows that menarche on average occurs later in developing compared with developed countries (National Research Council & Institute of Medicine, 2005) (see the discussion of gynecological age versus chronological age in section 4.7). Thus, an average 16-year-old developing country mother might be physically less well prepared for childbirth and run a higher risk of complications compared to her developed country counterpart.

No study has directly examined whether a comparable group of adolescents in developing countries has higher childbearing-related risks than adolescents in developed countries. An indirect way to answer this question is to examine whether studies are more likely to show a negative health impact among adolescents in developing countries than adolescents in developed countries. If adolescents, independent of factors such as socioeconomic status, level of education, and use of maternal care were at higher risk in developing countries, then presumably the proportion of developing country studies finding a significantly higher risk of adverse health impact in adolescents would be greater compared to the proportion of developed country studies.

Interestingly, studies point towards the opposite result. For example, studies that used adjusted odds ratios to compare younger and older mothers found that adolescents in developed countries had higher risk for 57% of the maternal outcomes compared with just 34% of the outcomes for adolescents in developing countries (Figure 37).[11] Looking at adjusted risk of low birth weight babies, 8 of 10 studies in developed countries found a relatively higher risk among adolescents compared with older women, versus 5 of 9 studies in developing countries. When looking at adjusted risk of preterm birth, 9 of 12 studies in developed countries found a relatively higher risk among adolescents compared with older women, versus 7 of 10 studies in developing countries.

11 The bulk of the studies measuring health impact reviewed for this paper were carried out in developing countries. Only 17 of the 66 studies that measured at least one maternal health outcome were carried out in developed countries; 27 of the 71 studies that measured at least one newborn health outcome were carried out in developed countries.

4.7 Health impact on sub-categories of the adolescent age group

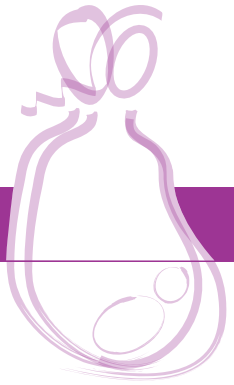
Another important question is the extent that the severity of adverse health impacts increase as maternal age decreases. Previous reviews found some evidence that the health impacts of adolescent pregnancy were progressively more severe as adolescent maternal age fell. This review found 14 studies that compared health outcomes in sub-groups of adolescent mothers to outcomes in older women. For 59 of the 84 birth outcomes that these studies measured, health impacts were significantly greater for the youngest adolescents (Figure 38 and Table 20).

How much greater is the health risk for the youngest adolescents? The three studies that examined maternal death found risks between twice (Berg *et al.* 2003; Donoso, Becker & Villarroel del, 2003) and four times (Conde-Agudelo *et al.* 2005) in the youngest adolescents versus older adolescents. Studies that looked at adverse newborn health outcomes found rates 50% – 200% higher in the youngest adolescents compared to older adolescents (Table 20). Although health risks almost universally diminish for older adolescents compared to younger adolescents, some studies still show that even adolescents who are 17-19 years old face significantly higher risk of adverse birth outcomes, compared to older women (Table 20).

In summary, even after controlling for possible confounding factors, an adolescent who gives birth before age 16 faces much higher risk to herself and her baby compared to a women in her 20s. Giving birth between 16 and 17 still carries a higher risk to the newborn and may raise the risk to the adolescent mother. If an 18 or 19-year-old gives birth, she probably faces the same risk as someone in her 20s. However, the health risk to her baby appears to be somewhat higher.

Is "gynecological age" (the interval between menarche and first pregnancy) a more important reason than chronological age in determining health risks to adolescents? Previous reviews concluded that there was a lack of evidence to support this hypothesis, since very few studies measure gynecological age. The current review found no studies measuring gynecological age, thus making it impossible to determine directly the impact of gynecological age on birth outcomes. An indirect way of measuring impact of low gynecological age would be to compare outcomes between countries where known age at menarche varies. That is, if low gynecological age were an independent factor in producing adverse birth outcomes, then compared with pregnancy in older women adolescent pregnancy in developing countries on average would be more dangerous than adolescent pregnancy in developed countries, because developing country adolescents reach menarche later. However, the evidence as presented in section 4.6 above shows that the opposite may be case. Thus, the impact of gynecological age remains an open research question.

In considering in particular why the *youngest* adolescent mothers and their newborns might face higher health risks, researchers have suggested that three biological and physiological factors appear to play an important role. First, immature pelvic bones may cause problems during birth and lead to increased risks such as postpartum hemorrhage. Second, adolescents that continue to grow during pregnancy may compete with their fetus for nutrients. Third, lack of psychological preparation for pregnancy may trigger depression. Biology also contributes to the increased risks of underlying health problems such as HIV and other sexually transmitted infections (World Health Organization, 2007b).



5. Social and Economic Impact of Adolescent Pregnancy

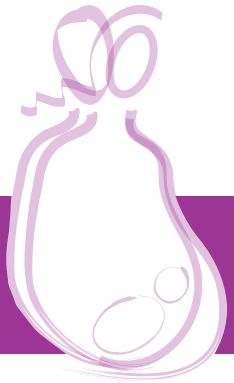
Although a full update of the literature on non-health outcomes of adolescent pregnancy is outside the purview of the paper, this section presents some of main findings of previous recent major reviews of the topic.

5.1 Impact of early childbearing on education, earnings, well-being and life options

Numerous studies have shown an association between adolescent pregnancy and negative social and economic effects on both the mother and her child. However, recent reviews have found the evidence inconclusive about the whether adolescent pregnancy is the cause or consequence of adverse socioeconomic factors (National Research Council & Institute of Medicine, 2005). One review (Greene & Merrick, 2005) found evidence that early childbearing increases household poverty, but this effect was mainly via the negative health impacts (Table 21, Figure 39).

5.2 Macro-level impact of adolescent pregnancy on population growth, age structure, investment, economic growth, and poverty reduction

Population momentum—largely a function of age at childbearing—is a major driver of population growth in developing countries. Studies have shown that delaying births to adolescents could significantly lower population growth rates, potentially generating broad economic and social benefits (Figure 40).



6. Adolescent Use of the Essential Package of Pregnancy Care

For pregnant women of all ages, use of health care services is a key proximate determinant of maternal and infant outcomes, including maternal and infant mortality. According to the MPS Strategic Approach, an essential package of interventions for maternal and newborn health care covers pregnancy, labor, birth, postnatal and early newborn care, family planning, unplanned pregnancy (and its consequences) and postabortion care. The international community has identified many key interventions along this continuum (World Health Organization MPS Department, 2007). Use of these maternal care services by women of reproductive age is low in many countries, and use by adolescents will roughly reflect the general level of care in a particular country. This section examines the extent to which adolescents use these services, and whether they are relatively disadvantaged compared to older women.

6.1 Essential care interventions during pregnancy

6.1.1 Routine antenatal care

Essential components of antenatal care include a minimum of four visits that include monitoring for and detection of problems such as anemia, hypertensive disorder, bleeding, malpresentations, multiple pregnancy; tetanus immunization, anemia prevention and control; information and counseling on self care at home, nutrition, safer sex, breastfeeding, family planning, and healthy lifestyle; birth and emergency planning; advice on danger signs and emergency preparedness, and syphilis testing. Depending on the location, antenatal care should also include HIV testing and counseling, antimalarial intermittent preventive treatment, deworming and assessment of female genital mutilation (World Health Organization MPS Department, 2007).

Previous review found either that adolescents use antenatal care less than older women(World Health Organization, 2004) or that the evidence on relative levels of care is mixed (World Health Organization, 2007a). These reviews also found evidence that adolescents, compared to older women, start antenatal care later and do not use it as optimally. New evidence continues to paint a somewhat mixed picture. Almost all of the 22 mostly small-scale studies examined in the current review show that adolescents have relatively inadequate antenatal care, with differences in care often quite substantial between pregnant adolescents and older pregnant women (Table 22). An unpublished WHO analysis that examined age effects on early antenatal care attendance found that in five of six studies, women under 20 (under 25 in one study) were less likely to receive antenatal care during the first trimester (citation: Lale Say's analysis).

Information from large national surveys shows that use of antenatal services is highly variable across countries and according to various social and demographic categories. At the national level, use of antenatal care by adolescents ranges from about 30% in Ethiopia to 98% in the Dominican Republic (Figure 41). In terms of relative disadvantage, these national statistics paint a mixed picture. In slightly more than half (21 of 38) of countries with recent DHS surveys, adolescents were less likely than women ages 20-34 to use any antenatal care. The differences between age groups are relatively small, generally a couple of percentage point difference. However, these statistics measure use of *any* antenatal care, and thus may not fully take into account the adequacy of care.

In terms of tetanus toxoid vaccination, DHS data shows that In 29 of 38 countries, adolescents have higher rates of tetanus toxoid vaccinations than do older women (Figure 42). By contrast, in 31 of 45 recent DHS, adolescents are less likely to have received iron tablets or syrup for their most recent birth (Macro International, 2009). In 20 of 26 countries with a recent DHS, adolescents are less likely to have received anti-malarial drugs for their most recent birth (Macro International, 2009).

One analysis of DHS data from 15 countries did control for various factors that might mediate the relationship between age and use of maternal health care (Reynolds, Wong & Tucker, 2006).[12] This study found virtually no differences in use of antenatal care by adolescent mothers in 11 of the 15 countries (Table 23).

6.1.2 Prevention of mother-to-child transmission of HIV

In areas where HIV prevalence is high, many antenatal care programs include activities to prevent mother-to-child transmission (PMTCT), including HIV counseling and testing, provision of antiretroviral drugs to prevent transmission of the virus to the baby, counseling on breastfeeding, and contraceptive information and services.

Previous reviews did not provide any information on use of PMTCT interventions in adolescents versus older women. A recent study at antenatal clinics in Kenya found that adolescents were equally as likely as older women to receive PMTCT services, but less aware of their availability and less likely to have been counseled on condom and contraceptive use (Reynolds & Kimani, 2006). Recent national surveys find that, in 16 of 19 countries, adolescents 15-19 are less likely than women 20-24 to know that the AIDS virus can be transmitted from mother to child (Macro International, 2009). Furthermore, in 12 of 16 countries with recent national surveys, adolescents 15-19 are less likely than women 20-24 to know that maternal to child transmission of HIV can be prevented through anti-retroviral therapy during pregnancy and avoiding breastfeeding (Macro International, 2009). In 13 of 16 countries with recent national surveys, adolescents 15-19 are less likely than women 20-24 to be counseled for HIV during an ANC visit; in 11 of 19 countries, they are less likely to be tested for HIV during an ANC visit (Macro International, 2009).

Adolescents may also be less likely than older women to use care for other sexually transmitted infections. Recent national surveys find that, in 17 of 20 countries, adolescents 15-19 reporting symptoms of STIs are less likely than women 20-24 to seek care at a service provider with personnel trained in STI care (Macro International, 2009).

6.1.3 Abortion and postabortion care

As discussed above, a significant proportion of pregnant adolescents choose to terminate their pregnancies, mostly through unsafe abortion. Postabortion care includes emergency treatment for complications of spontaneous or induced abortion; family planning counseling and service provision, sexually transmitted infection evaluation and treatment, and HIV counseling and/or referral for HIV testing; and health education and promotion for community members (USAID PAC Working Group, 2007).

Previous reviews found several small-scale studies showing that, compared to older women, a young woman is more likely to wait until the later stages of pregnancy to seek abortion, resort to an unskilled abortion provider or use dangerous methods to self-abort, and delay seeking care for complications. This makes abortion conducted under unsafe conditions particularly risky for young women. The current review found one publication, (de Bruyn M. & Packer, 2004), that confirms the findings from the previous reviews, drawing on evidence from studies through 2004.

6.2 Childbirth care

Another key element of the essential package of safe motherhood interventions is childbirth care. WHO's Recommended Interventions for Improving Maternal and Newborn Health (World Health Organization MPS Department, 2007) encompass care during labor and delivery and immediate postpartum care of mother. Important indicators of quality childbirth care are whether skilled personnel attended the birth, and whether the mother gave birth in a well-equipped health care facility.

Previous review found relatively little information about the proportion of births to adolescent mothers attended by skilled personnel or in an institutional setting. What information that did exist presented a somewhat mixed picture, with little variation by age in some countries, but in other countries adolescents less likely to use skilled childbirth care.

The latest information from large national surveys also shows mixed findings. Like antenatal services, use of skilled delivery care by adolescents is highly variable across countries and according to various social and demographic categories. At the national level, use of skilled delivery care by adolescents ranges from about 7% in Ethiopia to 100% in Armenia (Figure 43). In 15 of 38 countries with a recent DHS, adolescents were less

12 The multivariate analysis controlled for marital status, parity, education, still in school, place of residence, socioeconomic status, and either ethnicity, religion, or language.

likely than women ages 20-34 to have skilled attendance at birth. However, these differences were relatively small, generally a couple of percentage points. Findings comparing place of delivery are similar, with adolescents in 15 of 38 countries less likely to give birth in a health facility (Figure 44). An unpublished WHO analysis that examined age effects on having a skilled attendant at delivery found that four of four studies of high or moderate quality reported no differences between younger and older women (Lale Say's analysis).

A recent analysis of DHS data from 15 countries controlled for various factors that might mediate the relationship between age and use of maternal health care countries (Reynolds et al. 2006). In 4 of 15 countries (Bangladesh, Brazil, India, and Indonesia) adolescents had lower use of skilled delivery care that older pregnant women. In one country, Bolivia, adolescents were more likely to use delivery care. In the remaining ten, there were not significant differences in use of skilled delivery care (Table 23).

The recent review found only one small-scale study that examined associations between maternal age and institutional deliveries.[13] The study in India of 64 adolescent and 175 adult primigravida in a cohort of 843 antenatal women found that home delivery was two times more common among adolescents. Only one third of adolescents had institutional delivery where as more than half of adults opted for institutional delivery (Sharma et al. 2003). An unpublished WHO analysis that examined age effects on institutional deliveries found that in four of four studies of moderate quality, younger women were less likely to deliver in a medical setting. Another 11 studies of low quality reported mixed results (Lale Say's analysis).

6.3 Postpartum maternal care

Postpartum maternal care is a key element of pregnancy care because of the risks to the mother immediately after birth. According to WHO's *Recommended Interventions for Improving Maternal and Newborn Health*, postpartum maternal care encompasses a set of essential actions up to six weeks including assessment of maternal well-being, prevention and detection of complications, anemia prevention and control, information and counseling on nutrition, safe sex, family planning and provision of some contraceptive methods, advice on danger signs, emergency preparedness and follow-up, and provision of contraceptive methods (World Health Organization MPS Department, 2007).

Previous reviews found very little information on adolescents' use of postpartum maternal care as compared with older women. The available information showed relatively little difference by age. As shown in Figure 45, a recent analysis of DHS from 30 countries found an even split in the number of countries where adolescents who gave birth outside an institution were more or less likely to have received postpartum care versus older women. Large proportions of women of all ages who did not give birth in a health institution did not receive any postpartum care at all, reflecting the weakness of postpartum care in developing countries irrespective of the age of beneficiary (Fort & Kothari, 2006).

6.4 Newborn care (birth and immediate postnatal)

WHO defines newborn care at birth and immediately postnatal period to include promotion, protection and support for breastfeeding, monitoring and assessment wellbeing, detection of complications; infection prevention and control; eye care; information and counseling on home care, breastfeeding, and hygiene; advice on danger signs, emergency preparedness and follow-up; and immunization according to national guidelines, including vaccines for tuberculosis, hepatitis B, and polio (World Health Organization MPS Department, 2007).

Previous reviews found little information on breastfeeding practices in adolescent mothers versus older mothers. A national survey in the U.S. found that breastfeeding rates of mothers who were under 20 years of age (43%) were lower compared with mothers who were 30 years and older (75%) or 20–29 years of age (65%) (McDowell, Wang & Kennedy-Stephenson, 2008).

Previous reviews have also found little evidence comparing vaccination coverage among infants of adolescent mothers versus infants of older women. This small amount of information suggests that newborns of adolescents may be disadvantaged. One recent analysis of DHS data from 15 countries (Reynolds *et al.* 2006), in addition to analyzing maternal care as discussed above, also looked at associations between maternal age and differences in child vaccination rates. Their study found that, after controlling for social and economic factors[14], in between 4 and 6 of the 15 countries studied, children of adolescent mothers were less likely to be vaccinated versus children of older mothers (Table 23). A few recent small-scale studies also found mixed results. A study in Kenya (Taffa, 2003) found similar rates of child vaccination in adolescent mothers versus older mothers. A study in Bangladesh

13 Most studies are hospital-based, thus all pregnant women regardless of age will have received skilled care and delivered in an institution.

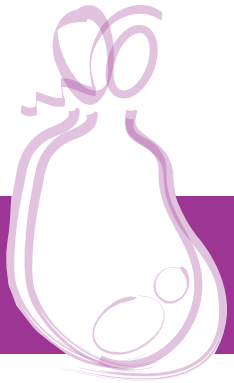
14 The multivariate analysis controlled for marital status, parity, education, still in school, place of residence, socioeconomic status, sex of the infant, and either ethnicity, religion, or language.

found that children of adolescent mothers were 1.8 times as likely not to have immunized their children for DTP (diphtheria, tetanus, pertussis), after controlling for various factors (Abdullah *et al.* 2007).

6.5 Postnatal newborn care

WHO defines postnatal newborn care to encompass assessment of infant's well-being; detection of complications and responding to maternal concerns; information and counseling on home care; and additional follow-up visits for high risk babies (World Health Organization MPS Department, 2007).

Previous reviews do not report any information on whether adolescents are relatively disadvantaged in use of this care. The current review also found no studies that shed light on this question.



7 Determinants of Pregnancy Care-Seeking Behavior of Adolescents

The same range of demand and supply side determinants that influence use of pregnancy care in adolescents also influence the behavior of older women (Figure 46). The question this section examines is whether these determinants have more or less of an influence on the behavior of adolescents versus older women.[15]

7.1 Demand side determinants

7.1.1 Autonomy

Personal autonomy, the ability to act or make decisions on one's own, is known to be a key determinant of a woman's ability to seek reproductive health services. Previous reviews found evidence from developing country studies showing that adolescent women have relatively less autonomy than older women in making health care decisions, including decisions related to pregnancy care. Studies in some countries have found that husbands and mothers-in-law often play a dominant role in such decision-making.

7.1.2 Education

Previous reviews found evidence that higher levels of education improve health-seeking behavior for women of all ages. Previous reviews, however, do not report any differences in whether the influence of education on health-seeking behavior is different for adolescents than for older women. In fact, previous reviews found that age is more important than education level as a factor in decision-making about seeking care.

7.1.3 Financial constraints

Cost can be a major impediment for women seeking pregnancy care. Previous reviews did not find studies that compared the influence of cost on the health-seeking behavior of adolescents versus older women. However, many studies show that pregnant adolescents are relatively disadvantaged economically compared to older pregnant women. Moreover, as noted in section 7.1.1, adolescents have less authority over use of resources compared with older women.

7.1.4 Limited mobility

The ability to leave one's home to seek care has an important influence on use of health care, especially in rural areas far from health services. Previous reviews found evidence that pregnant and mothering adolescents have lesser mobility than older women, especially after marriage.

7.1.5 Coercion and violence

Coercion and domestic violence may limit pregnant women's ability to seek care. Previous reviews found some evidence that such coercion and violence may affect the ability of pregnant adolescents to seek care to a greater degree than older women.

7.1.6 Socio-cultural factors

Previous reviews have noted the importance of widely varying social cultural factors that affect pregnant women's health-seeking behaviors. Examples include how communities and individuals perceive pain around labor and delivery, restrictions on the ability of women to consult a male health worker, and traditional beliefs about health conditions and treatments that may conflict with biomedical practices. However, the previous review does not present any evidence that such social and cultural factors affect adolescents any differently from older women.

15 This chapter draws primarily on the literature reviewed by the two previous WHO-commissioned reviews of adolescent pregnancy care (World Health Organization, 2004; World Health Organization, 2007a). Except where noted, the evidence cited comes from these previous reviews.

7.2 Supply side determinants

7.2.1 Availability and accessibility of health services

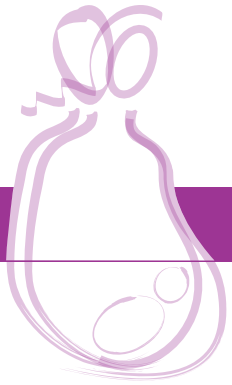
The previous review found that distance to health services is an important determinant of use. However, the review did not report any studies that looked at whether distance affects adolescents to a greater or lesser degree.

7.2.2 Health care human resources

The previous review found evidence that the treatment adolescent women receive at the hands of health care workers could be an important barrier to use of services. Health workers typically lack the competencies and attitudes needed to deal with the special information and psychosocial needs of adolescent mothers.

7.2.3 National laws and policies

The previous reviews noted the impact laws, policies, and regulations can have on use of pregnancy care. The existence of parental consent laws, abortion laws, the degree to which national health policies include language on adolescents, the legal framework to combat coercion and violence, school pregnancy policies, minimum age at marriage laws, and laws and policies affecting girls' access to education and jobs are all important in determining use of pregnancy care.



8. Program Intervention

Addressing the needs of adolescents requires a multi-pronged approach that incorporates both prevention of pregnancy and care for pregnant adolescents and their newborns. The reasons an adolescent becomes pregnant vary greatly from person to person, and between and within countries. Thus, the program response must be highly flexible and adapted to specific settings. This chapter reviews the effectiveness of programs specifically designed to meet the needs of pregnant adolescents.

8.1 Why adolescents face heightened health risks from pregnancy

Before examining the evidence on intervention effectiveness, it is useful to review what the findings from chapter 4-7 can tell us about why young maternal age may raise the risk of maternal and newborn health problems. No simple answer exists because the causes are greatly intertwined and many of the causal pathways are still unclear. The best answer appears to be that biological, behavioral, and social and economic factors combine with inadequate use of care to exacerbate health problems that underlie health risks and to directly raise the risk of maternal and newborn health problems (Figure 47).

As noted in section 4.7, biological and physiological factors appear to play an important role in raising health risks, especially to the youngest adolescents. Many adolescents are physically immature, their continued growth during pregnancy may compete with the fetus, and their lack of psychological preparation may trigger depression. A second set of factors raising risk have to do with adolescent health behaviors (section 4.1). Relative to older pregnant women, adolescents have higher rates of smoking and substance abuse, and poorer nutrition. The causes for these are complex, but mostly related to social and economic disparities. These behaviors lead directly to many of the proximate causes of death and disability (for example, smoking is contributes to low birth weight and preterm labor) and indirectly through their contribution to underlying health problems (such as the role poor nutrition plays in anemia and malaria).

Social and economic reasons are a third set of factors that contribute to behavioral problems such as substance abuse and poor nutrition, exacerbate susceptibility to underlying health problems, and contribute directly to some of the proximate causes of maternal and newborn death and disability. These factors include the relative disadvantages adolescent face in education, income, mobility, and autonomy (section 7.1). Social and economic disparities may also raise the likelihood that adolescent mothers abuse drugs and smoke, and underlie higher rates of HIV and other sexually transmitted infections. Greater psychological stress may underlie greater substance abuse and smoking, which in turn underlie higher rates of preterm labor.

Finally, inadequate use of pregnancy care combines with the three main underlying factors to exacerbate underlying health problems and directly affect to the proximate causes of maternal and newborn health problems. The roots of inadequate care are in the social and economic inequalities listed above. Not only do adolescents use care less, but the care they do receive is often inadequate compared with older pregnant women. This holds for both married and unmarried adolescents (see chapter 6).

The interventions discussed in this chapter and in chapter 9 attempt to address one or more these many factors.

8.2 Prevention interventions

Because this paper focuses on pregnancy care, prevention programs—although likely the best way of reducing death and illness from adolescent pregnancy—will not be examined in depth.[16] This section briefly describes the main prevention efforts.

16 An upcoming WHO-sponsored review plans to examine systematically examine pregnancy prevention and care programs along the lines of WHO's recent review on the effectiveness of HIV prevention programs for youth.

8.2.1 Prevention of unplanned pregnancy

A consensus exists among program staff and researchers that a differential approach is needed for pregnancy prevention in adolescents compared with older women. Much of the focus to date has been on helping

adolescents prevent unplanned pregnancies, for which several strategies have been tried and proven effective (Kirby, Laris & Rolleri, 2007).

A subset of interventions to prevent unplanned pregnancy includes interventions to prevent coercive sex. Documentation and evaluation of such strategies has been relatively scarce.

8.2.2 Delay of too-early, planned pregnancy

Recognizing that many adolescents who say they want to have a baby in reality may be complying with the wishes of families or communities rather what is in their own best interest, countries can carry out various interventions to delay this "planned" pregnancy. Strategies to delay this "planned" pregnancy that generally occurs within marriage have focused on postponing marriage and delaying childbearing within marriage. They include interventions such as enrolling and keeping girls in school; providing livelihoods opportunities to young women; legal reforms to raise the age of marriage; and contraceptive information and services targeting married couples (Mathur, Greene & Malhotra, 2003). These strategies are, however, less widespread, less well articulated, and less proven compared with strategies to prevent unwanted pregnancy (National Research Council & Institute of Medicine, 2005).

8.3 Health sector interventions before pregnancy in childhood and adolescence

Several health interventions that take place before an adolescent gets pregnant (sometimes referred to has "preconception care") can help make pregnancy safer when it does occur. These include:

- Good nutrition (overall balanced diet; micronutrient supplementation)
- Immunization (tetanus, rubella, human papillomavirus)
- Prevention of diabetes
- HIV prevention and treatment
- Prevention and treatment of other STIs and reproductive tract infections
- Prevention and treatment of gender-based violence
- Prevention of female genital mutilation
- Malaria prevention and treatment
- Smoking prevention
- Substance abuse prevention and treatment
- Mental illness prevention and treatment

These interventions are equally important whether a woman becomes pregnant in adolescence or later in life. Thus, although these interventions may vary with the age of the girl or woman, this paper does not discuss them in any further detail. For more information on the effectiveness of these interventions that are specifically aimed at adolescents see (Lule *et al.* 2006).

8.4 Care for pregnant adolescents

A previous WHO review (World Health Organization, 2007a) described 15 programs for care of pregnant and mothering adolescents of which 9 are set in developing countries. This previous review found that each of the interventions had been successful in changing at least one key outcome indicator of either health-seeking behavior, maternal or newborn health, parenting skill, or child development. The current review identified 37 studies published in 2003-2008, plus an additional 5 reviews or meta-analyses that encompass a total of 81 interventions. The large majority of these studies (30 of 37) were of programs in developed country settings, mostly in the U.S. (Table 24).

- The previous review classified programs according to five main types:
- Programs designed to improve pregnancy outcomes
- Programs designed to detect violence during pregnancy
- Programs designed to increase postpartum contraception use and/or breastfeeding
- Postabortion care programs

- Programs designed to improve financial access to care
- The updated review groups programs into four roughly equivalent categories:
- Programs focused on improving pregnancy outcomes
- Programs focusing on preventing repeat pregnancies
- Postabortion care programs for adolescents
- Programs designed to improve financial access to care

The section below briefly describes each of these programs and their outcomes, according to type of program as described below. Details on these studies can be found in Appendix 4.

8.4.1 Programs focused on improving pregnancy outcomes (health, social, economic)

The first group includes 24 studies of programs aimed at improving a range of pregnancy outcomes. Most of these programs aim to improve care for pregnant adolescents throughout multiple stages of the continuum of care—during the antenatal period, through delivery, postpartum, and beyond. These programs are divided into four groups, according to the setting: (1) in the clinic; (2) in the family, community, or workplace; (3) in schools; or (4) in multiple settings.

Interventions in a clinical setting

- Six programs operate mainly in a clinical setting. These programs set out to change health-seeking behaviors and improve maternal and newborn health outcomes. They were largely successful. These programs were able to significantly improve at least one of these key outcomes in all categories they tried to influence (Table 24).
- An Australian study of comprehensive teenage pregnancy clinics in large maternity hospitals found that such clinics may reduce the rate of preterm birth (Quinlivan & Evans, 2004).
- A U.S. study of group prenatal care using the Centering Pregnancy model found that the model has encouraged excellent health care compliance, satisfaction with prenatal care, and low rates of preterm birth and low birth weight infants (Grady & Bloom, 2004).
- A U.S. study found that screening pregnant adolescents for HSV-2 (herpes simplex virus) infection during their first prenatal visit can be performed with minimal alterations in clinical protocol. More than one-fifth (21.3%) of the adolescents tested positive for HSV-2 (Crosby *et al.* 2003).
- A study in Uganda found that adolescents had greater use of maternity and other services in adolescent-friendly clinics versus regular clinics (Mbonye, 2003).
- In a program at an inner city prenatal clinic in the U.S., all subjects, irrespective of prenatal acceptance of vaccine, were offered Hepatitis B vaccine before postpartum discharge, and the rate of actual acceptance was determined. In these predominantly African American (95%) adolescents, the rate of vaccine acceptance was 91%. Actual vaccination rate was 86%, but it was not associated with prior acceptance of vaccination or behavioral or attitudinal factors (Stringer, Ratcliffe & Gross, 2006).
- A U.S. smoking cessation program for pregnant adolescents was effective at 8 weeks following treatment initiation. At one year following study entry, however, there were no differences between the groups in smoking behaviors. Findings suggest that the peer-enhanced programming had a limited effect but could not sustain the participant beyond postpartum (1 year following study entry). Future studies should include relapse prevention to sustain smoking abstinence into the postpartum period (Albrecht *et al.* 2006).

Family, community, and workplace settings

Seven programs were classified as operating mainly in family, community, and workplace settings, most of these being home visiting programs. All programs successfully changed at least one key outcome indicator (Table 24).

- A U.S. quasi-experimental study tested the impact of a home visitation intervention on resource utilization and birth outcomes among pregnant adolescents. Participating teens received monthly prenatal home visits by a public health-registered nurse and by a medical social worker to help teens access community

resources, select a prenatal care provider, and make and schedule appointments. The program also provided health education and transportation to medical appointments. The intervention significantly increased use of prenatal care but did not result in significant differences in mean infant birth weight between the intervention and control group (Flynn, Budd & Modelski, 2008).

- In a randomized control trial of a postnatal home visiting program in Australia, the program reduced adverse neonatal events and improved contraception outcomes, but did not affect breastfeeding or infant vaccination knowledge or compliance (Quinlivan, Box & Evans, 2003).
- A study of an early intervention home visit program in the U.S. found that it improved in selected areas of infant and maternal health, and these improvements were sustained for a period of 1 year following program termination, in comparison with traditional public health nursing care (Koniak-Griffin *et al.* 2003).
- Preliminary results from a study of home visiting by public health nurses in California indicate that home visitation by public health nurses positively affected the health of adolescents mothers and their infants. The incidence of premature births to adolescent mothers in the intervention group was lower than that found in the California population of adolescent mothers (Nguyen *et al.* 2003).
- A study in the U.S. evaluated the impact of a community-based home-visiting program on repeat pregnancy, depression, school dropout, and poor parenting, and on linking the adolescents with primary care. Trained home visitors, recruited from local communities, were paired with each adolescent and provided services through the child's second birthday. Controlling for baseline differences, follow-up parenting scores for home-visited teens were 5.5 points higher than those for control teens (95% confidence interval, 0.5-10.4 points; P = .03) and their adjusted odds of school continuation were 3.5 times greater (95% confidence interval, 1.1-11.8; P <.05). The program did not have any impact on repeat pregnancy, depression, or linkage with primary care (Barnet *et al.* 2007).
- Participation in the Adolescent Parenting Program, a case management program first-time pregnant and parenting adolescents in North Carolina, U.S. was associated with an increased likelihood of normal birth weight (more than 2,500 grams [5.5 pounds]) and full-term birth (at or more than 37 weeks). Adolescents ages 12 to 16 in the APP group also delayed second births significantly longer than the non-APP group (Sangalang, Barth & Painter, 2006).
- In a randomized control trial involving adolescent mothers and their newborns, calcium diet supplemented with dairy products during pregnancy resulted in higher maternal vitamin D and folate serum levels and higher newborn weight and bone mineralization compared with controls (Chan *et al.* 2006).

Three other studies in this setting examined adolescent-specific interventions but did not quantitatively compare outcome indicators.

- A study in the U.S. measured measure mothers' expected involvement in the care of their parenting adolescent daughters and grandchildren after postpartum discharge, and to measure adolescents' expectations about their mothers' involvement in the care of themselves and their newborns. The study found no differences in expected care by either of the two parties. Authors concluded that Involvement of mothers in the postpartum care of their daughters and grandchildren needs further study, but with precautions, nurses may consider including mothers in the maternal and newborn care of adolescents (Bowman, 2006).
- A U.S. study looked at using the internet to communicate with pregnant and parenting adolescents. Authors found that with careful planning and design, online communications could result in mutual benefits for researchers, service providers, and pregnant and parenting adolescents. Findings showed that online communication was preferred over face-to-face group discussions. Being anonymous online encouraged open and honest feedback. Participants experienced various forms of social support, however, there was an overall lack of teen involvement online (Valaitis & Sword, 2005).
- The Food for Life program in the United Kingdom involved seven informal food preparation sessions led by midwives in a community setting. Midwives found the package easy to follow and use. The 16 (of the 120 invited) adolescent women who attended found the courses helpful but objective evaluation of dietary intake was not possible because of poor compliance (Wrieden & Symon, 2003).

School settings

Four programs function in school settings, where the focus is improving maternal health outcomes, improving parenting skills and child development outcomes, and keeping pregnant and mothering adolescents in school. These programs have also shown some promise in achieving these goals (Table 24).

- Absenteeism and dropout rates were reduced for pregnant adolescents receiving prenatal care at a school-based health center in an urban alternative school in Baltimore, U.S. Findings underscore the importance of funding and evaluating school-based health centers and other interventions that may ameliorate negative outcomes among childbearing adolescents ((Barnet *et al.* 2004)).
- A study of a U.S. high school- based program on parental competence, parent-child interaction, and child development indicate that adolescent mothers and their young children in the sample benefited from the educational and support services offered at a school-based child care and parent support program (Sadler, Swartz & Ryan-Krause, 2003).
- A U.S. social support intervention delivered to pregnant adolescent girls between 32 and 36 weeks of gestation, to prevent post-partum depression was found not have a significant impact on post-partum depression 6 weeks postpartum (Logsdon *et al.* 2005).
- A study of the Paquin School in Baltimore, U.S., an alternative school-based comprehensive program for pregnant and parenting teens, study found that school enrollment increased the odds of current contraceptive use, use of Depo-Provera, and decreased the odds of desire for more children (Amin & Sato, 2004).

Multiple settings

Another seven studies look at impact of programs that operate in multiple settings (clinic, family, community, schools, etc.). These programs were mostly successful in changing at least one key outcome indicators (Table 24).

- A study in Nepal examined the effect of a participatory approach in defining and addressing the reproductive health concerns of adolescents. The evaluation found that although the effect of the participatory approach is only marginally more positive in terms of basic indicators of youth reproductive health, it is substantially more positive in terms of the broader, more contextual factors that influence YRH, as well as capacity building, empowerment, and sustainability (Mathur, Mehta & Malhotra, 2004). The program in Nepal also appeared to improve equity in use of care by urban-rural residence and by socioeconomic status (Malhotra *et al.* 2005).
- The First-time Parents Project in India (Santhya, Haberland N & Das, 2008) 2008) aimed to increase young women's social support networks and use of reproductive health care services, including pregnancy care. An evaluation found that exposure to the intervention had a significant, positive net effect on such indicators as use of contraceptives to delay the first birth, comprehensive antenatal care, delivery preparations, routine postpartum check-ups and breastfeeding practices in one or both sites, it did not appear to positively influence institutional delivery at first birth in either site.
- A school-linked NGO clinic with an outreach program for pregnant adolescents in the U.S. achieved impressive pregnancy outcomes compared to state averages (Bowman & Palley, 2003).
- A study examined 53 programs that served pregnant and parenting teens in New Mexico, U.S. between 1997 and 2000. Data on 3,194 teens, including their characteristics, the services they received, and several key outcomes, are examined. These data indicate that the programs were successful in promoting educational attainment as well as gains in employment. Prevalence of late prenatal care and low birth weight babies was lower than statewide averages, and the rate of repeat pregnancy was lower than that reported by many other programs. How these programs achieved these results is discussed (Philliber *et al.* 2003).
- A review of 14 U.S. adolescent parenting programs suggests that they can be effective in improving a range of psychosocial and developmental outcomes for teenage mothers and their children (Coren, Barlow & Stewart-Brown, 2003).
- U.S. pregnant adolescents attending either a residential treatment facility or a rural alternative school participating in a psycho-educational parenting group had significant improvement in parenting attitudes and beliefs. No significant change was found in self-esteem (Thomas & Looney, 2004).

- A study examining dietary habits of adolescent mothers interviewed 1,180 adolescent mothers in maternity hospitals in Rio de Janeiro, Brazil. Adolescent mothers who received dietary information and changed their eating habits during pregnancy showed better results concerning the consumption of energy and nutrients (Barros *et al.* 2004).

One study reviewed 19 social support interventions and found mixed results:

- (Letourneau, Stewart & Barnfather, 2004) reviewed 19 studies of U.S. adolescent mother social support interventions, defined as programs to promote interactions with family members, friends, peers, and health professionals that communicate information, esteem, aid, and understanding. These interventions aimed to increase social support, contraceptive knowledge and behavior, employability, parental confidence and psychological well-being, parenting skills and knowledge, and/or child health and development. The results were mixed. Several of the interventions positively affected key outcome variables related to parenting and child health and development. Others had no effect.

8.4.2 Programs focusing on preventing repeat pregnancies

Many programs have as their primary goal helping adolescents delay or prevent a repeat pregnancy. The current review found nine new studies published in recent years examining these types of programs, almost all of them from the U.S. The findings are somewhat mixed. Study results showed that most programs were successful in reducing or delaying repeat pregnancies in adolescents or improving other health-seeking behaviors. However, reviews of previous studies showed mixed results, and few of the evaluations used highly rigorous designs (Table 24).

- A U.S. study evaluated the effectiveness of a secondary teen pregnancy prevention intervention that includes school-based social work services coordinated with comprehensive health care for teen mothers and their children. A prospective cohort study compared subsequent births to 63 teen mothers followed for at least 24 months or until age 20 years (whichever was longer) compared with 252 matched subjects from state data. The intervention was effective in reducing subsequent births to teens: subsequent births were more common in the comparison group (33%) than among subjects (17%) ($p = .001$), and survival curves were significantly different ($p = .007$) (hazard ratio = 2.5). The cost savings of delayed births outweigh the expenses of this intensive model. Cost savings were calculated as $19,097 per birth avoided or $5,055 per month. (Key *et al.* 2008).
- A U.S. evaluation of a peer education, school-based program to prevent repeat pregnancies demonstrated a decrease in repeat teen births during the intervention period of the program with a rebound after it was discontinued (Key *et al.* 2005).
- A 2003 study uses survival analysis to re-examine three large-scale, multi-site, randomized, controlled programs that attempted to prevent or delay second births to teenagers. The analysis found that only one of the three programs resulted in significant delays in second births (Klerman, Baker & Howard, 2003).
- A meta-analysis was conducted on 16 control-comparison group studies that evaluated the effect of U.S. teenage pregnancy and parenting programs on pregnancy rates. At the first follow-up period at which programs assessed outcome (average 19.13 months), interventions produced a 50% reduction in the odds of pregnancy compared to comparison-control conditions, but by second follow-up (average 31 mos.), the effect had dissipated (Corcoran & Pillai, 2007).
- A study synthesized 15 randomized and 14 non-randomized studies to examine the effect of secondary teen pregnancy prevention programs on educational attainment among unwed African American teen mothers. The results suggest that secondary teen pregnancy prevention programs and other interventions or adolescent mothers have had minimal impact on increasing rates of educational attainment among adolescent mothers. The 14 non-randomized studies, primarily based on school-based interventions, estimated significantly larger effects that are not reliable due to the inherent selection bias in these studies (Baytop, 2006).
- A randomized, controlled trial of a U.S. home-based intervention curriculum aimed at delaying rapid second births among adolescent mothers found that the intervention was effective in preventing rapid repeat births among low-income, black adolescent mothers. The effectiveness of the intervention could be seen after only 2 visits and increased over time. There were no second births among mothers who attended > or = 8 sessions (Black *et al.* 2006).

- A U.S. program aimed to increase use of emergency contraception in parenting teens through advance distribution of emergency contraception. Parenting teens who received advanced emergency contraception were much more likely to have used it than the control group at the 6-month interview (83% vs. 11%) and the 12-month interview (64% vs. 17%). Advance provision of emergency contraception did not affect the use of condoms, or hormonal methods of birth control. However, parenting teens who received advance emergency contraception may have been more likely to have unprotected sex (Belzer *et al.* 2005).

One study reviewed several programs and found mixed results:

- (Klerman, 2004)'s review of 19 secondary pregnancy prevention programs in the U.S. found that more than half of the 19 studies that were included reported that they had been able to significantly postpone additional pregnancies or births to teen mothers for some time period. However, only three of the studies showing significant positive effects were based on randomized, controlled designs—two home visitation programs and one program in a medical setting. Moreover, the size of the effects was often small.

8.4.3 Abortion and postabortion care

The review found three studies published in the last five years examining abortion or postabortion care for adolescents (Table 24).

- A U.S. study evaluated a short-term postabortion group for adolescents. Three groups were conducted in an adolescent mental health clinic within an urban high school-based health clinic. The clinical group experiences offered the adolescents an opportunity to integrate the experience of pregnancy and the abortion decision into their lives. The study found that adolescents who participated in the postabortion counseling group chose and used a method of birth control, did not repeat an unplanned pregnancy, and remained in high school (Daly, Ziegler & Goldstein, 2004).
- In 2007, Pathfinder initiated adolescent-friendly postabortion care services in eight African countries: Angola, Ethiopia, Ghana, Kenya, Nigeria, Mozambique, Tanzania, and Uganda. The project's goal is to increase access to postabortion care responsive to the special needs of adolescents. Although results varied by country, overall program outcomes included increased community support for services and activities that prevent unwanted pregnancy and address the issue of unsafe abortion among young women; increased availability of PAC services in eight African countries; greater numbers of service providers with the capacity to deliver YFPAC services; and increased numbers of youth PAC clients adopting a contraceptive method to prevent future unintended pregnancies (Burket, Hainsworth & Boyce, 2008).
- A study in South Africa examined the impact of legalization of abortion on abortion complications. The study compared abortion outcomes in forty-seven public hospitals in 1994 (prior to the 1996 legalization) and again in 2000. The study found that legalization of abortion had an immediate positive impact on morbidity, especially in younger women, who had the highest rates of complications prior to legalization (Jewkes *et al.* 2005).

8.4.4 Programs to increase financial access to pregnancy care

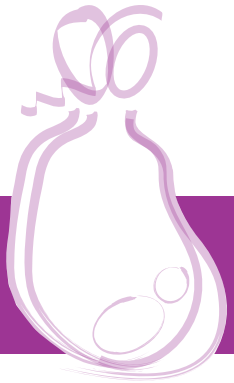
The review found one study published in 2003-2008 that examined the impact of programs to increase financial access to pregnancy care (Table 24). The program was successful in increasing use of prenatal care, among other reproductive health programs.

- A voucher scheme in Managua, Nicaragua succeeded in increasing access to sexual and reproductive health care for poor and underserved girls, including prenatal care. A relatively simple intervention through existing health facilities met the needs of adolescents. Many adolescents appeared willing to protect themselves against the risks of sexual intercourse. This suggests that access to sexual and reproductive health care can play an important role in changing youth behavior and increase the use of contraceptives and condoms (Meuwissen, Gorter & Knottnerus, 2006).

8.4.5 Scope of programs for pregnancy care of adolescents

The earlier sections of this chapter examined the evidence on effectiveness of programs that specialize in care for pregnant adolescents. However, very little information exists on the scope of these programs. Anecdotal evidence points to an extreme lack of these programs, particularly in relation to pregnancy prevention activities. Although

WHO and other organization have long advocated a differential approach to adolescent health care (WHO/UNFPA/UNICEF Study Group, 1999), it is unknown the extent to which countries have made progress toward the approach laid out in such documents. Other recent reviews of broader adolescent health issues have noted that programs for adolescents continue to be relatively few and small scale (Lule *et al.* 2006; National Research Council & Institute of Medicine, 2005; World Bank, 2006).



9. Implications for the content and organization of pregnancy care

This chapter examines the implications of the evidence presented above for the content and organization of pregnancy care for adolescents. A starting point is to recognize that for a safe pregnancy, childbirth and postnatal experience, mothers of all ages and their babies need a continuum of care that starts in the household and community and extends into the health care system, including emergency treatment if a birth is prolonged or obstructed (Kerber *et al.* 2007). The international community has identified key interventions along this continuum (World Health Organization MPS Department, 2007).

Previous reviews and reports (World Health Organization, 2003; World Health Organization, 2007a; World Health Organization & United Nations Population Fund [UNFPA], 2006; World Health Organization MPS Department, 2007) have tackled the question of how to make these interventions work better for adolescent mothers and their newborns and what—if any— unique interventions might be needed for the adolescent age group.

This chapter summarizes the consensus that has emerged around this question, laying out the recommended adolescent-specific interventions according to three main categories that correspond to WHO's *Recommended Interventions for Improving Maternal and Newborn Health* (World Health Organization MPS Department, 2007): (1) interventions by individuals, families, and communities; (2) interventions by the health services; and (3) health systems interventions (Figure 48). The discussion below describes each proposed intervention, the justification for taking a different approach for adolescents, and the evidence on the effectiveness of the proposed intervention (see the summary in Table 25).

When considering the usefulness of the proposed adolescent-specific interventions, it is important to recognize that many have health benefits that go beyond pregnancy. For example, treating anemia improves a range of health and non-health outcomes. Similarly, schooling in general and life skills education specifically have broadly beneficial effects. These interventions should form part of a comprehensive program to improve the health and well-being of adolescents.

Also, that some of the suggested interventions take place outside the health sector highlights the need for a multi-sectoral, collaborative approach. This approach involves sectors such as education, social welfare, the judiciary, and other government ministries; legislative bodies; the media; religious, workplace and labor organizations; political parties; and NGOs, community organizations, and other groups within civil society (World Health Organization & United Nations Population Fund [UNFPA], 2006).

9.1 Individual, family, and community interventions

Ensuring good pregnancy outcomes starts with home-based care practices that support the mother and their newborn before, during, and after the pregnancy. WHO recommends a total of 55 interventions centered in the home, family, community, and workplace (World Health Organization MPS Department, 2007). The current consensus supports five adolescent-specific interventions in this category (Table 25), discussed below. These interventions generally aim to deal with adolescent mothers' lack of knowledge, education, experience, income, and decision-making power relative to older mothers (section 7.1).

9.1.1 Involve the community

Interventions that enhance the involvement of the community at large, male partners, and other influential family members are thought to ensure their support and acceptance in use of pregnancy services for adolescents. These interventions aim to address some of the demand side determinants that appear to differentially influence adolescents' use of care (section 7.1). Research on interventions of this type specifically aimed at pregnant adolescents has been sparse. However, some research from the broader literature on access to adolescent reproductive health care shows that such community interventions can have a positive impact (Focus on Young Adults, 2001; Gardiner, 2008; UNAIDS Inter-agency Task Team on Young People (UNAIDS IATT), 2006).

9.1.2 Disseminate knowledge of complications of pregnancy

Pregnant women of any age should know the complications of pregnancy and their signs. For pregnant adolescents, however, there is greater urgency because they are more likely to experience life-threatening pregnancy complications and thus require specialized care (section 4). This reasoning underlies proposed interventions to widely disseminate this knowledge to pregnant adolescents and their families and communities. However, no research study has evaluated the effectiveness of this intervention when specifically applied to adolescents.

9.1.3 Provide adolescent mothers with life skills and sexuality education

As noted, relative to older mothers, adolescents face significantly greater barriers to using pregnancy care (section 7.1). Families and communities may be able to help adolescents overcome these barriers by providing adolescent mothers with life skills (including vocational training) and sexuality education to increase adolescents' autonomy, mobility, self-esteem, and decision-making abilities. Research has shown these interventions to be effective, although very few studies have focused specifically on pregnant adolescents (Focus on Young Adults, 2001; Gardiner, 2008; UNAIDS Inter-agency Task Team on Young People (UNAIDS IATT), 2006).

9.1.4 Empower adolescent girls to deal with domestic violence

Because adolescents are relatively more susceptible to violence from intimate partners than are older women (section 7.1.5), it is important to provide community programs to empower adolescents to deal with domestic violence. The international community has reached some consensus on what the elements of an adolescent-specific approach to the problem may be. However, such programs that specifically aim at adolescents are very new and still almost entirely untested in terms of their effectiveness (Interagency Gender Working Group, 2006; United Nations Population Fund, 2007; World Health Organization, 2007a).

9.1.5 Keep girls in school after getting pregnant

Many societies force adolescent girls who become pregnant to leave school (World Health Organization, 2007a). Families and communities that work to keep adolescents in school after pregnancy and birth benefit the mother and her newborn in the short run and provide longer-term social, economic, and health benefits for the mother and her family. Several interventions have aimed to keep pregnant adolescents in school, with mostly positive results (section 8.4). Efforts in the policy realm are examined in section 9.3.3 below.

9.2 Care by health services

Skilled health workers provide a range of services in clinical settings or through outreach beyond the clinic walls that help save the lives of pregnant mothers and their newborns. WHO recommends a total of 35 routine care interventions by health services, plus 27 additional care interventions for women and babies with moderately severe diseases and complications, and 14 specialized interventions for women and babies with severe diseases and complications (World Health Organization MPS Department, 2007). The current consensus supports 14 interventions in this category adapted to better serve adolescent mothers and their newborns (Table 26), discussed below.

9.2.1 Test and counsel early on pregnancy

Relative to older women, adolescents tend to delay seeking abortion, resort to the use of less skilled providers, use more dangerous methods, and delay seeking care for complications. They are therefore more likely to suffer serious complications and even death, particularly the unmarried adolescents (section 4.3.4). For these reasons, it is particularly important for health services to provide pregnancy tests, counseling, and options to adolescents for continuing or terminating the pregnancy. However, little research is available on the effectiveness of such adolescent-specific approaches.

9.2.2 Place special attention on diagnosing and treating anemia

Because of their special susceptibility to anemia in pregnancy, it is important for programs to make a special effort to diagnose and treat adolescents for anemia. Treatment protocols for anemia in adolescents do not differ from protocols for older pregnant women. However, evidence on intervention effectiveness for adolescent-specific approaches to anemia diagnosis and treatment in pregnancy is very limited (Delisle, 2005).

9.2.3 Improve nutritional status

Improving the nutritional status of adolescents during pregnancy can reduce adverse outcomes such as low birth weight. Pregnant adolescents have nutritional needs that are specific to their age group and may require a different approach to improving their nutritional status during pregnancy (Delisle, 2005). However, evidence on intervention effectiveness for adolescent-specific approaches to nutrition in pregnancy is very limited (Delisle, 2005).

9.2.4 Prevent and treat sexually transmitted infections during pregnancy

Special efforts to prevent and treat sexually transmitted infections during pregnancy can also reduce adverse outcomes such as low birth weight. Pregnant adolescents have been found to have higher rates of sexually transmitted infections compared with older women (section 4.2.3). Although treatment protocols are the same for adolescents and older women, health workers should take into account the differential information needs and social support situations of adolescents in their management of treatment and prevention (Brabin, 2004). Nonetheless, evidence for effectiveness of adolescent-specific approaches to treating and preventing sexually transmitted infections in pregnant adolescents is scant (Brabin, 2004). More research on such interventions is available from the broader adolescent reproductive health literature, and shows promising evidence of effectiveness (Focus on Young Adults, 2001; Gardiner, 2008; UNAIDS Inter-agency Task Team on Young People (UNAIDS IATT), 2006).

9.2.5 Treat for malaria

Evidence also shows that pregnant adolescents—especially first time mothers—are particularly susceptible to malaria, a major factor in maternal deaths in some countries. Programs should thus give priority in treatment and management of malaria in pregnancy for adolescent mothers. Like for sexually transmitted infections, treatment protocols are the same for adolescents as for older pregnant women. However, because adolescents are less likely to receive adequate prenatal care, their adherence to treatment protocols is more uncertain (Lalloo, Olukoya & Olliaro, 2006). Similarly, studies have found that compliance with use of bednets, another proven prevention strategy, is worst in the adolescent age group (Lalloo *et al.* 2006). Overall, however, very little intervention research has looked specifically at strategies for reducing malaria burden in pregnant adolescents (Lalloo *et al.* 2006).

9.2.6 Give special attention to youngest adolescents

Because adolescents under 16 and their newborns are at especially high risk of complication and death (section 4.7), health workers should provide special attention during obstetric care to the youngest mothers. This special attention should include:

- early detection of pregnancy and special outreach for extra antenatal care and social support;
- special services to support and manage mental health problems such as the potential for suicide;
- offering a financial subsidy for antenatal care and attended delivery based on age and economic situation to improve access to services; and
- screening for conditions that put pregnant adolescents at higher risk such as low body weight, anemia, concurrent HIV infection, and STIs (World Health Organization, 2003).

Although such special attention to the youngest pregnant adolescents makes sense, evidence on the effectiveness of interventions that specifically target this very young age group is lacking.

9.2.7 Emphasize the plan for birth

Developing the "Plan for Birth," including the place of birth, availability of transportation, and costs involved, is essential for all pregnant women. This is particularly true for adolescents, in light of their higher incidence of premature delivery. However, there does not appear to be any evidence on the effectiveness of such an intervention for adolescents, distinct from women of all ages.

9.2.8 Detect gender-based violence

Health workers should also prioritize adolescents for systematic detection of violence, to which adolescents are more vulnerable than older women are. The international community has reached some consensus on what the elements of an adolescent-specific approach to the problem may be. However, such programs that specifically aim

at adolescents are very new and still almost entirely untested in terms of their effectiveness (Interagency Gender Working Group, 2006; United Nations Population Fund, 2007; World Health Organization, 2007a).

9.2.9 Prevent mother-to-child transmission of HIV

Health workers should also prioritize adolescent use of services to prevent mother-to-child transmission of HIV, because young women have higher infection rates and lower uptake of PMTCT care, including voluntary counseling and testing for HIV infection, lower adherence to protocols for drugs to prevent vertical transmission, and lower use of postpartum family planning to avoid unplanned future births (section 6). Some research shows that a differential approach may be effective in better reaching adolescents with PMTCT services, especially for counseling and testing (Reynolds & Kimani, 2006).

9.2.10 Reduce smoking and drug abuse

Pregnant adolescents are more likely to smoke and abuse drugs than are older women. Health services should address special efforts towards reducing these behaviors that can harm both the mother and newborn. Very few smoking cessation programs have specifically targeted pregnant adolescents, but there is some promising evidence of their effectiveness (section 8.4.1). In addition, evidence exists on the effectiveness of adolescent-focused smoking cessation interventions in the broader adolescent population, although most of these proven interventions target the individual, family, and community and are not based in health services (Lule & Rosen, 2008).

9.2.11 Reach adolescents through IEC activities

Health services should also carry out specific information, education, and communication (IEC) activities directed at promotion and use of reproductive health services and decreasing family and community barriers to the use of services by pregnant adolescents (World Health Organization, 2003). Although few such IEC initiatives have aimed to specifically increase use of pregnancy care by adolescents, evidence from the broader literature on use reproductive health care shows that such initiatives can effectively increase use by adolescents (Focus on Young Adults, 2001; Gardiner, 2008; UNAIDS Inter-agency Task Team on Young People (UNAIDS IATT), 2006).

9.2.12 Counsel on and provide support for breastfeeding

Like for pregnant and mother women of all ages, adolescents should receive counseling and support for breastfeeding during pregnancy and in the postpartum period. Particular attention to adolescent mothers has been suggested as a feature of pregnancy care because of some evidence that adolescent mothers are less likely to breastfeed their children (section 6.4). The research on the effectiveness of interventions to increase breastfeeding rates in adolescent mothers has shown mixed results (section 8.4.1).

9.2.13 Delay or prevent repeat pregnancy

After a first pregnancy, many adolescents remain at high risk of a subsequent pregnancy. Prevention of such repeat pregnancies—especially when they are unplanned—is important because of adolescents' relatively high unmet need for contraception and the inherent health risks of early childbearing. Adolescent-specific approaches to delaying or preventing repeat pregnancy are widespread, and aim to reach adolescent women during pregnancy and in the postpartum period. Health services have a role as well as schools and other venues as a way to delay or prevent repeat adolescent pregnancies. As noted above (section 8.4.2), findings on the effectiveness of such interventions have been mixed.

9.2.14 Visit adolescents at home

Home visits during pregnancy by specially trained health workers can improve birth outcomes and, in the postpartum period, can promote and support breastfeeding, contraceptive use, newborn care, and parenting skills. Care in the postpartum period is of special importance because of the high risk of preterm and low birth weight babies born to adolescents. Home visits aim to respond to adolescents' social isolation, lack of mobility, and lower likelihood of seeking care at health facilities relative to older women. Although several studies have examined the effectiveness of home visiting interventions, the results have been mixed (section 8.4).

9.3 Health system features

Well-functioning health systems are critical to provision of pregnancy care for women of all ages. The current consensus encourages countries to incorporate five features into their health systems to improve adolescent use of care and the quality of care that they do receive (Table 27).

9.3.1 Develop health worker competencies in addressing adolescent needs

Countries should develop health worker competencies in dealing with the special information and psychosocial needs of adolescent mothers, and in fully understanding the particular health risks facing adolescent mothers and their babies and the relevant support that health workers can provide as described above in section 9.2. Limited evidence is available showing the effectiveness of such an approach for pregnancy care specifically (section 8.4.1 and section 8.4.3), with more evidence available from the broader literature on effectiveness of youth-friendly services (Focus on Young Adults, 2001; UNAIDS Inter-agency Task Team on Young People (UNAIDS IATT), 2006)

9.3.2 Organize services to better meet adolescent needs

Countries should also prudently adapt the timing, location, and physical environment of their pregnancy care services to ensure that they are more responsive to adolescents' needs. To ensure that they respect privacy and confidentiality of adolescent mothers, health services should adopt and put into practice appropriate guidelines that inform service delivery, including under special circumstances such as emergency settings (World Health Organization, 2003). As noted above, the evidence on the effectiveness of applying such features to pregnancy care specifically is somewhat limited (section 8.4.1), with more evidence available from the broader literature on effectiveness of youth-friendly services.

9.3.3 Foster a more conducive legal and policy environment

Countries should also enact changes in the legal and policy environment to improve the context in which adolescents determine their reproductive intentions, enhance access to care for adolescents, and address the unique pregnancy care needs of adolescents (Table 28). Although the legal and policy environment for adolescent sexual and reproductive health has improved in the last decade, with regard to the care of pregnant adolescents specifically, in most countries the environment is still deficient. While many countries have general policies promoting that promote safe motherhood and some have policies on adolescent reproductive health, few such policies include specific attention to the needs of pregnant adolescents. Some information is available on school policies related to pregnancy, but their implementation and effectiveness has not been evaluated (Table 29). Although a set of legal and policy actions has been proposed, and in some countries partially enacted, evidence of the effectiveness of these interventions, as for policy interventions on other topics, is lacking (World Health Organization, 2007a; Youth-policy.com, 2008).

9.3.4 Reduce the cost of pregnancy care for adolescents

Programs should also find ways to reduce the cost of pregnancy care for adolescents, who tend to have fewer financial resources than older women do. Limited evidence exists for the effectiveness of such approaches (section 8.4.4).

9.3.5 Involve adolescents

Policies and programs are more effective when adolescents are involved in all aspects of their design, implementation, and evaluation. Although the youth involvement approach often has strong support among program staff, very little research has rigorously tested its impact. One of the few studies to test the impact adolescent involvement in a pregnancy care setting found mixed results (Mathur *et al.* 2004), section 8.4.1.

9.4 Summary of findings on content and organization of pregnancy care

In what ways, if any, should individual, family, and community interventions be different for adolescents than for older women?

Ensuring good pregnancy outcomes starts with home-based care practices that support the mother and their newborn before, during, and after the pregnancy. The current consensus supports five adolescent-specific

interventions in this category. These interventions generally aim to deal with adolescent mothers' lack of knowledge, education, experience, income, and decision-making power relative to older mothers. Programs should involve the community; disseminate knowledge of pregnancy complications widely; provide adolescent mothers with life skills and sexuality education; empower adolescent girls to deal with domestic violence; and keep girls in school after getting pregnant.

In what ways, if any, should clinical and outreach interventions be different for adolescents than for older women?

Skilled health workers provide a range of services in clinical settings or through outreach that help save the lives of pregnant mothers and their newborns. The current consensus supports 14 clinical or outreach interventions adapted to better serve adolescent mothers and their newborns. When adolescent girls first contact health services, they should receive pregnancy tests, counseling, and options to continue or terminate the pregnancy. Prenatal care services should place special attention on diagnosing and treating anemia in pregnant adolescent; improve their nutritional status; prevent and treat sexually transmitted infections; treat for malaria; emphasize developing the plan for birth; detect gender-based violence; prevent mother-to-child transmission of HIV; reduce smoking and drug abuse; and reach adolescents through information, education, and communication activities. During the post-partum period, health services should pay special attention to counseling on and providing support for breastfeeding; delaying or preventing repeat pregnancy; and visiting adolescents at home. The youngest adolescent mothers, those under 16, should receive special attention throughout pregnancy, in childbirth, and during the postpartum period.

In what way, if any, should health systems be organized differently to better serve adolescent mothers?

Well-functioning health systems are critical to provision of pregnancy care for women of all ages. The current consensus encourages countries to incorporate five features into their health systems to improve adolescent use of care and the quality of care that they do receive. Countries should develop health worker competencies in meeting the special information and psychosocial needs of adolescents mothers; adapt the timing, location, and physical environment of their pregnancy care services to ensure that they are more responsive to adolescents' needs; foster a more conducive legal and policy environment; reduce the cost of pregnancy care for adolescents; and involve adolescents in program design, implementation, and evaluation.

To what extent does evidence support the effectiveness of the recommended interventions?

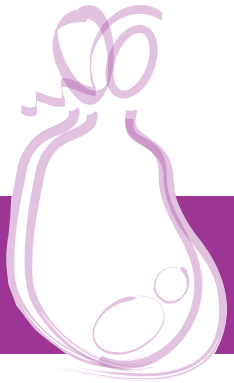
Overall, the intervention effectiveness data for many of the recommended interventions is weak or non-existent. Of the 24 recommended interventions, 5 have some direct evidence from evaluation of adolescent-specific pregnancy care interventions, 5 rely only on indirect evidence from the broader adolescent reproductive health literature, 4 combine both direct and indirect evidence, and 10 have no supporting quantitative evidence of any type (Table 30).

Do findings from the recent literature review suggest any changes in the recommended content and organization of pregnancy care for adolescents as put forth in previous WHO documents?

- The 2003 technical consultation on adolescent pregnancy (World Health Organization, 2003) produced a consensus statement on three broad principles of how pregnancy care should treat adolescents differently:
- The whole health care system needs to made more responsive to the special needs of adolescents
- Special approaches or models of care for adolescents are needed to ensure that the social and cultural circumstances around adolescent pregnancy are addressed and access to services improved
- Very young adolescents (under 16) need to be managed differently by the health care system, irrespective of other demographic characteristics such as marriage

The evidence from the recent literature review supports maintaining these three broad principles. However, the evidence appears to suggest more strongly than before that biological and physiological factors related to adolescent pregnancy exert an independently negative effect on health risks to mothers and their newborns. Thus, the second principle should be modified to say:

> "Special approaches or models of care for adolescents are needed to ensure that the social and cultural circumstances around adolescent pregnancy *and the special biological and physiological vulnerabilities of adolescents* are addressed and access to services improved."



10. Action plan to address: adolescent in Making Pregnancy Safer efforts

The evidence discussed above lays out a clear rationale for action to address adolescent pregnancy, in particular to mitigate the health risks associated with early childbearing. The overarching goal of making pregnancy safer efforts is that all women and newborns will have access to skilled care services during pregnancy, childbirth and the postpartum and newborn periods, thereby minimizing maternal, perinatal, and newborn morbidity and mortality. This section proposes an action plan for how WHO and partner organizations can better incorporate adolescent concerns into these efforts to make pregnancy safer.

The plan organizes actions into five categories:

- Advocacy
- Technical support
- Monitoring progress
- Supporting research
- Partnerships

Each of the proposed actions (summarized in Table 31) were developed based on interviews with key WHO staff, results of technical and expert group consultations with WHO and outside partners, and findings of the current review of evidence. The extent to which these actions apply to and are carried out at the country level will vary, highlighting the importance of developing assessment tools to guide country-specific action. Parallel to this generic action plan, regional and country action plans are being elaborated based on recent consultations among WHO and its partners (World Health Organization, 2009).

10.1 Advocate for attention to adolescent pregnancy

Despite the increasing interest in adolescent pregnancy by governments and WHO regions, there remains a large need to secure high-level political support for action on adolescent pregnancy specific to maternal health issues. The following actions can help further this objective.

10.1.1 Help governments to analyze the scope of adolescent pregnancy and its impact on health and well-being

Basic information is readily available at the country level on many dimensions of adolescent pregnancy. However, efforts need to be increased to take this information and make it useful for building political support. Helping governments to synthesize, analyze, and use this information for advocacy and decision-making needs to be a priority. Depending on the country, WHO and partners can incorporate information on adolescent pregnancy into ongoing approaches to build broader support for maternal and newborn health programs or develop additional, adolescent specific approaches as needed. As part of this effort can help provide detailed country-level information on the break down of adolescent pregnancies by married/unmarried, consensual/nonconsensual, planned/unplanned. Information on married/unmarried and planned/unplanned can be gained through further analysis of the DHS. Information on pregnancies from consensual versus nonconsensual sex would have to be gained through smaller scale surveys and qualitative studies.

10.1.2 Mainstream adolescent pregnancy concerns into efforts to increase community awareness and demand for quality pregnancy care

While support at the national level is important communities and individuals are also important actors in advocating for greater attention to adolescent pregnancy concerns. WHO and partners can adapt some of their efforts that focus on communities to include an adolescent dimension as appropriate.

10.1.3 Pilot adolescent-specific advocacy approaches at the country level

Experience advocating on adolescent pregnancy care at the country level is very limited. WHO and partners can add to the body of knowledge on this subject by piloting specific advocacy approaches, building on existing efforts in the fields of safe motherhood and adolescent health more broadly. As part of this effort, analysis can be done on previous adolescent pregnancy care advocacy approaches, including those that incorporate anecdotes and put a human face on adolescent pregnancy. Design and implementation of such advocacy pilots can be coordinated closely within WHO as well as with outside organizations advocating on adolescent health and safe motherhood.

10.1.4 Develop a consistent policy framework on adolescent pregnancy

To assist advocacy, one focus area should be in developing a consistent policy framework on adolescent pregnancy for adoption at regional, national, and subnational levels. Countries currently lack a framework that lays out specific actions needed in the legal and policy arena to ensure support for adolescent pregnancy initiatives. The essential elements of such a framework are already contained within documents prepared by WHO and its partners. These elements can be turned into a more formal statement of policy requirements.

10.1.5 Support changes in the legal and policy environment.

Using the findings from legal and policy reviews (see 10.2.1), WHO and partners could support countries to make positive changes in the legal and regulatory environment around maternal and newborn health.

10.2 Provide technical support

Those countries that want to act on adolescent pregnancy need the best technical advice possible from WHO and other international organizations. Key actions to provide this technical support include the following.

10.2.1 Review MPS-related national policy documents

Using a policy assessment tool (see 10.2.6), reviews can determine the degree to which the legal and policy environment is supportive of action on adolescent pregnancy. Such reviews could be carried out jointly with other interested stakeholders including governments, other international organizations working on adolescent pregnancy, NGOs, and local advocacy groups.

10.2.2 Disseminate information on adolescent pregnancy through various channels

The existing knowledge on adolescent pregnancy is underutilized worldwide, both in developed and developed countries. Thus, a sustained knowledge dissemination effort is an essential complement to the actions under each of the four strategic directions. MPS can work closely with its partner organizations to ensure that information on all aspects of adolescent pregnancy is communicated in the most efficient manner possible to key policy makers, programs managers, communities, and individuals. In particular, WHO can greatly expand information available over the internet through well-designed web sites that target information to key audiences. The web site could include detailed country and region information on adolescent pregnancy. This position paper should be a starting point for the dissemination of information, to eventually include other print and electronic resources.

10.2.3 Review all IMPAC tools and guidelines with an adolescent lens, and revise according to evidence base

WHO has already developed a set of comprehensive tools and guidelines for use by countries, under the rubric of Integrated Management of Pregnancy and Childbirth (IMPAC). To ensure that these reflect the latest evidence on care for pregnant adolescents, WHO can undertake a review of each tool and guideline and modify them as needed. The review should focus on areas such as individual, family, and community care, where a differentiated on focus on adolescents may be most indicated. These reviews can be carried out across WHO departments and including partner organizations to ensure that the tools and guidelines reflect the larger body of knowledge on both reproductive health and on adolescent health care and development. For new norms, guidelines, and tools that are under development, there should be an explicit mechanism to ensure that they incorporate the latest evidence on adolescents.

10.2.4 Support implementation of adolescent-friendly care for pregnant adolescents

WHO and partners can provide support for broader efforts to make health services adolescent-friendly. As part of this initiative, new or modified job aids can be developed to reflect current evidence on best practice in addressing the needs of pregnant adolescents.

10.2.5 Review preservice curricula and support needed changes

Schools that train health workers can play a key role in ensuring they have the proper competencies for working with pregnant adolescent clients. Very little is known about what is taught in these schools on the topic of adolescent pregnancy. WHO and partners can develop tools to facilitate review of these curricula, carry out or sponsor review, make recommendations for improvements as necessary, and support needed curriculum changes and training as appropriate. Collaboration with experts in health systems and human resources will be key.

10.2.6 Develop a tool to enable an adolescent-focused review of MPS-related policy documents and promote consistency with care recommendations

In line with efforts to develop a consistent policy framework, tools can be developed to allow review of policy documents related to making pregnancy safer initiatives. Such a tool could build on existing models. For example, WHO's RHR Department has developed a set of tools for examining laws and policies related to sexual and reproductive health. One tool specific to pregnancy is *Using Human Rights for Maternal and Neonatal Health: a Tool for Strengthening Laws, Policies, and Standards of Care (World Health Organization, 2008). Another model is the Maternal and Neonatal Program Effort Index* tool supported by USAID (Bulatao & Ross, 2000).

10.3 Monitor progress

As the sections above noted, much of the information on adolescent pregnancy needed by decision makers is still lacking at the country level. WHO and partners can undertake several actions to improve data availability and use, including the following.

10.3.1 Promote the collection and use of data on the scope of adolescent pregnancy

As noted, some gaps exist in knowledge about the scope of adolescent pregnancy, including about its scope and impact amongst the adolescents 16 and under, planning status of adolescent pregnancy, and variation by marital status and socioeconomic categories. WHO and partners can help set up a coordinating body to define the key adolescent pregnancy indicators, data collection procedures, and formats for dissemination at the national and subnational levels.

10.3.2 Promote better age-specific data on health impacts, including on maternal and newborn mortality, and on cause of maternal death

More work is needed to determine disease burden related to adolescent pregnancy, rates of maternal death in adolescents and whether causes of maternal death among adolescents differ substantially from causes for other age groups. WHO and partners can work with national governments to improve surveillance systems to allow for measurement of age-specific rates of maternal and newborn death and causes of death, a key area where good information is lacking. This effort can build on current WHO work to analyze available information from Confidential Enquiries into Maternal Death (CEMD) and to review the entire WHO mortality database to look specifically at cause of death in adolescents.

10.3.3 Encourage collection, synthesis, and analysis of better age-specific information on use of key maternal health services

As noted above, relatively little is known about adolescent use of pregnancy care. WHO and partners can lead the effort to better collect and analyze this information for use in planning, advocacy, and evaluation of impact.

10.3.4 Catalog coverage of adolescent pregnancy care programs

Little is known about the extent to which maternal and newborn health program serve adolescents, and the extent to which countries are carrying out pregnancy care interventions that are proven to be effective in meeting the

special needs of adolescents. WHO and partners can take the lead in establishing indicators for program coverage and an evaluation framework for measuring changes over time.

10.4 Support research

The previous sections identified several gaps in knowledge about the scope of adolescent pregnancy, the context in which adolescent pregnancy occurs, health, social, economic, demographic, and societal impacts of adolescent pregnancy, and effective interventions. Expanding and improving on the evidence base is crucial to a more effective national response. Actions include the following.

10.4.1 Define and support a research agenda on adolescent pregnancy

WHO and partners can help define a comprehensive research agenda aimed at maintaining current levels of knowledge about adolescent pregnancy and filling these key gaps. This will require close coordination among the many actors within and outside WHO with expertise in specific knowledge areas. This research agenda can build on the suggestions offered in many recent reviews, including (National Research Council & Institute of Medicine, 2005; World Health Organization, 2007a; World Health Organization & United Nations Population Fund [UNFPA], 2006). As priorities, the agenda should include a focus on research of effective interventions for pregnancy care, to address the enormous gaps in knowledge on program approaches and effectiveness in developing countries. Another priority should be research on the demand and supply side determinants of adolescent pregnancy-care seeking behavior, many of which have not been examined by age of mother. It is important, for example, to examine the possible negative unintended consequences of government policies to assist pregnant adolescents (specifically, in the U.K., where some evidence shows that the program has weakened prevention efforts).

10.4.2 Pilot adolescent-specific technical and program approaches at the country level

As noted in previous chapters, the evidence base on effective pregnancy care programming for adolescents is still thin. In addition to promoting more and better research on the topic, WHO and partners can expand on this evidence base through direct support for rigorously-evaluated pilot activities in selected countries.

10.4.3 Improve the evidence base on costing of adolescent-focused approaches

The almost total lack of cost information on these approaches hinders advocacy, planning, budgeting, and program design, and scale-up. WHO and partners can begin to remedy this problem through inclusion of an adolescent costing component in existing pregnancy care costing models (e.g. Choice and Integrated Technology Healthcare Package [IHTP]), and through generation of cost data in currently neglected areas such as individual, family, and community interventions.

10.5 Build effective partnerships

Partnership on adolescent pregnancy is critical because of the cross-cutting nature of the issue. Some of the actions to encourage collaboration include the following.

10.5.1 Harmonize the actions of the various WHO departments dealing with adolescent pregnancy

Within the Family and Child Health cluster at WHO, harmonization among the various departments in key to furthering the objectives of the action plan. Key departments include MPS, CAH, RHR and Gender, Women and Health (GWH). WHO can help ensure the implementation of this action plan by establishing focal points on adolescent pregnancy at headquarters and at the regional level. These individuals will be responsible for providing overall direction on the implementation of this action plan, carrying out action plan activities as appropriate, and evaluating the implementation and impact of the action plan.

10.5.2 Harmonize and collaborate with outside partners

Many organizations have programs and initiatives that address adolescent pregnancy, in a variety of ways. Key WHO partners include UNFPA, UNICEF, the World Bank and regional development banks, bilateral donors, and international NGOs and professional bodies. Within countries, government, the private sector, professional bodies, academic institutions, and other civil society organizations all have important roles. WHO should collaborate with

its partners at global, regional, and national levels to maximize the utilization of scarce resources and minimize duplication of efforts.

10.5.3 Ensure consistency in data and on recommendations for interventions

Another key area of collaboration is ensuring that partners working on adolescent pregnancy, to the extent possible, use consistent data and speak with a single voice to governments and other implementing organizations.

10.5.4 Use or adapt tools and guidelines as appropriate

To save scarce resources, close coordination is needed to develop and adapt tools and guidelines for use at the country level. A wide array of such tools and guidelines already exists, produced either by WHO or by partner organizations.

10.5.5 Provide expertise to partner organizations on adolescent pregnancy issues

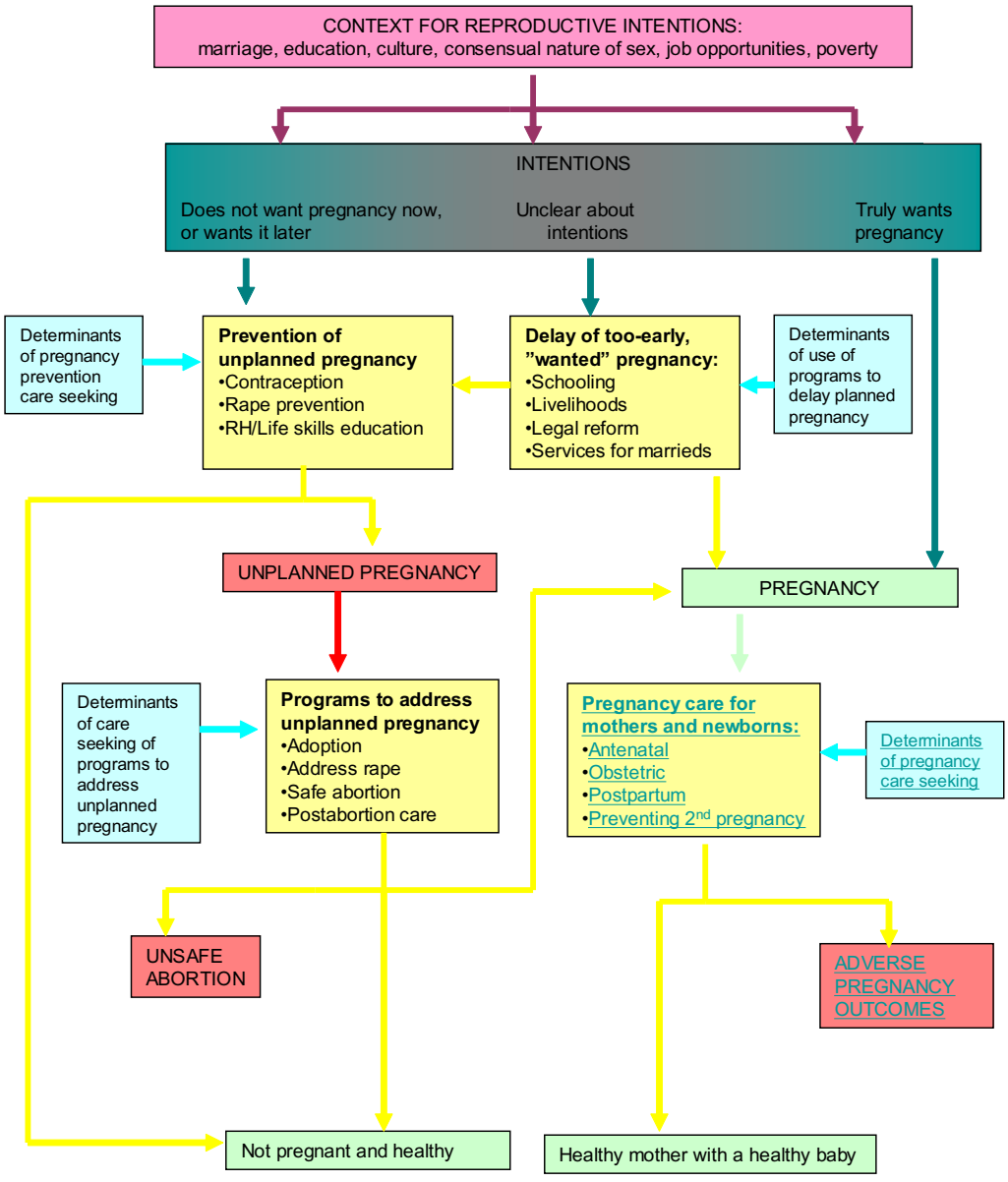
WHO can help build understanding of the issue and capacity to deal with adolescent pregnancy through the programs and activities of partner organizations. For example, WHO can help other organizations to develop training modules to incorporate into their own staff development activities, provide materials for dissemination, and make targeted presentations to staff from other organizations.

10.5.6 Mainstream adolescent pregnancy issues in other safe motherhood and adolescent health awareness-raising and advocacy initiatives

Several international and regional initiatives address either safe motherhood or adolescent health and development. These include the Partnership for Maternal, Newborn, and Child Health, Coalition for Adolescent Girls, various initiatives on youth and HIV/AIDS, and follow-up to international conferences such as the October 2007 Women Deliver conference and the April 2008 conference on Investing in Young People's Health and Development. WHO can help mainstream adolescent pregnancy issues in these initiatives through direct participation by WHO staff or by providing technical input via appropriate channels.

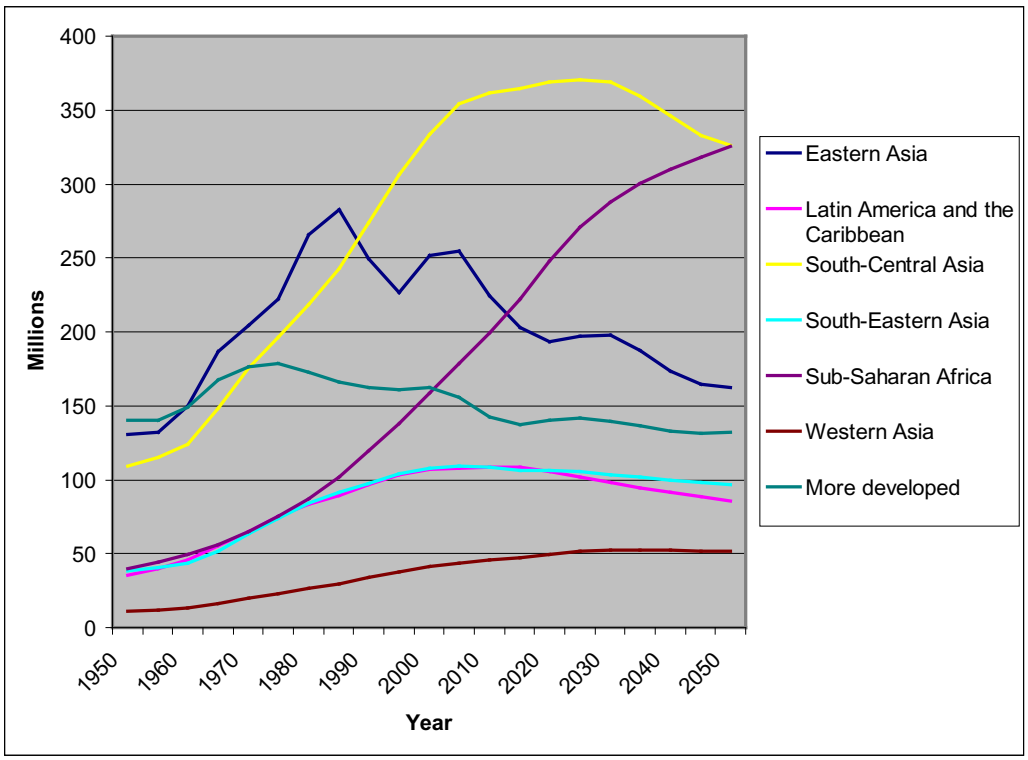
Figures

Figure 1: Conceptual Framework for Addressing Adolescent Pregnancy



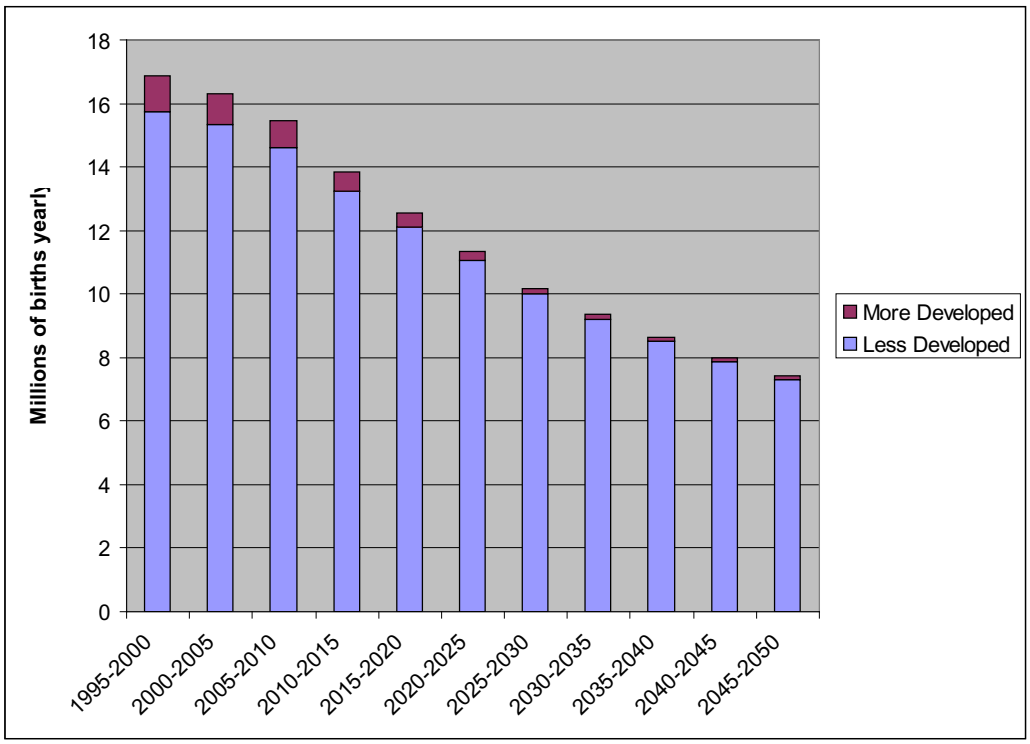
Source: The author

Figure 2: Population of 10-19 Year-olds by Selected Region and Economic Level, 1950-2050



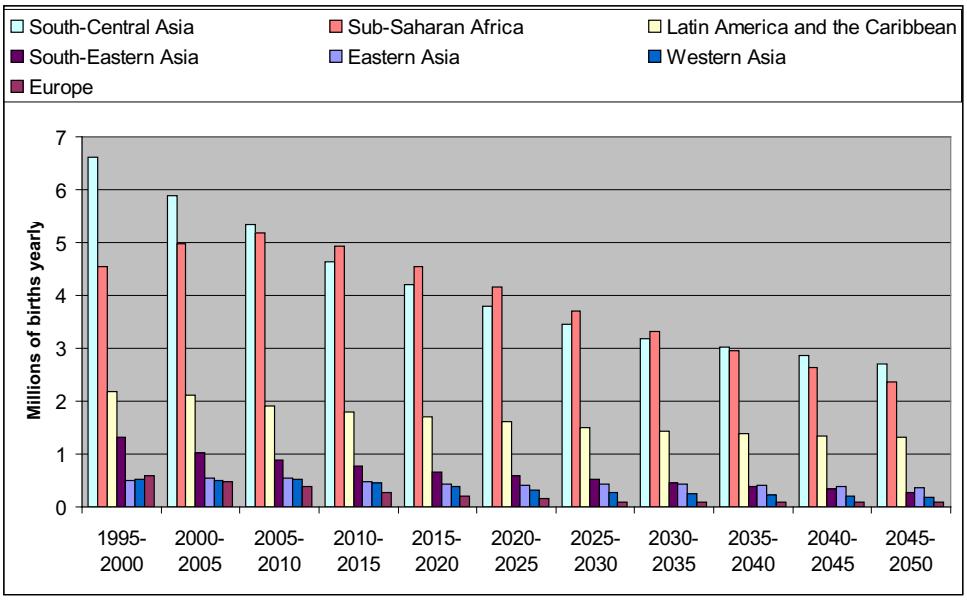
Source: (Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, 2009)

Figure 3: Trends in Births to 15-19 Year-olds, Developed and Developing Countries, 1995-2050, UN Medium-fertility Projection



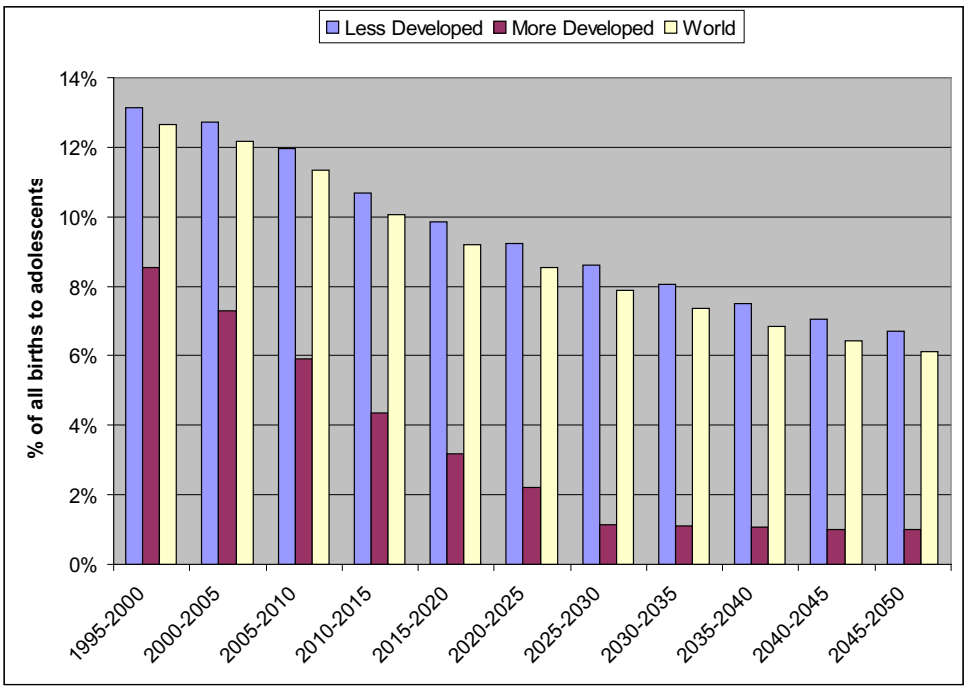
Source: (Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, 2009)

Figure 4: Trends in Births to 15-19 year-olds by Selected Region, 1995-2050, UN Medium-fertility Projection



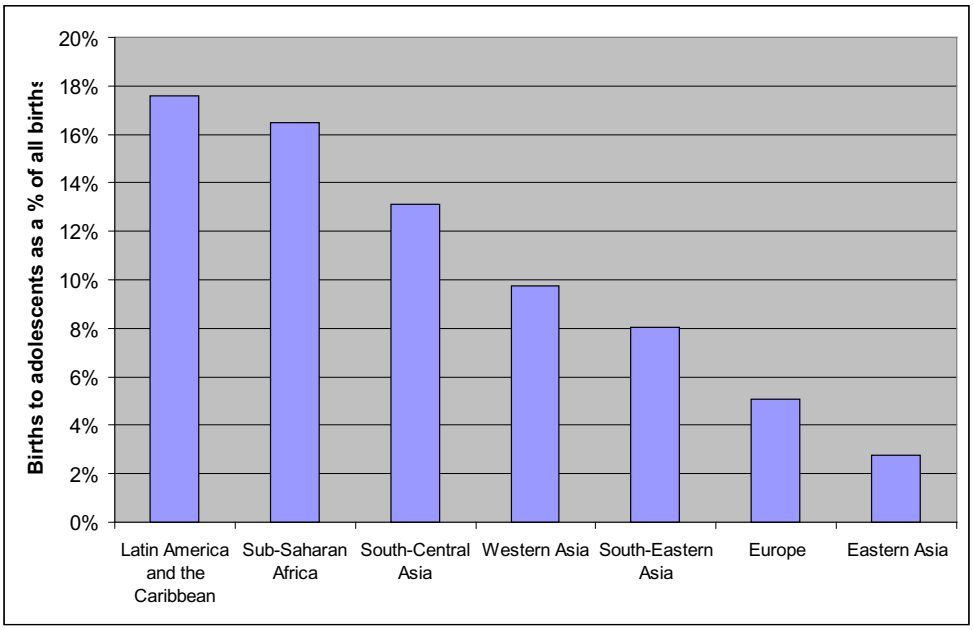
Source: (Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, 2009)

Figure 5: Projected Trends in Births to 15-19 year-olds as a Proportion of All Births, Developed and Developing Countries, 1995-2050, UN Medium-fertility Projection



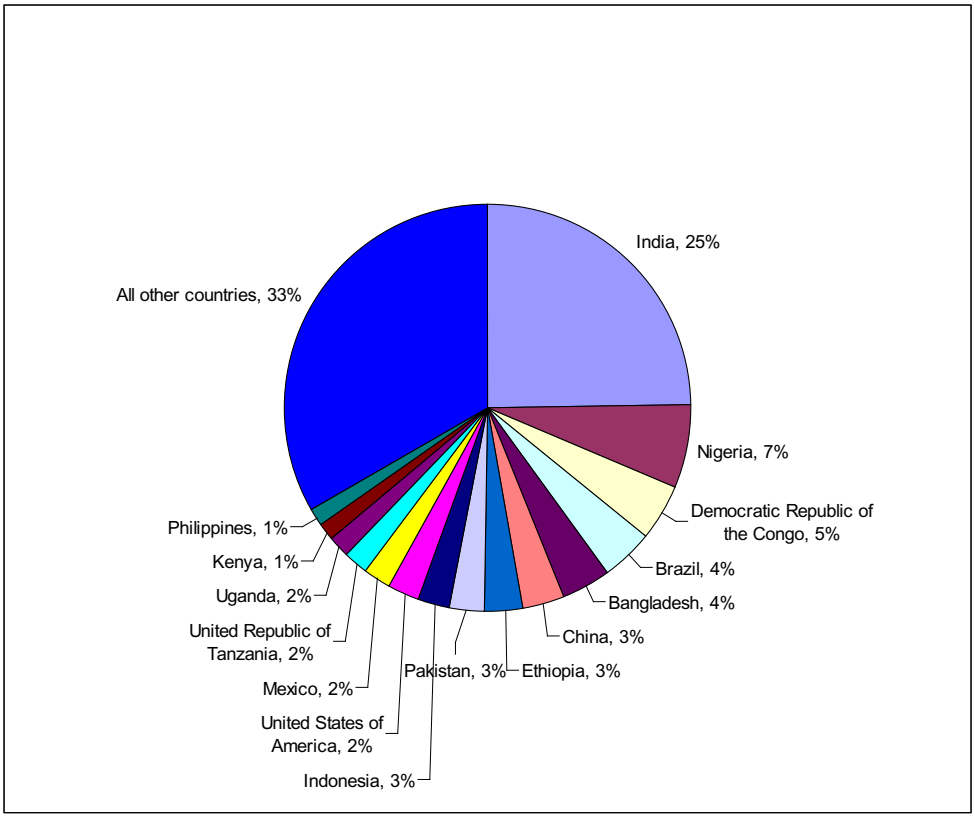
Source: (Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, 2009)

Figure 6: Births to 15-19 year-olds as a Proportion of All Births, by Region, 2005-2010 period



Source: (Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, 2009)

Figure 7: Distribution of Births to 15-19 year-olds for the 15 Countries with the Largest Number of Adolescent Births, 2005-2010



Source: (Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, 2009)

Figure 8: Percent of Women Ages 15-19 Giving Birth in One Year, by Country

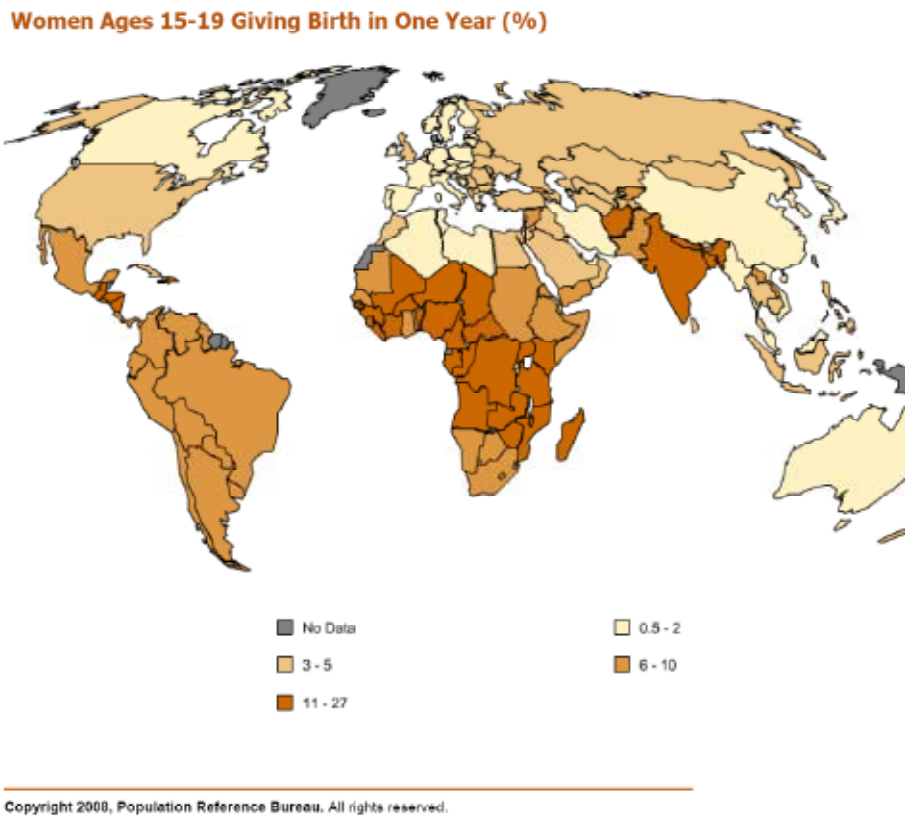
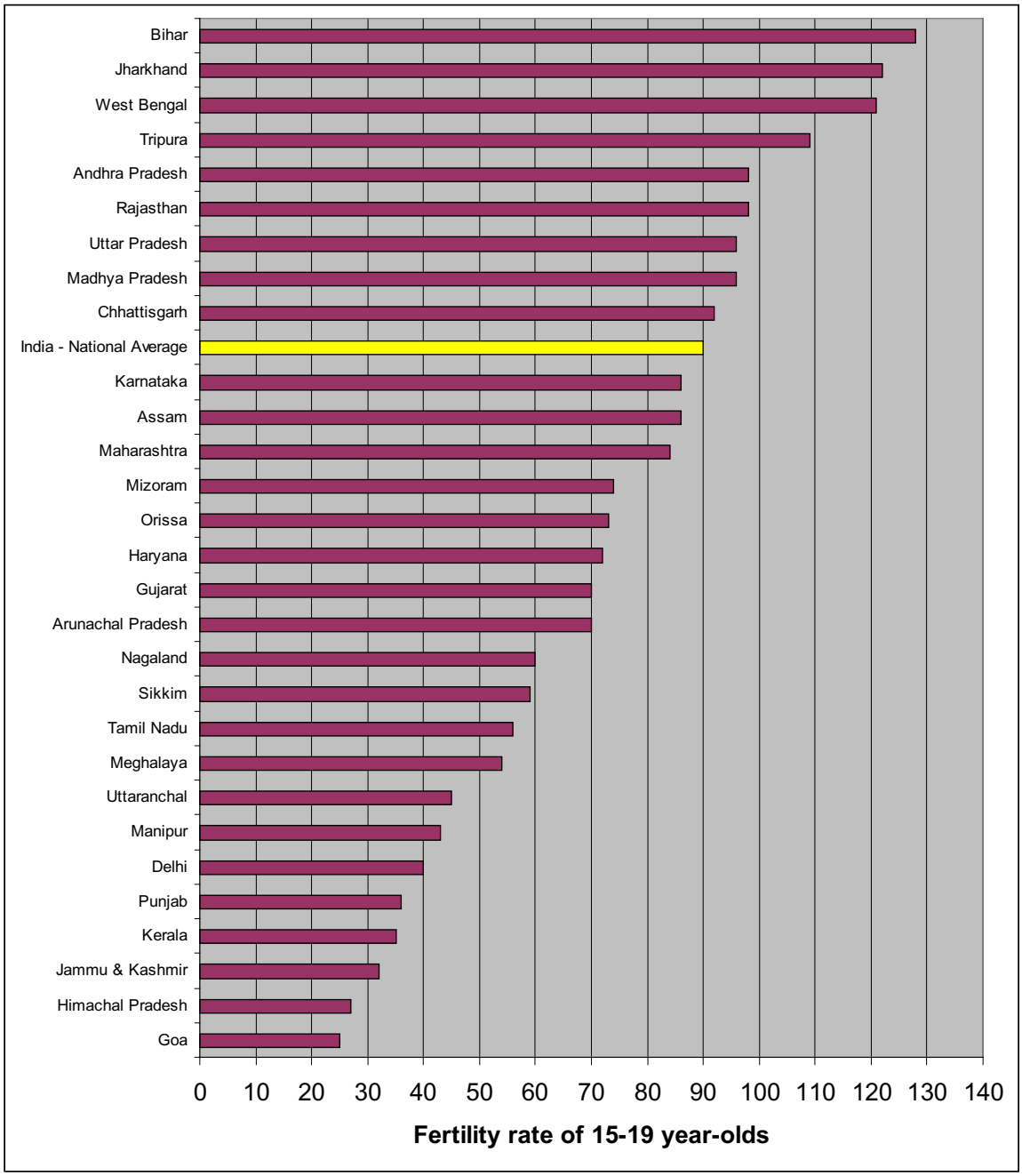
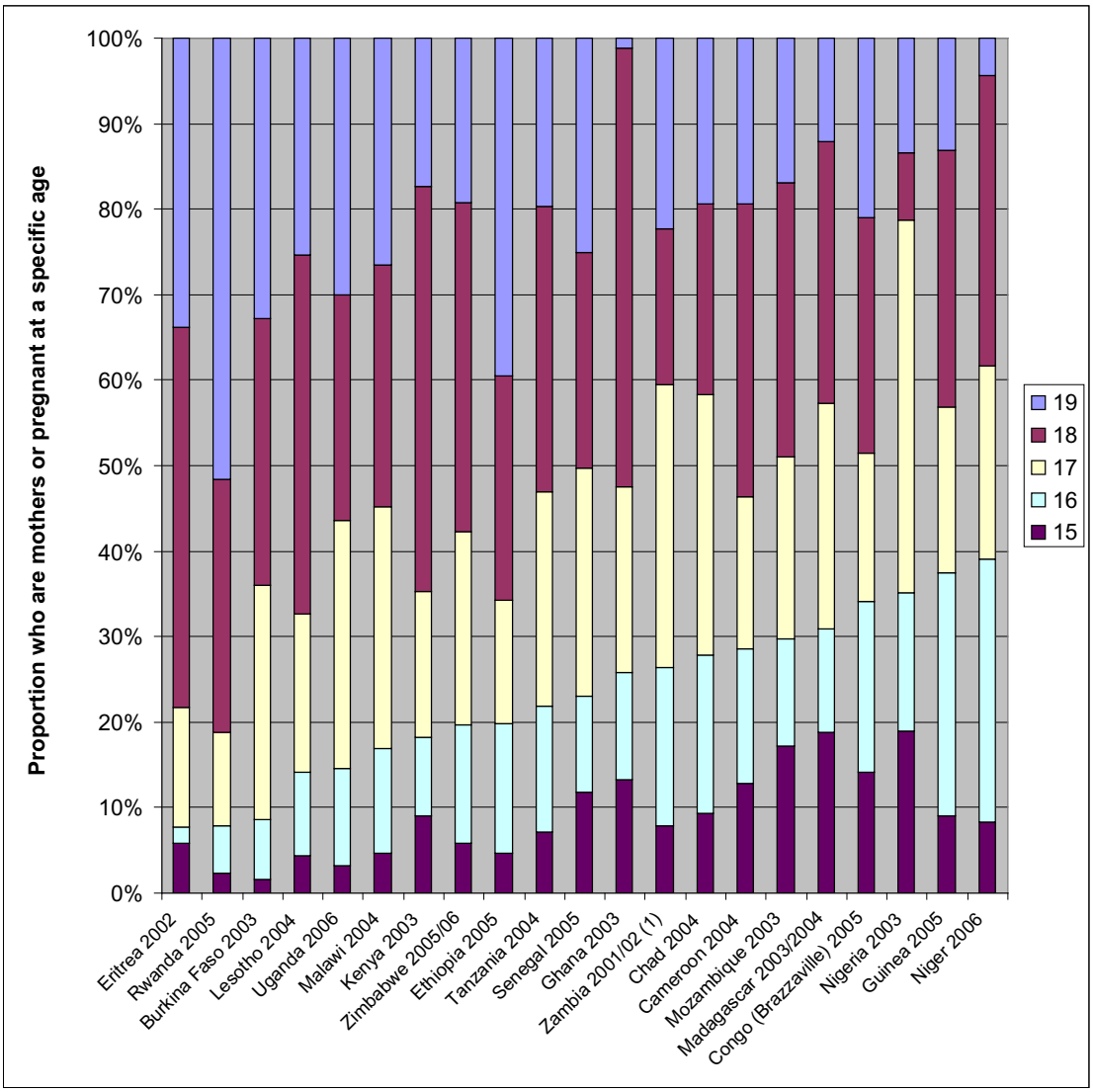


Figure 9: Variation in Fertility rate of 15-19 Year-olds in India, by State, for the Three-year Period Preceding the Survey, 2005-06



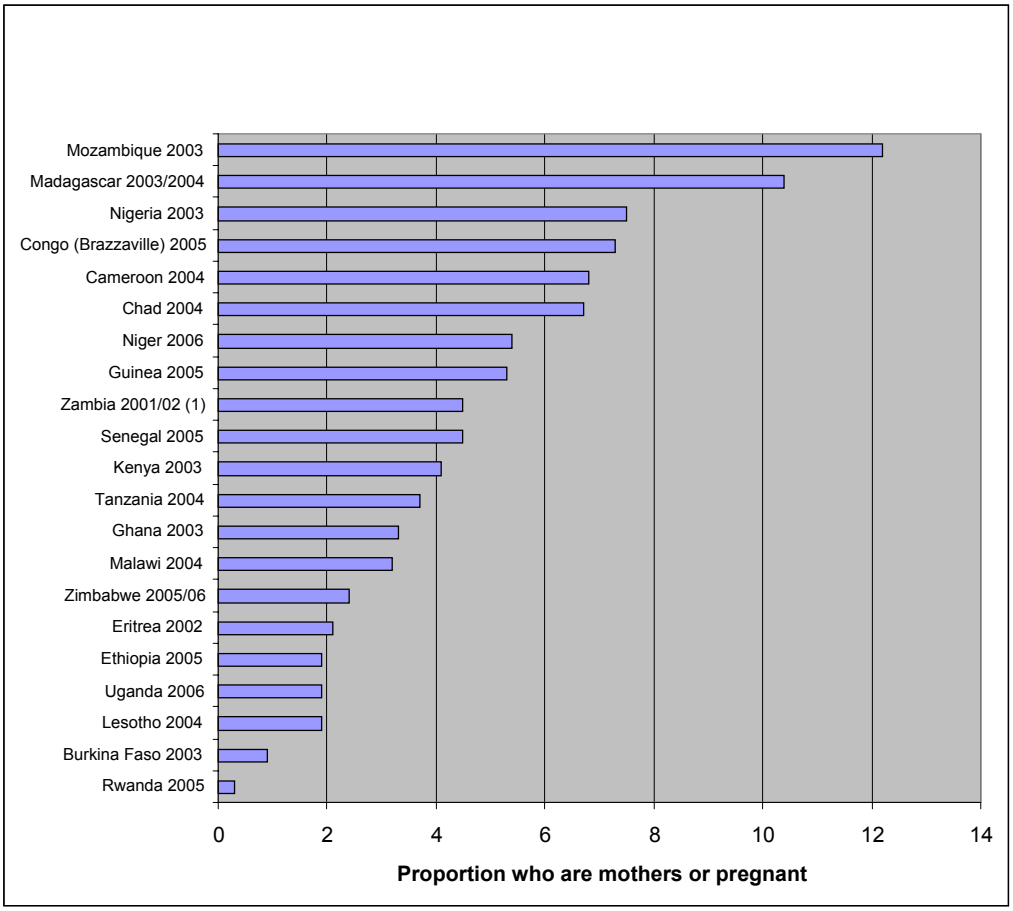
Source: (International Institute for Population Sciences (IIPS) & Macro International, 2007)

Figure 10: Distribution of Births or First Pregnancy to 15-19 year olds by Single Years of Age, Sub-Saharan Africa, early to mid-2000s.



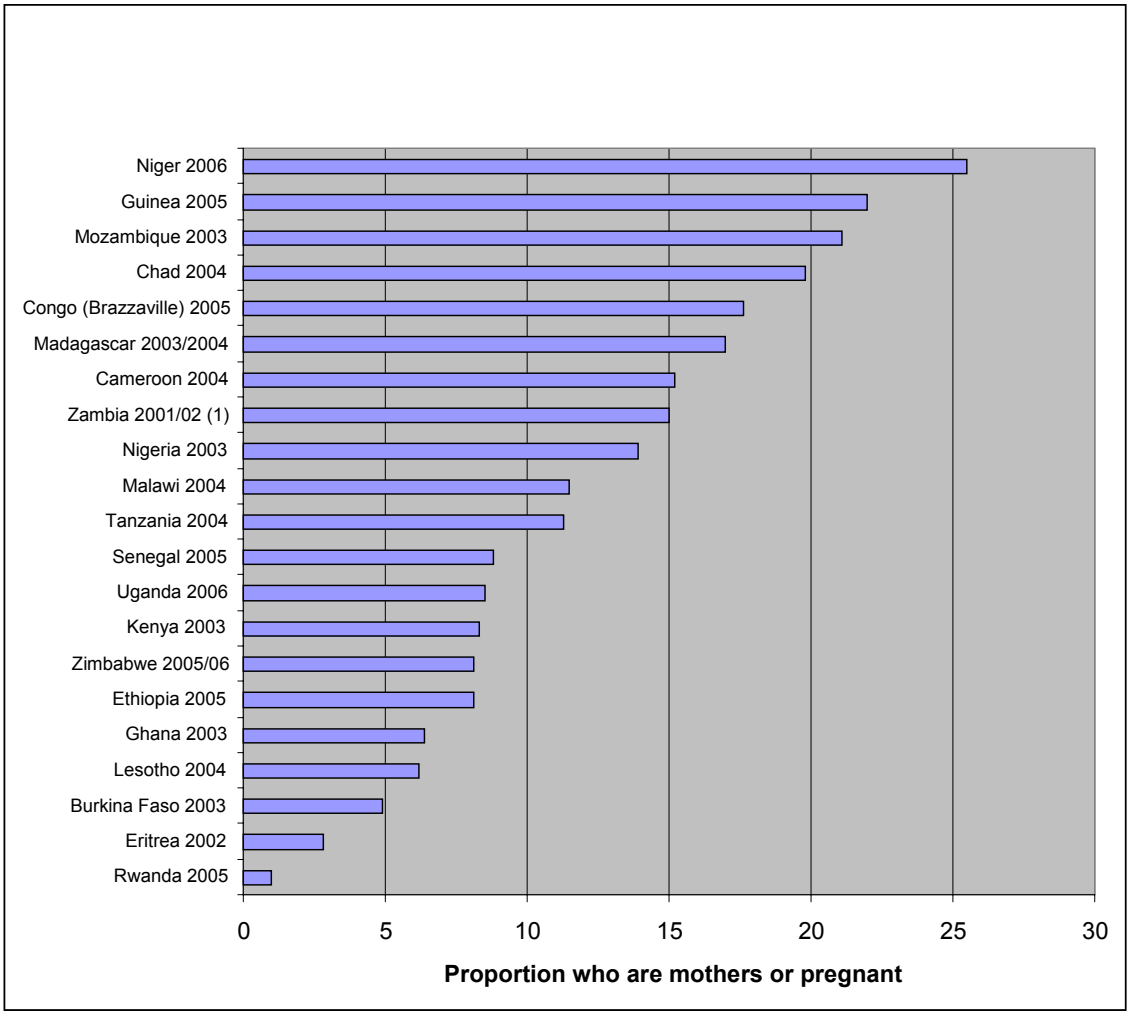
Source: (Macro International, 2008)

Figure 11: Proportion of Adolescents Who are Mothers or Pregnant by Age 15, Sub-Saharan Africa



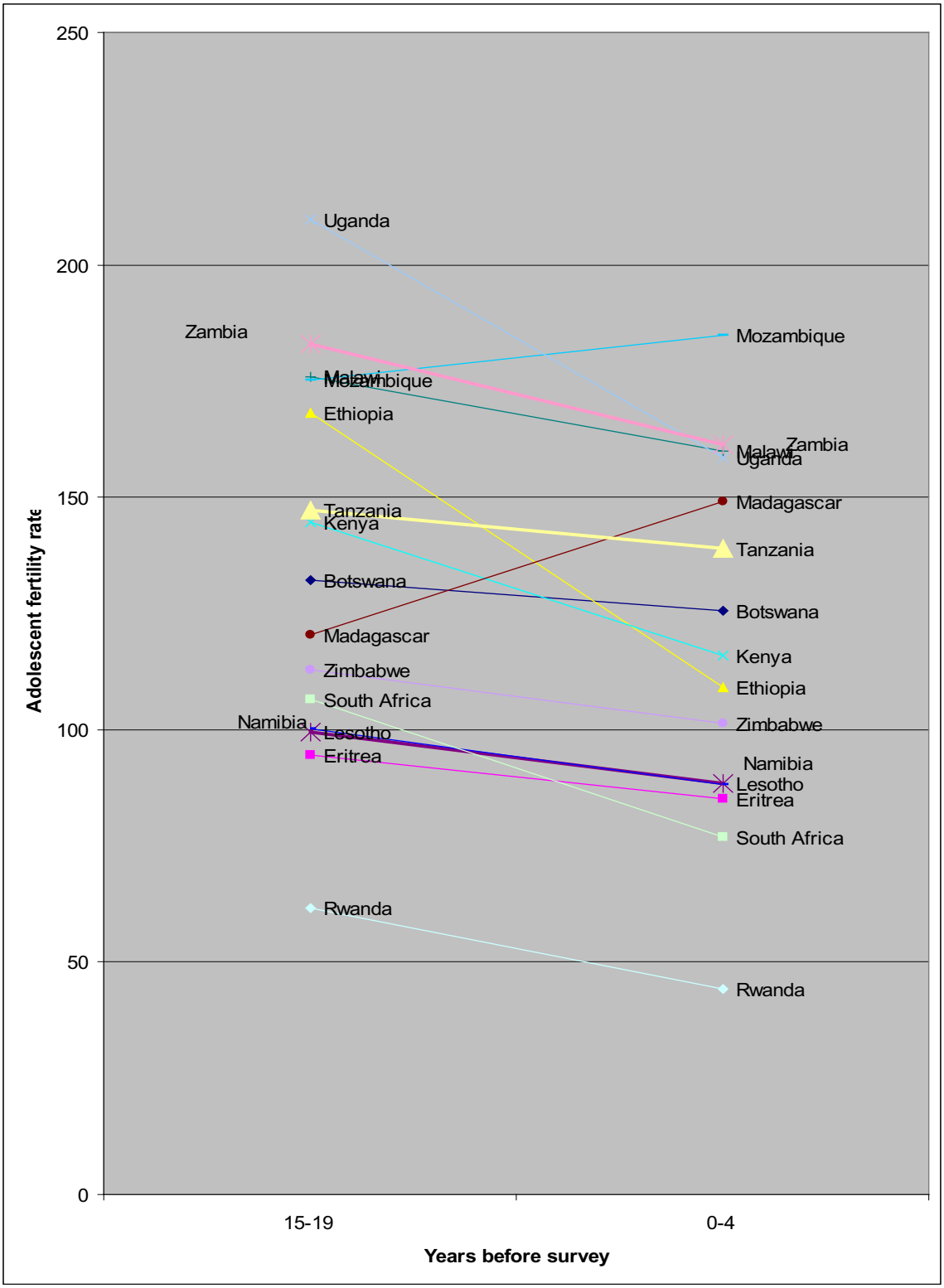
Source: (Macro International, 2008)

Figure 12: Proportion of Adolescents Who are Mothers or Pregnant by Age 16, Sub-Saharan Africa



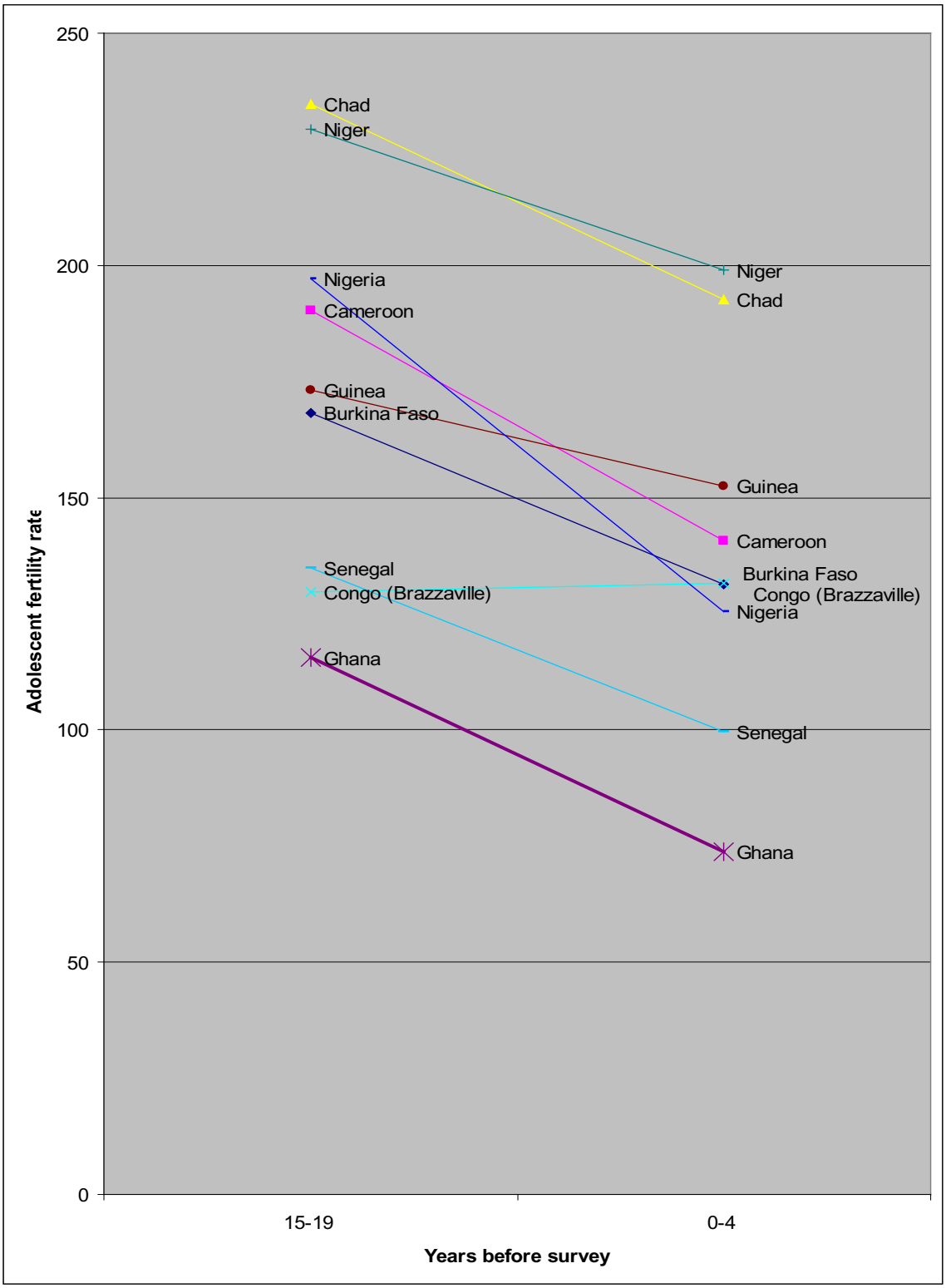
Source: (Macro International, 2008)

Figure 13: Trends in Fertility Rates of 15-19 year-olds, Eastern and Southern Africa



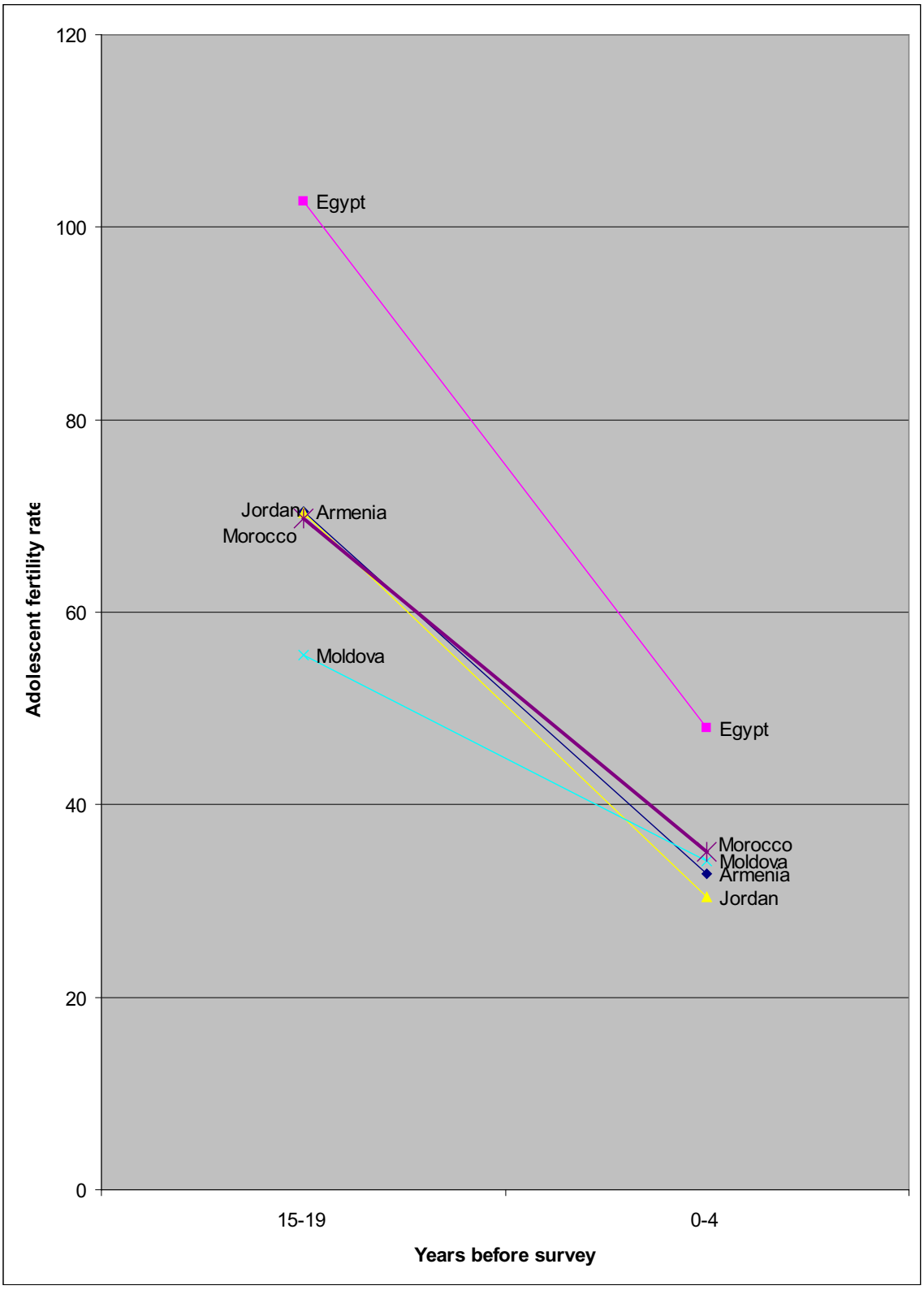
Source: (Macro International, 2008)

Figure 14: Trends in Fertility Rates of 15-19 year-olds, West and Middle Africa



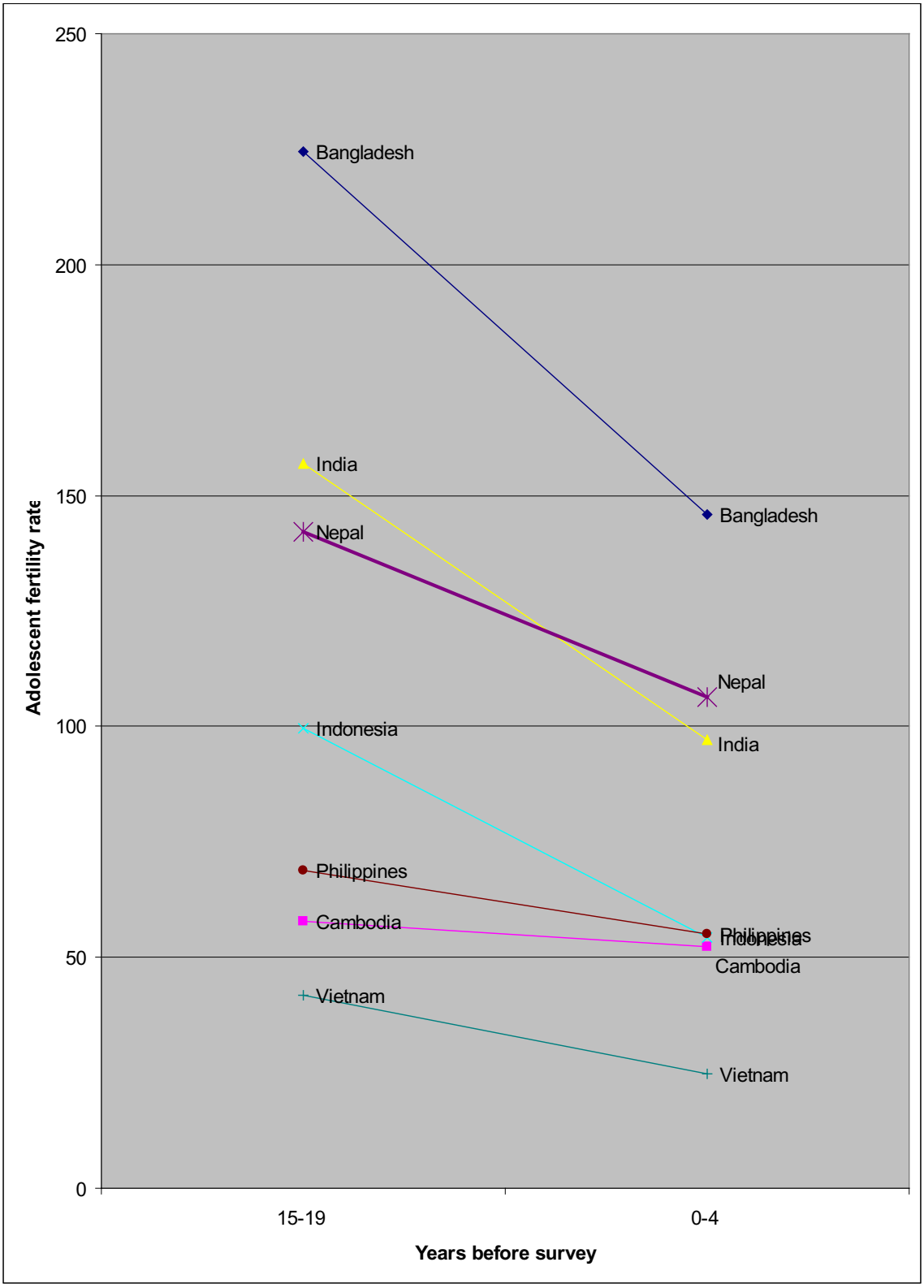
Source: (Macro International, 2008)

Figure 15: Trends in Fertility Rates of 15-19 year olds, North Africa/W. Asia/Europe



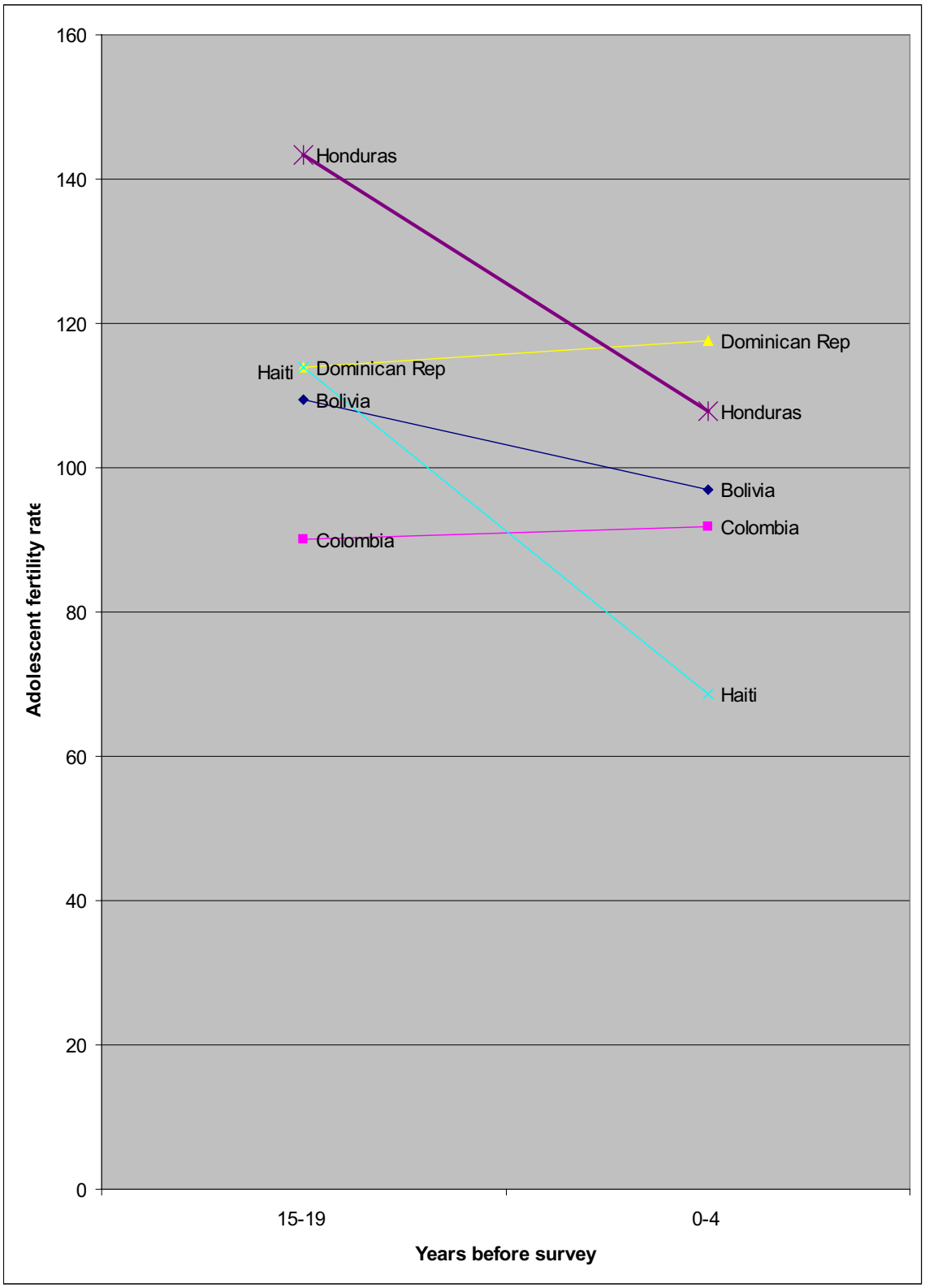
Source: (Macro International, 2008)

Figure 16: Trends in Fertility Rates of 15-19 year-olds, South and Southeast Asia



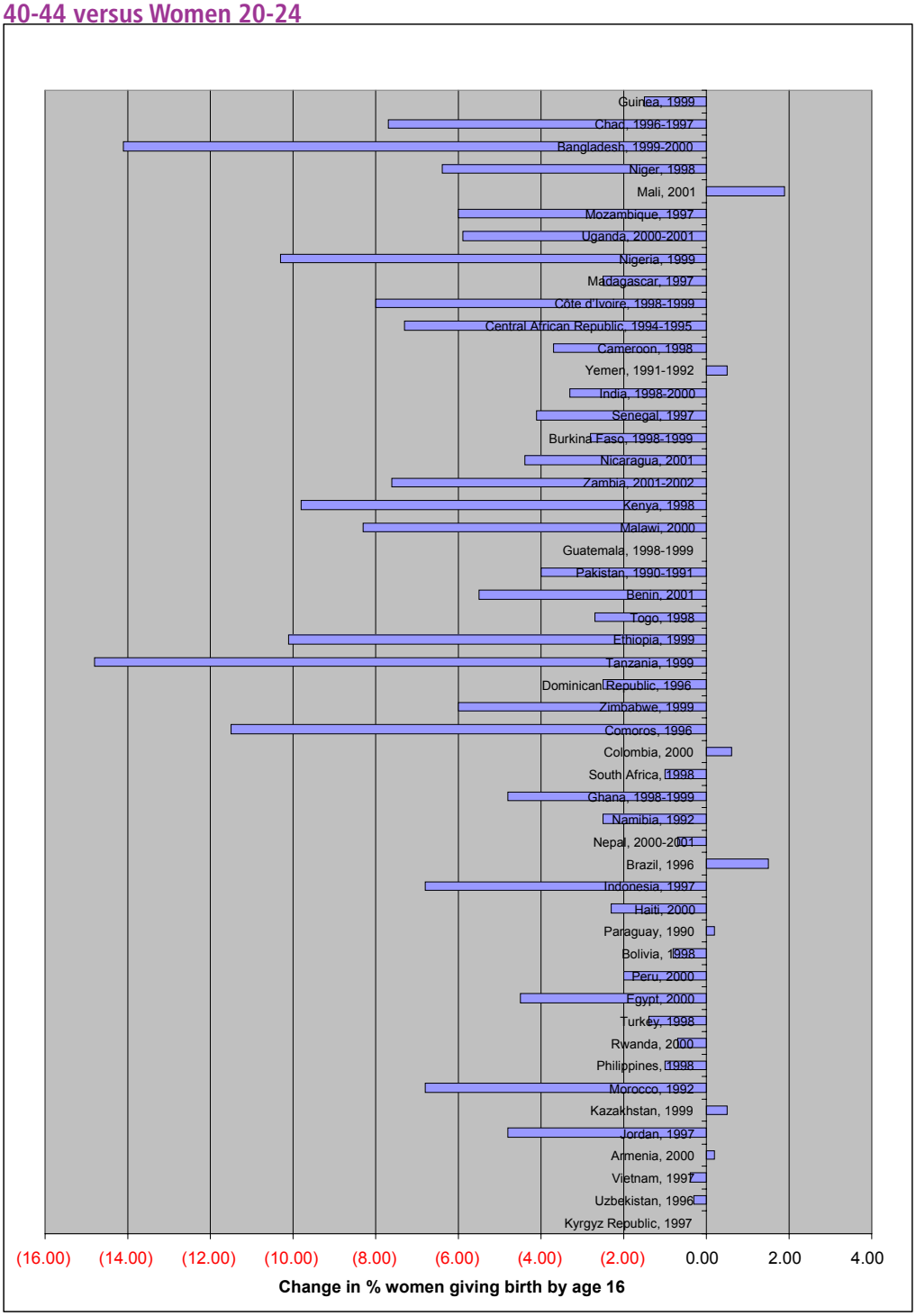
Source: (Macro International, 2008)

Figure 17: Trend in Fertility Rates of 15-19 year-olds, Latin American and the Caribbean



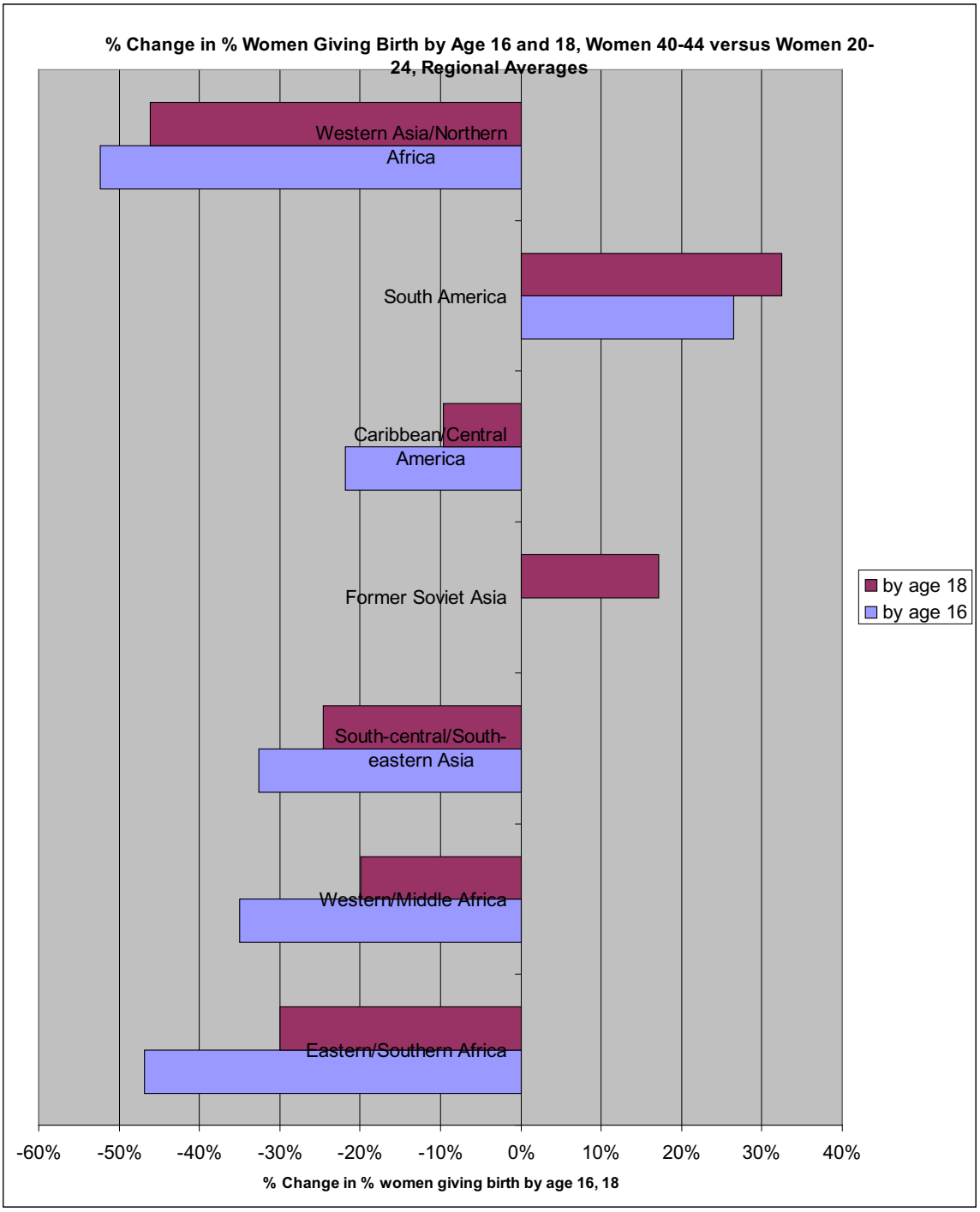
Source: (Macro International, 2008)

Figure 18: Change Over Time in Percentage of Women Giving Birth by Age 16, Women 40-44 versus Women 20-24



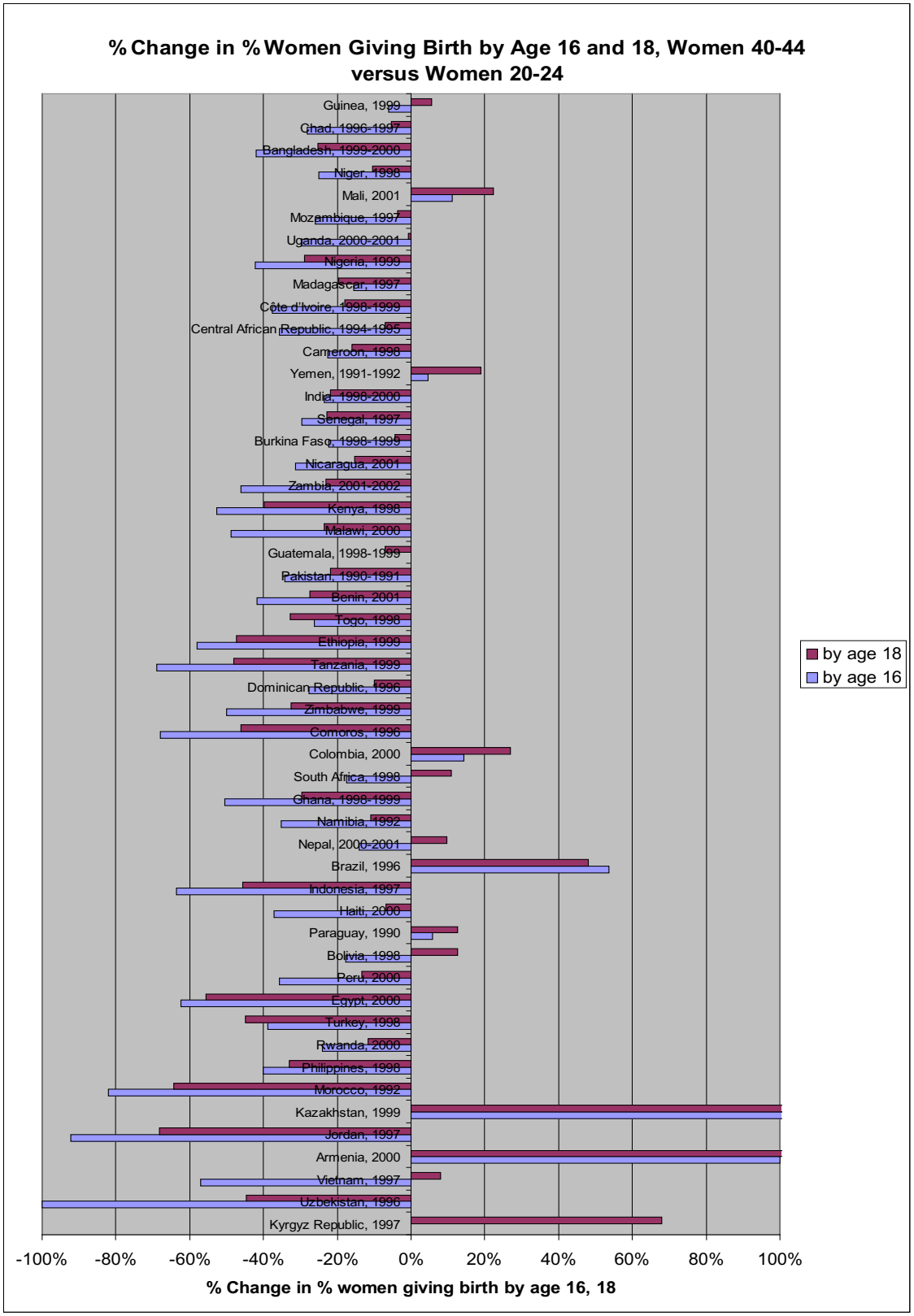
Source: (National Research Council & Institute of Medicine, 2005)

19: Regional Trends in Childbearing by Age 16 and by Age 18



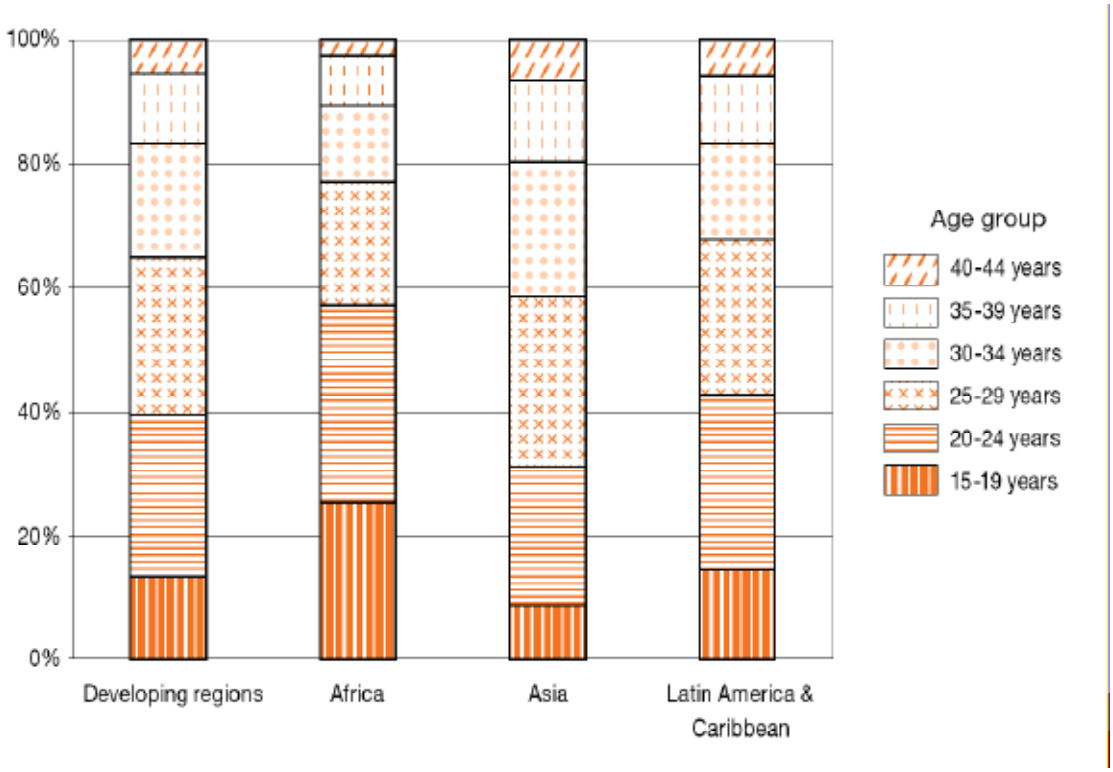
Source: (National Research Council & Institute of Medicine, 2005)

Figure 20: Country Trends in Childbearing by Age 16 and by Age 18



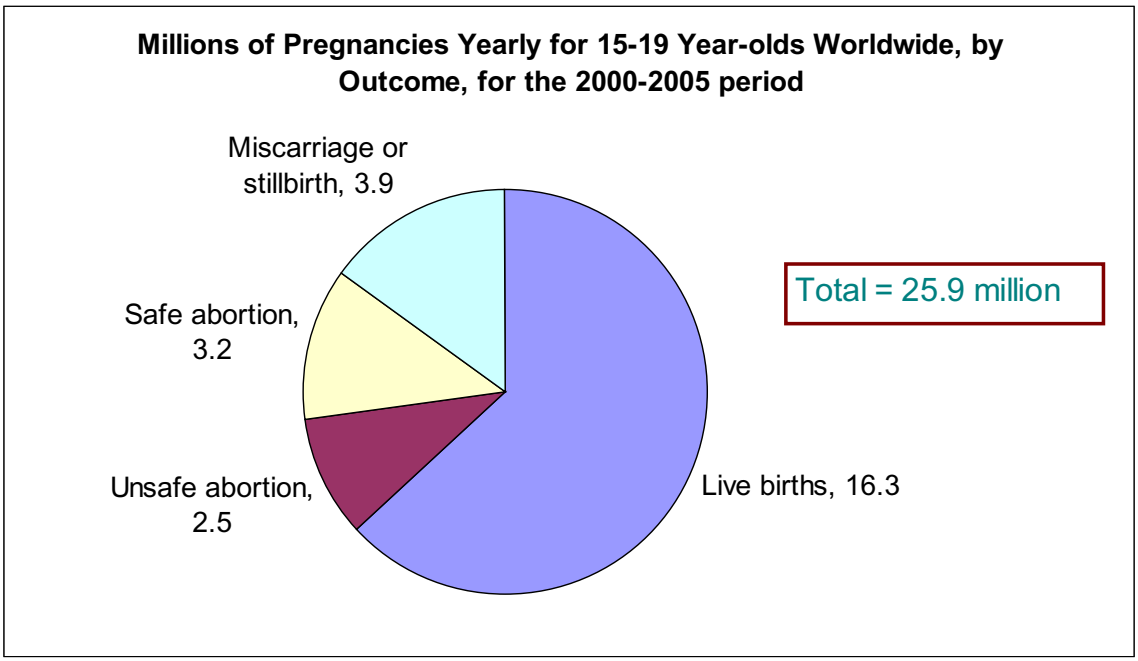
Source: (National Research Council & Institute of Medicine, 2005)

Figure 21: Percentage Distribution of Unsafe Abortion by Age Group and Region



Source: (World Health Organization, 2007c)

Figure 22: Number of Pregnancies Yearly for 15-19 Year-olds Worldwide, by Outcome, for the 2000-2005 Period



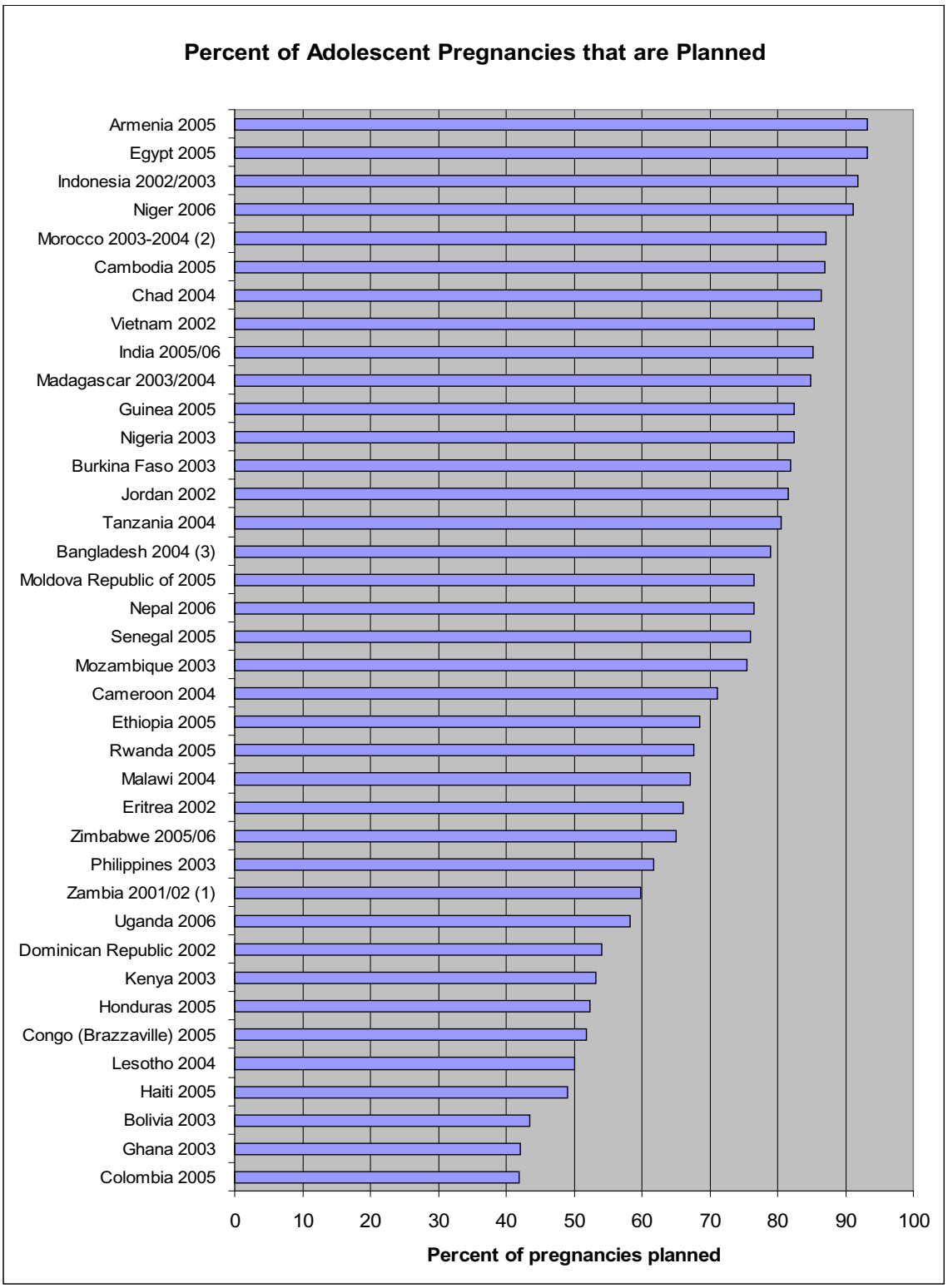
Sources:

Pregnancy outcomes: (World Health Organization, 2005a)

Unsafe abortion estimates: (World Health Organization, 2007c)

Live births: (Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, 2009)

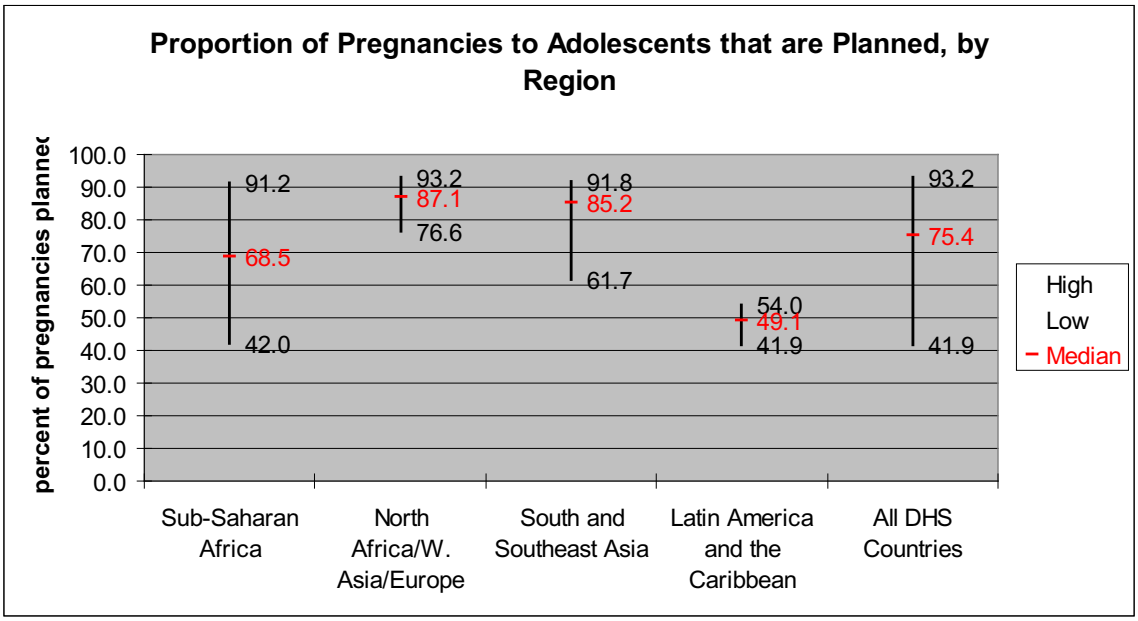
Figure 23: Proportion of Pregnancies to Women under 20 that are Planned, DHS Countries



Note: The surveys define "planned" as meaning that the mother wanted the pregnancy at the time she got pregnant.

Source: (Macro International, 2008)

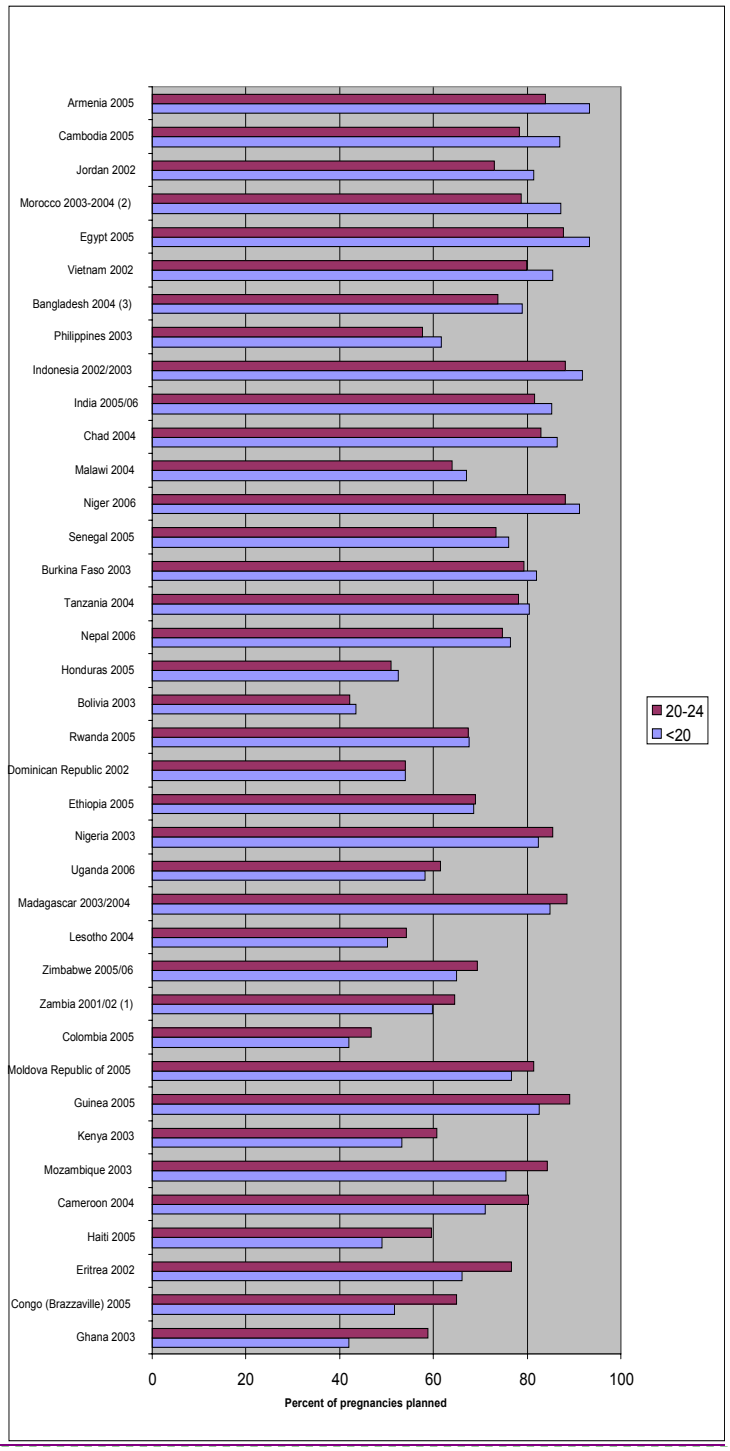
Figure 24: Proportion of Pregnancies to Women under 20 that are Planned, by Region



Note: The surveys define "planned" as meaning that the mother wanted the pregnancy at the time she got pregnant.

Source: (Macro International, 2008)

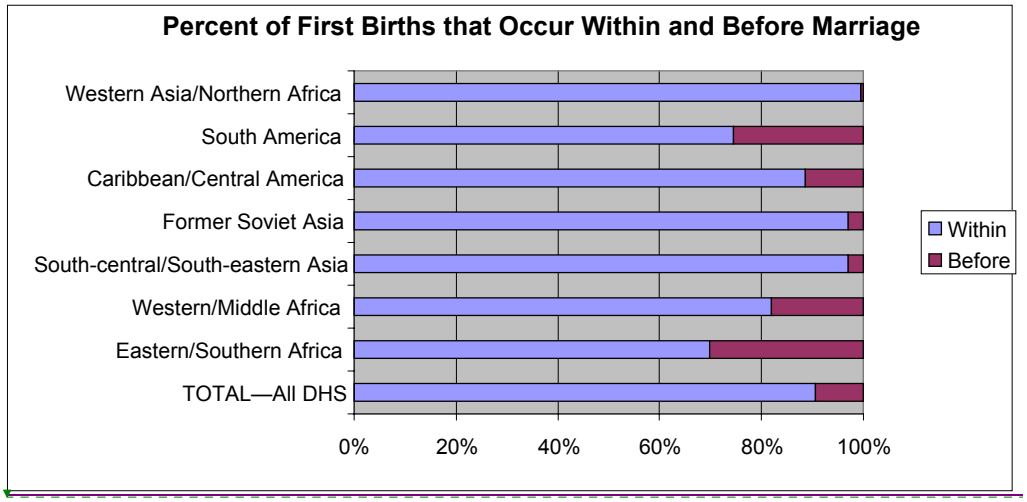
Figure 25: Proportion of Pregnancies that are planned, Women < 20 vs. Women 20-24



Note: The surveys define "planned" as meaning that the mother wanted the pregnancy at the time she got pregnant.

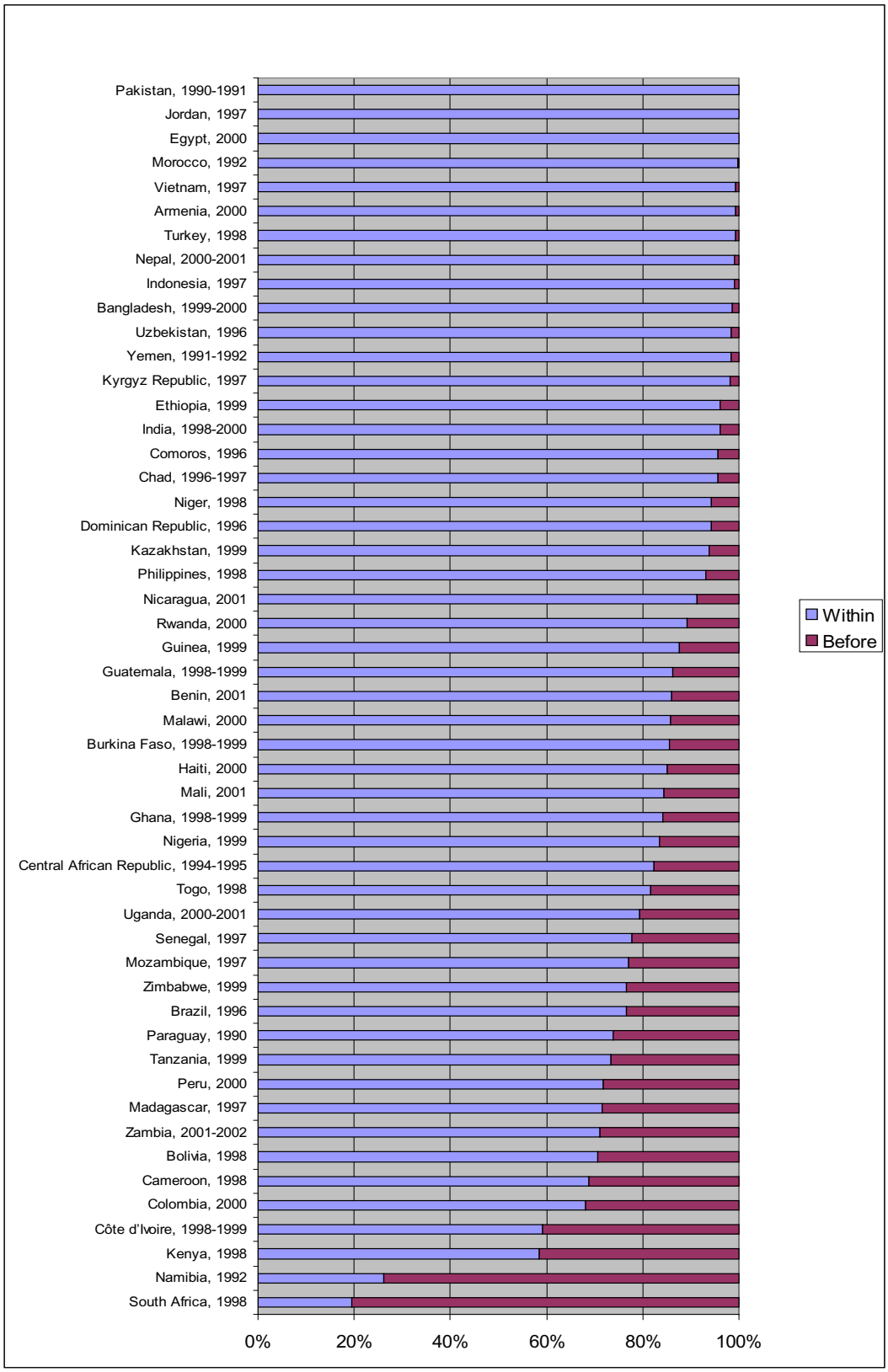
Source: (Macro International, 2008)

Figure 26: First Births to Women under 20 Within and Before Marriage, by Region



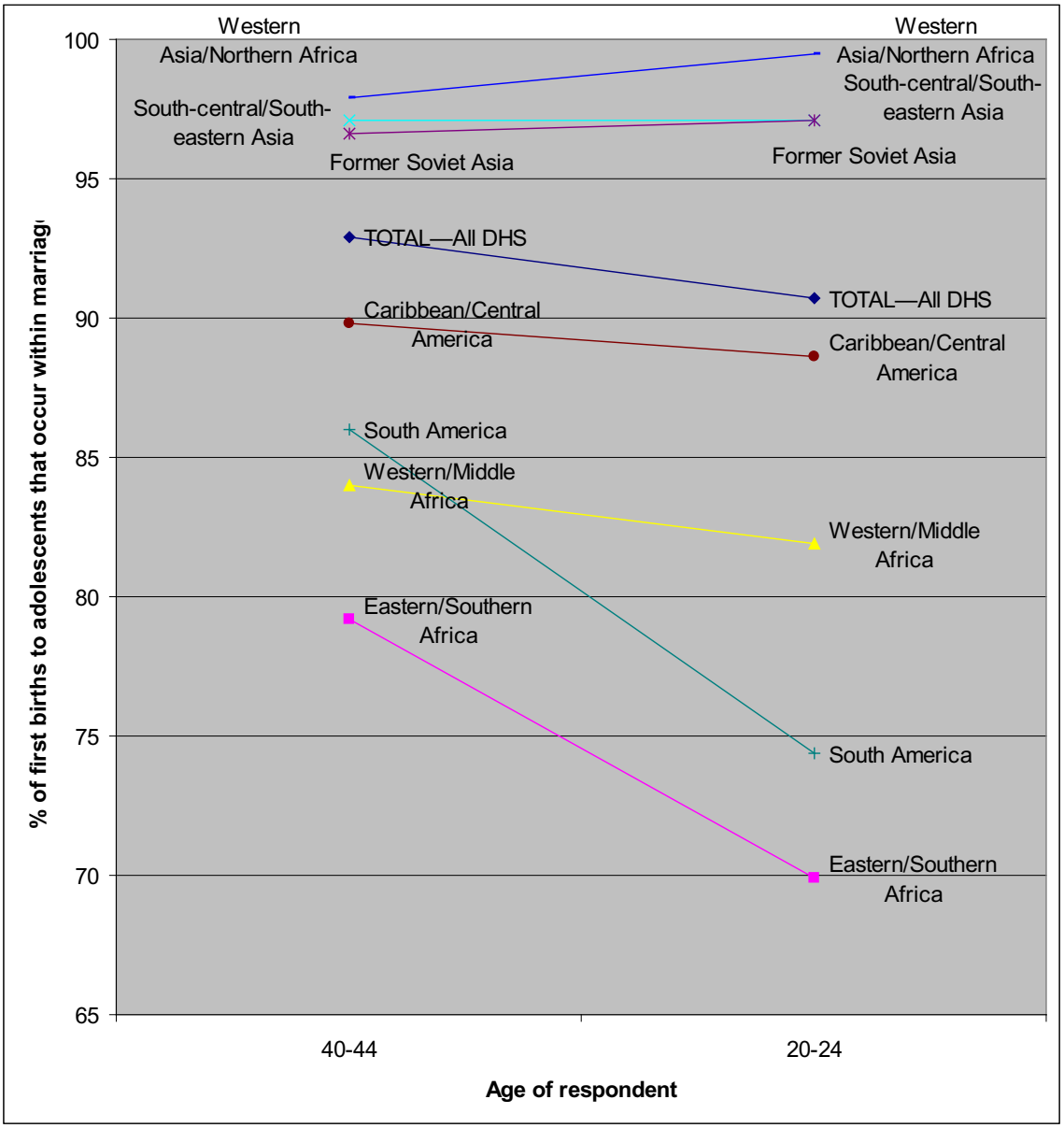
Source: (National Research Council & Institute of Medicine, 2005)

Figure 27: Births to Women under 20 Within and Before Marriage, by Country



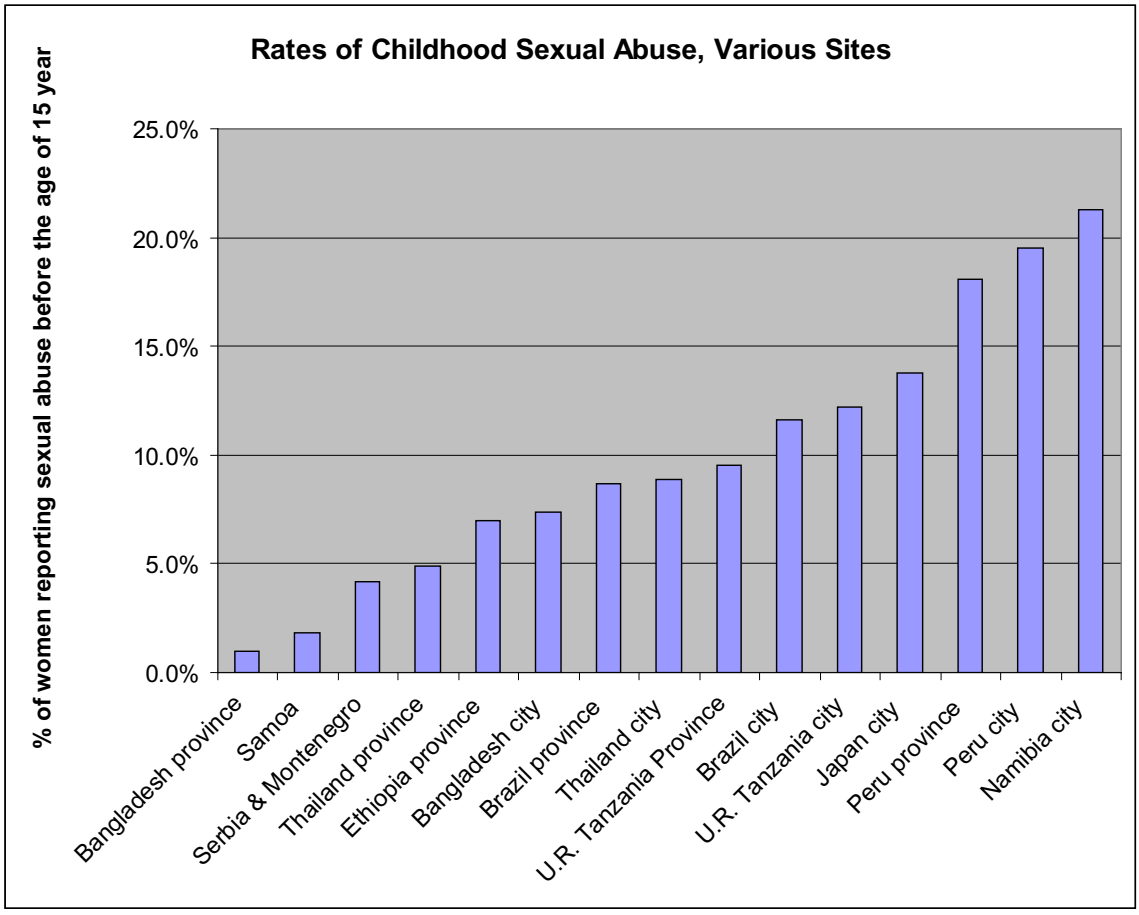
Source: (National Research Council & Institute of Medicine, 2005)

Figure 28: Trends in Percentage of First Births to Women < 20 that Occur Within Marriage, by Region, Women 40-44 years old compared to Women 20-24 years old



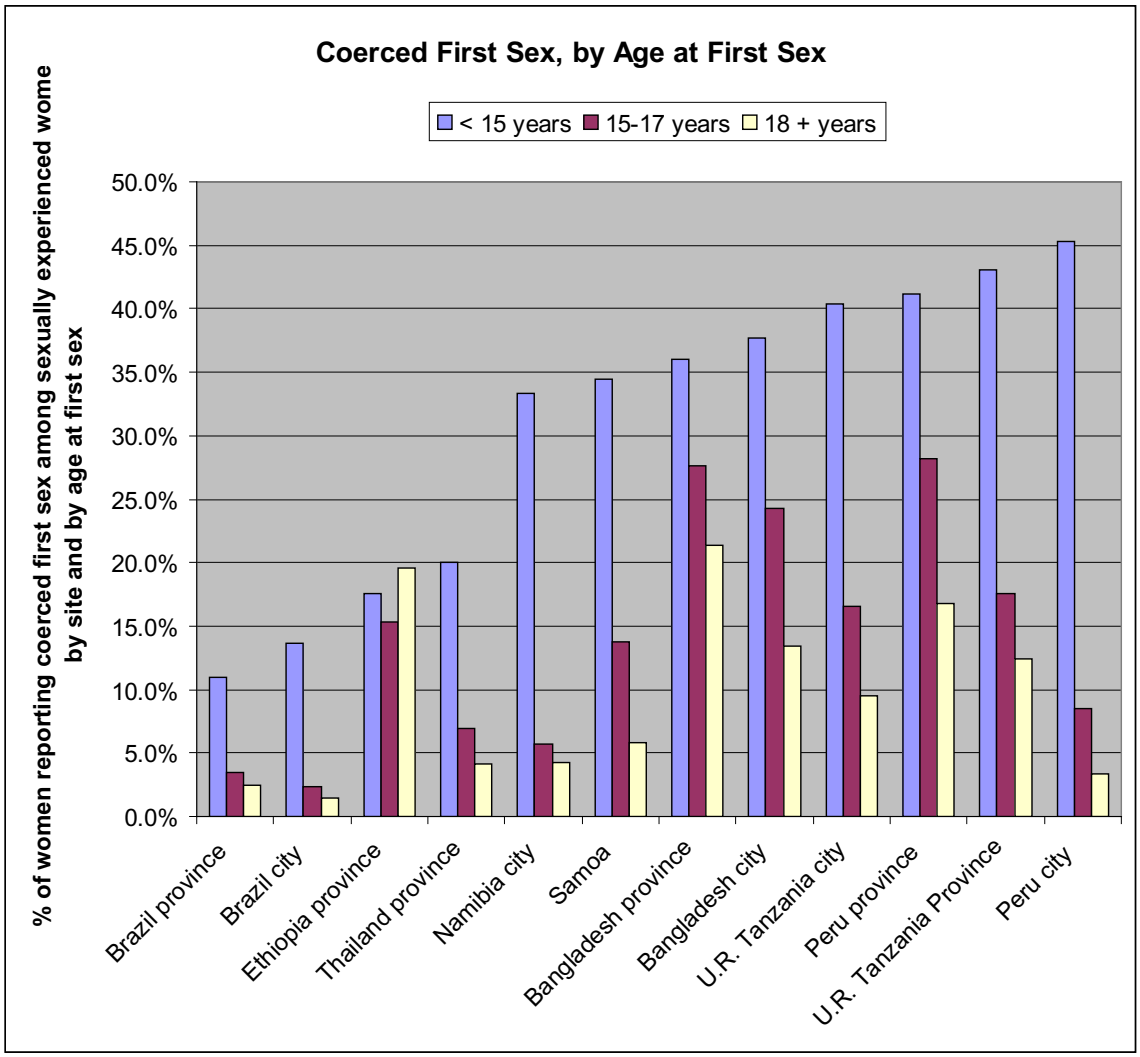
Source: (National Research Council & Institute of Medicine, 2005)

Figure 29: Rates of Childhood Sexual Abuse, Various Sites



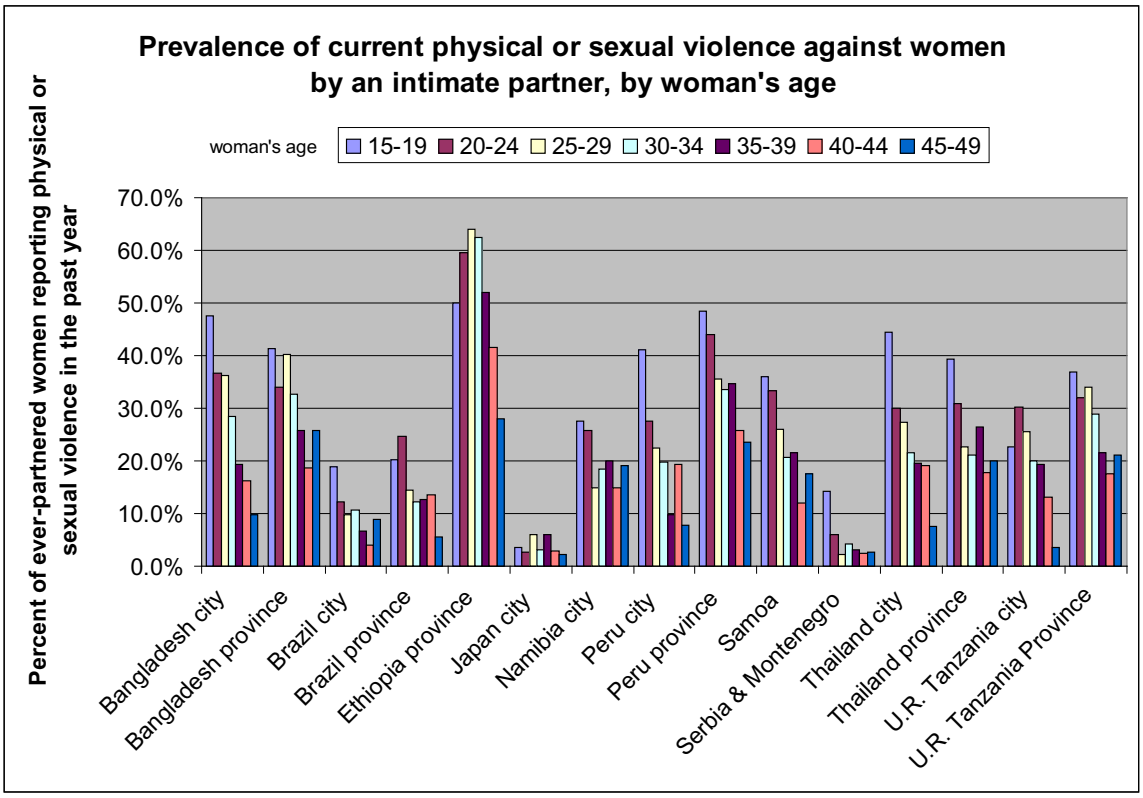
Source: (World Health Organization, 2005b)

Figure 30: Coerced First Sex by Age at First Sex



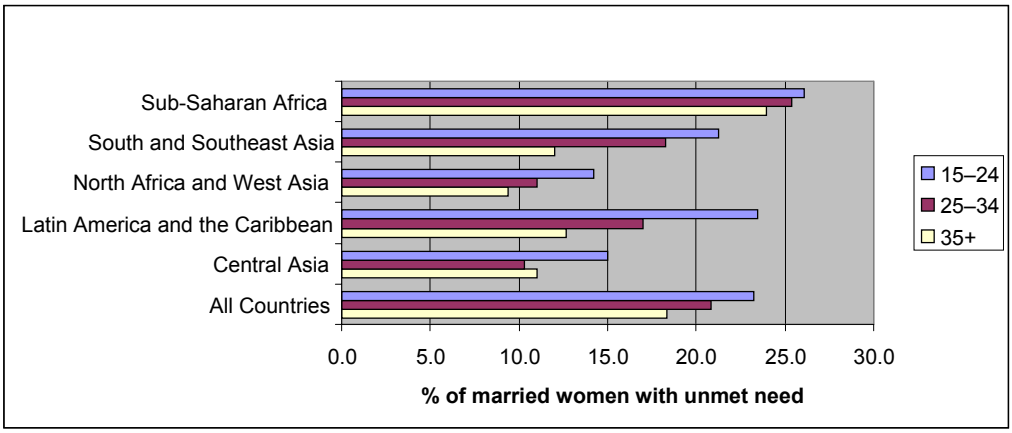
Source: (World Health Organization, 2005b)

Figure 31: Physical or Sexual Violence Against Women by an Intimate Partner, by Woman's Age



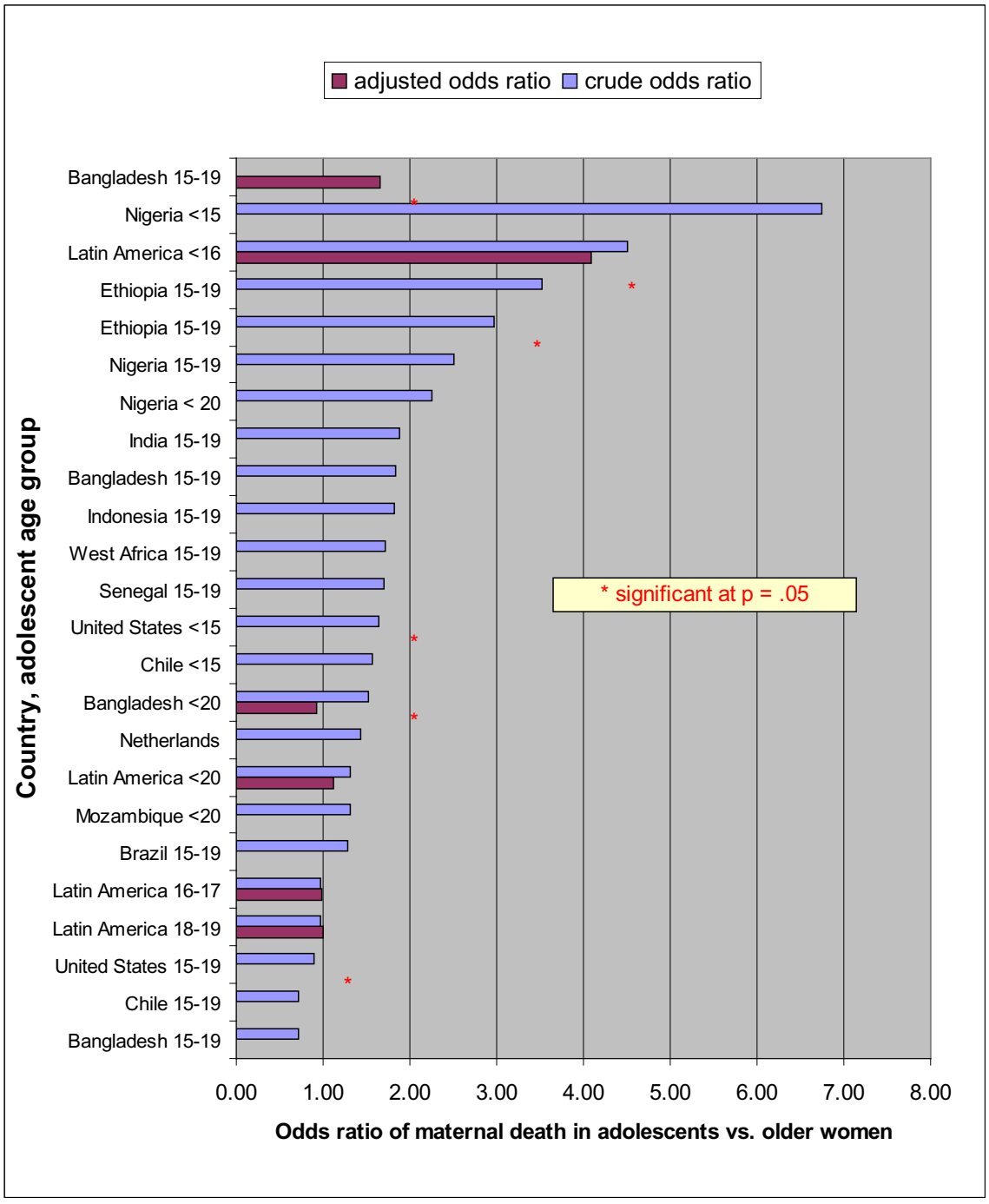
Source: (World Health Organization, 2005b)

Figure 32: Unmet Need for Contraceptive by Age Group and Region



Source: (Sedgh et al. 2007)

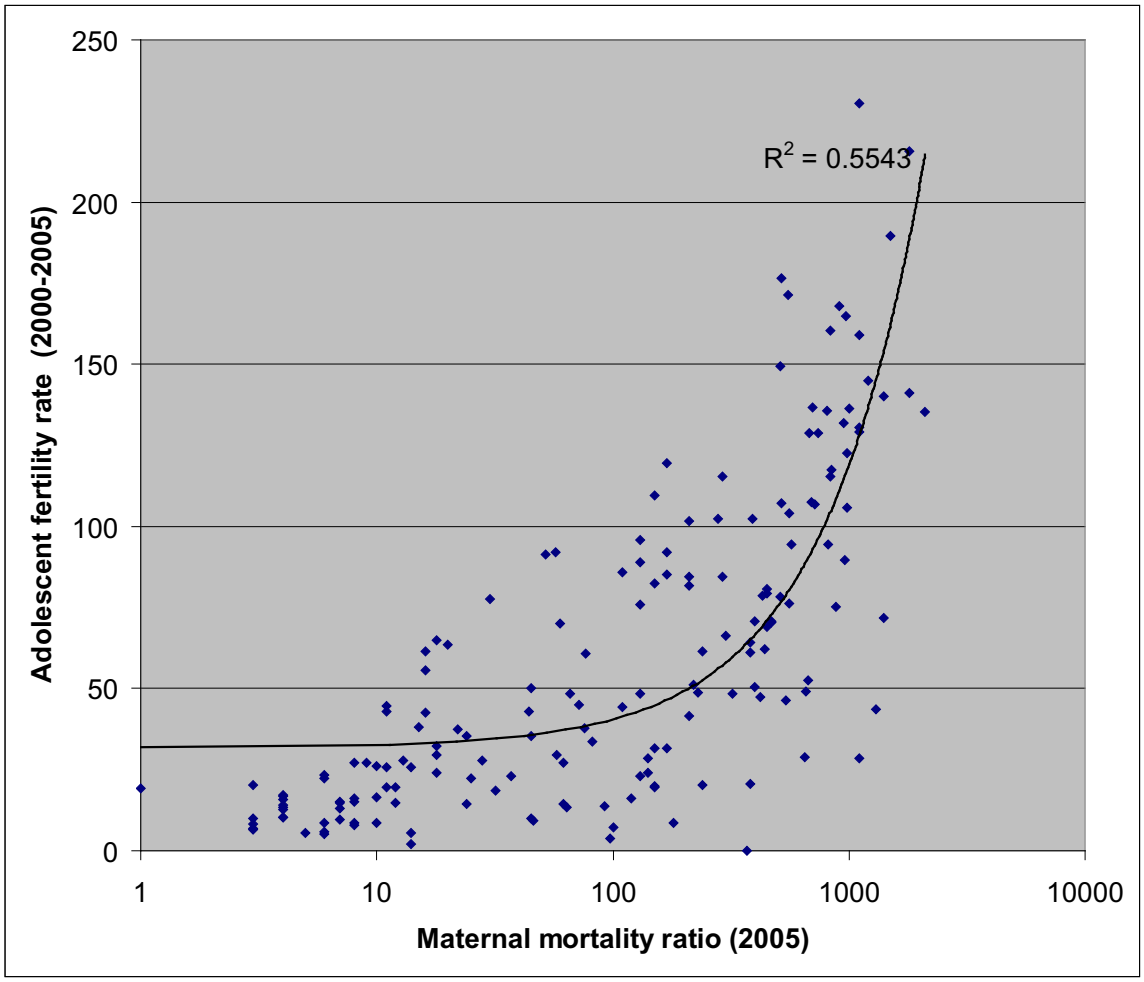
Figure 33: Risk of Maternal Death in Adolescents vs. Older Women [a]



[a] The reference age group of older women varies by study. See Appendix 2 for details

Source: Studies cited in Appendix 2.

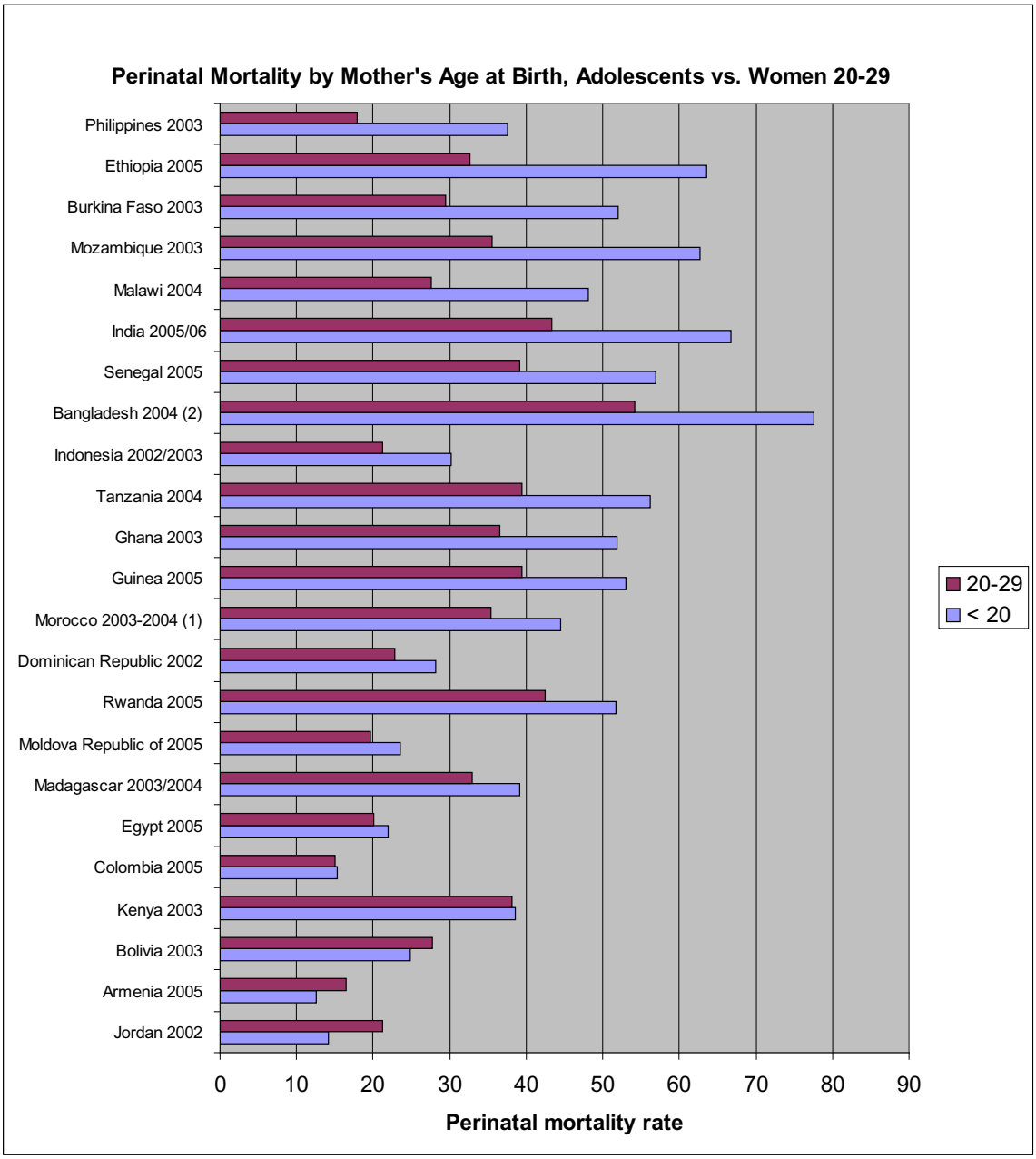
Figure 34: Correlation between Maternal Mortality Ratio and Fertility Rates of 15-19 year-olds, 171 Countries



Source: (Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, 2008; World Health Organization et al. 2007; World Health Organization MPS Department, 2005)

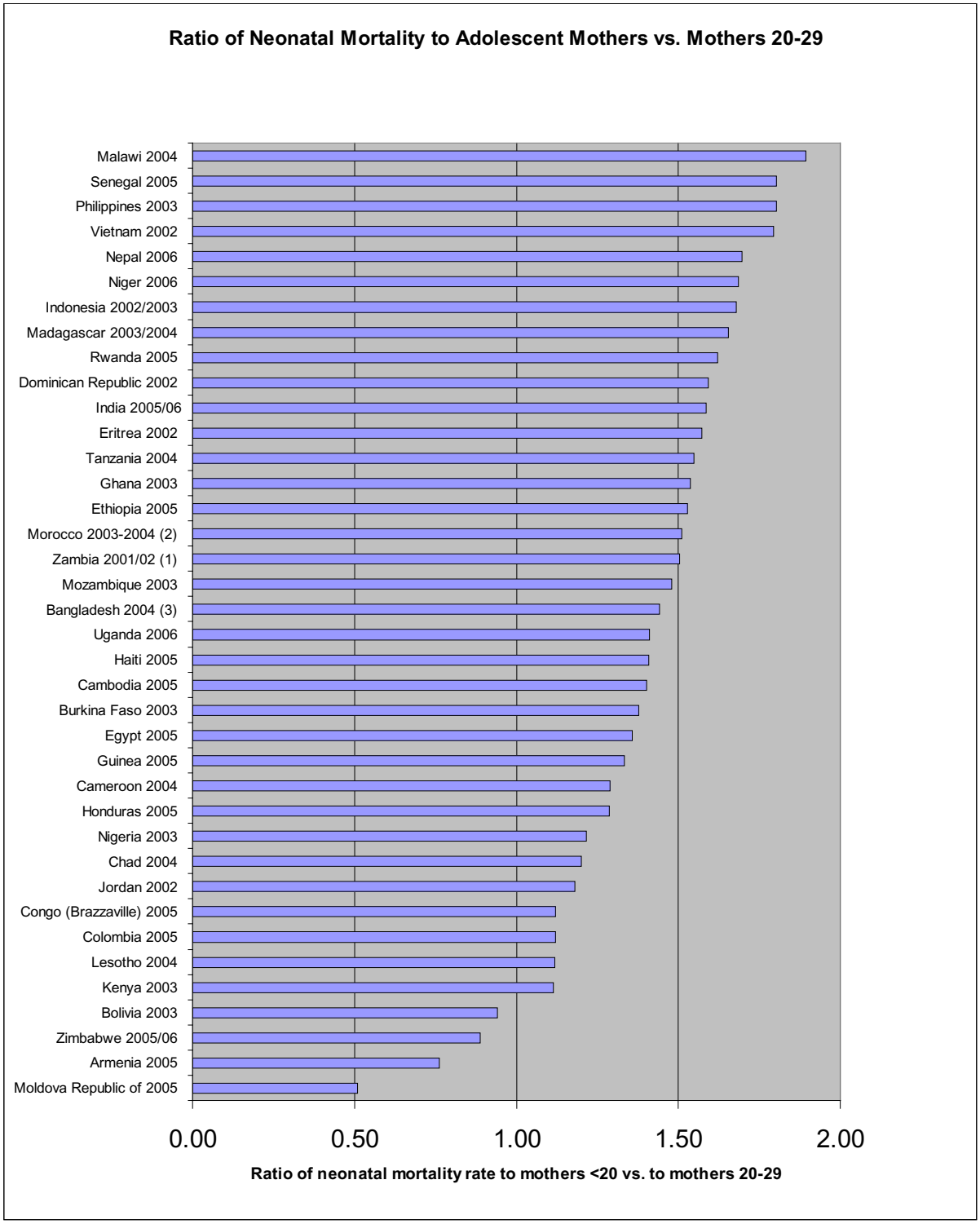
Note: Maternal mortality ratio is for all women of reproductive age

Figure 35: Perinatal Mortality, Adolescents under 20 versus Mothers 20-29



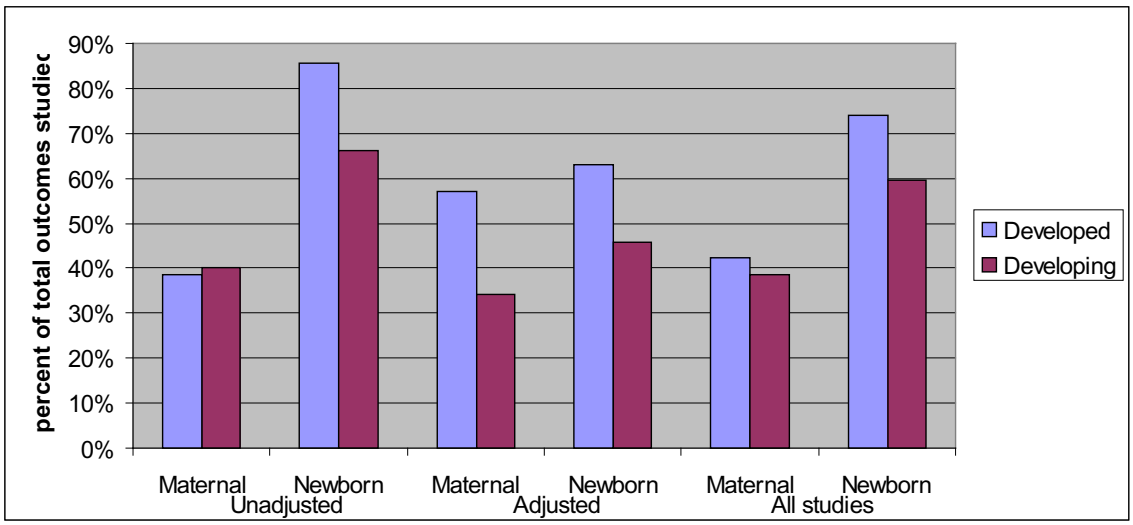
Source: (Macro International, 2008), (International Institute for Population Sciences (IIPS) & Macro International, 2007)

Figure 36: Neonatal Mortality by Mother's Age



Source: (Macro International, 2008), (International Institute for Population Sciences (IIPS) & Macro International, 2007)

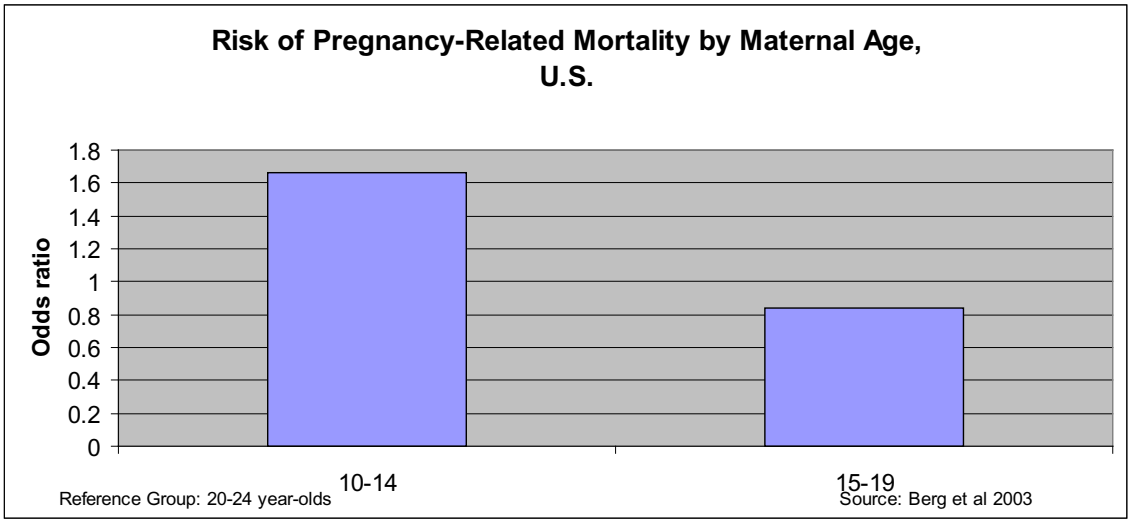
Figure 37: Percent of Studies Finding Higher Risk of Adverse Health Outcomes in Adolescent versus Older Mothers, Developed versus Developing Countries

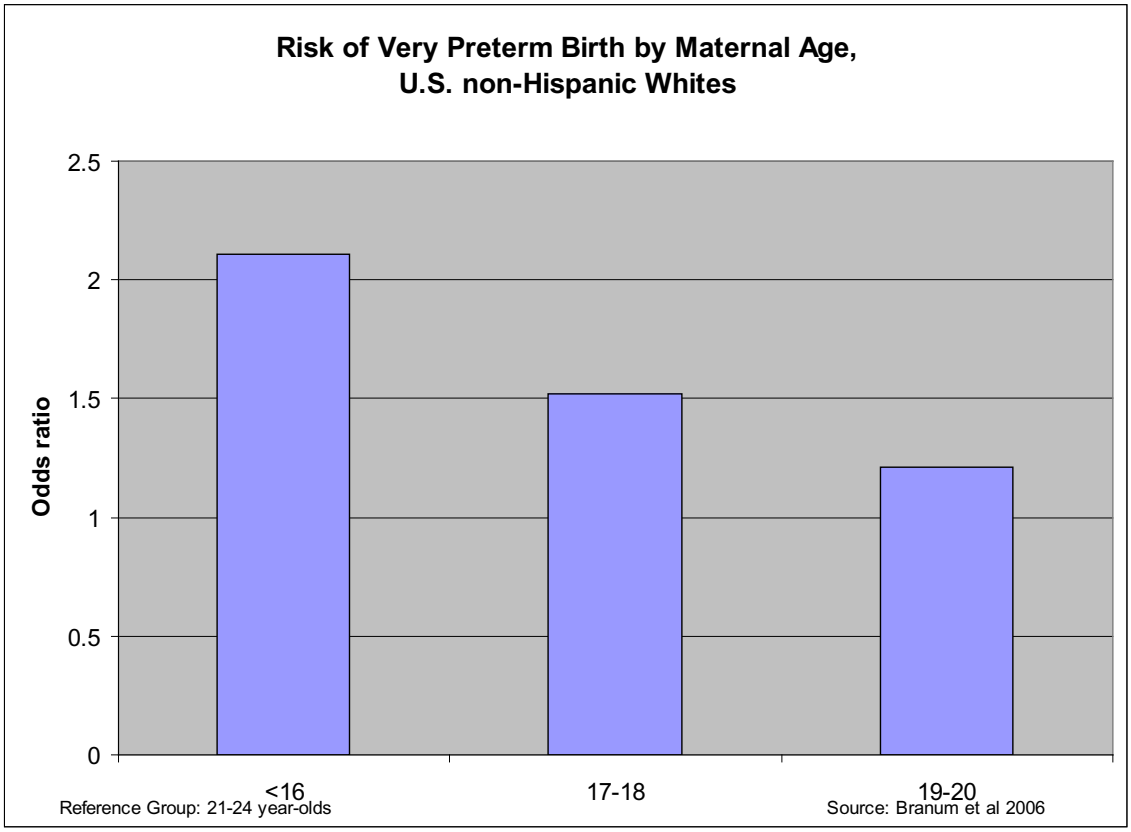


Source: The author, from studies cited in Appendix 3

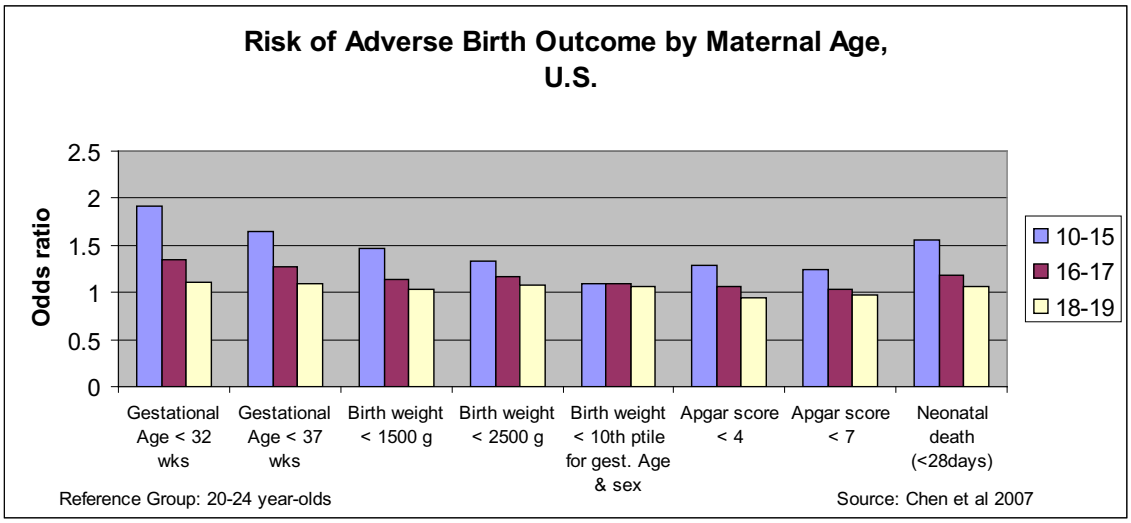
Note: Adolescent age group and reference age group of older women varies by study

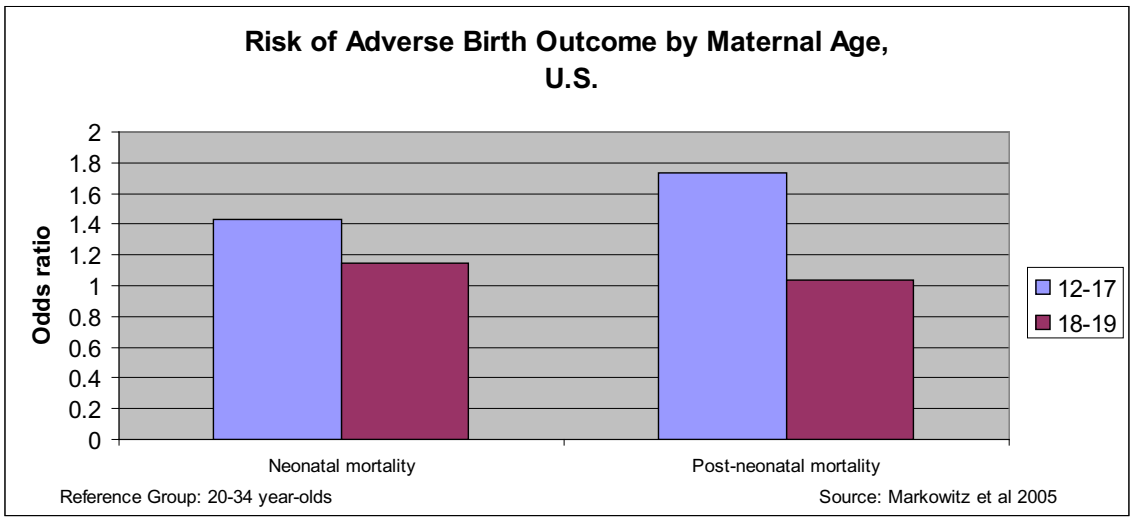
Figure 38: Health Risks in Adolescents versus Older Women, by Age of Adolescent Mother, Various Studies

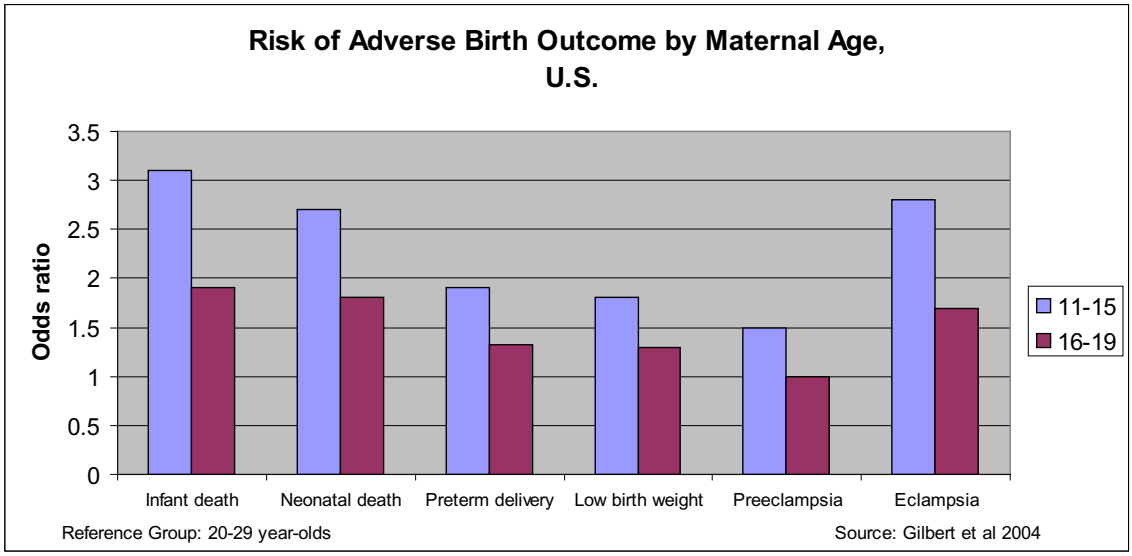


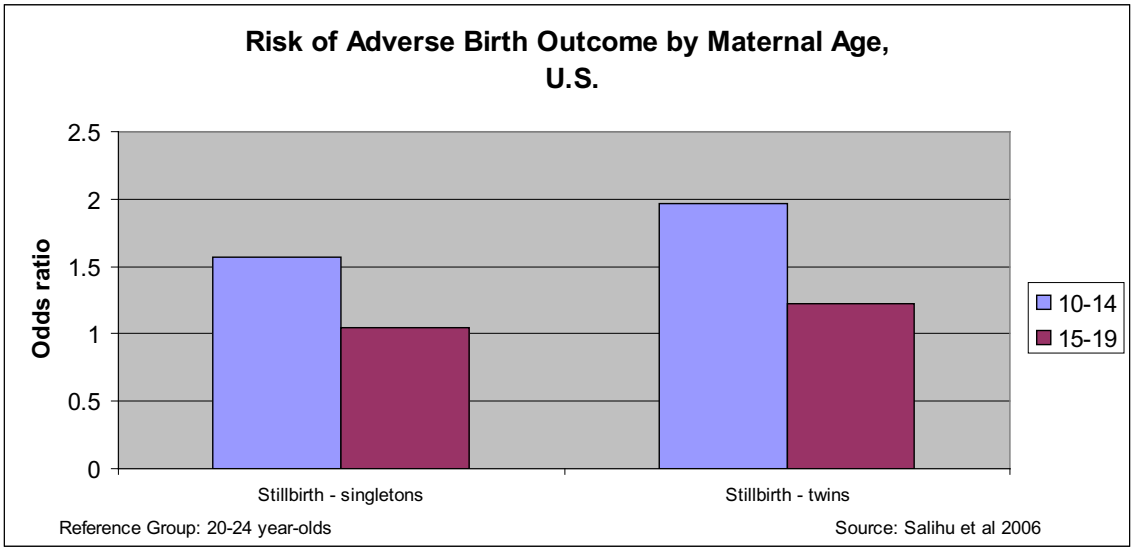


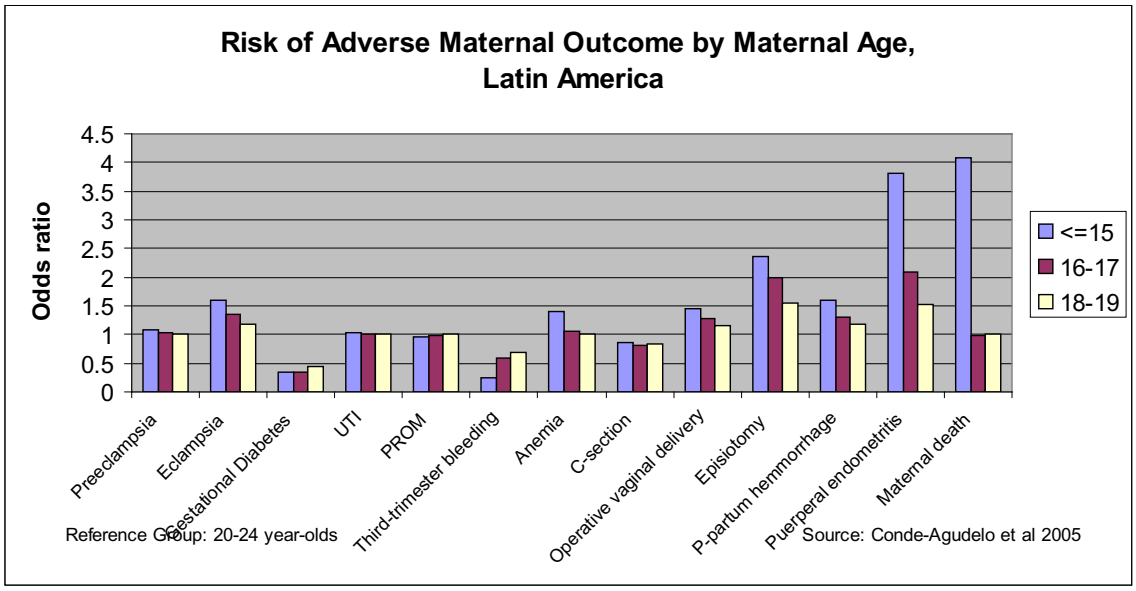
17 Reference age group of older women varies by study. See Appendix 3.

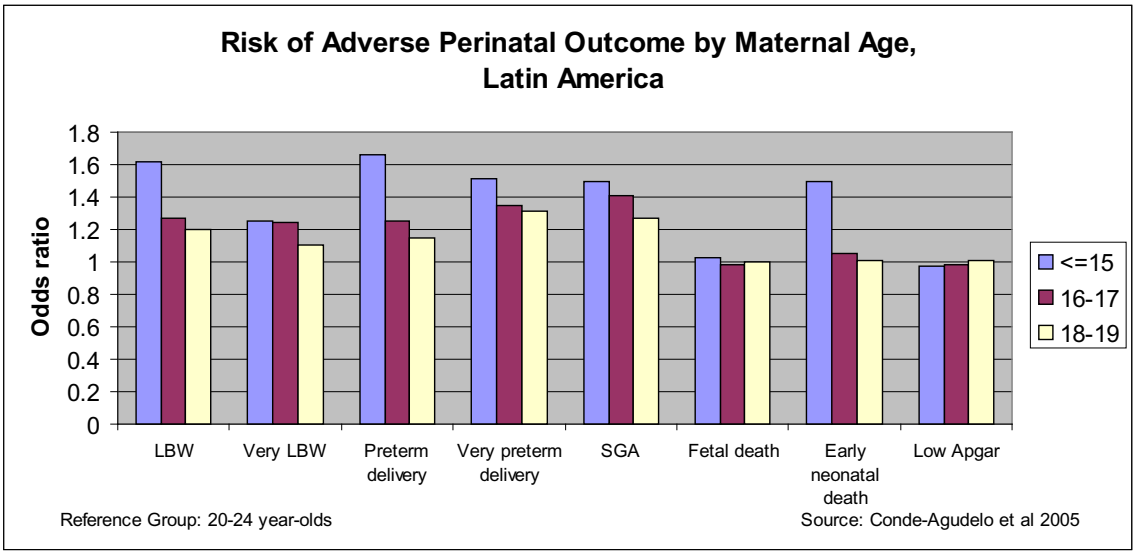

Risk of Adverse Birth Outcome by Maternal Age, U.S.
Odds ratio
2.5
2
1.5
1
0.5
0
Gestational Age < 32 wks
Gestational Age < 37 wks
Birth weight < 1500 g
Birth weight < 2500 g
Birth weight < 10th ptile for gest. Age & sex
Apgar score < 4
Apgar score < 7
Neonatal death (<28days)
10-15
16-17
18-19
Reference Group: 20-24 year-olds
Source: Chen et al 2007

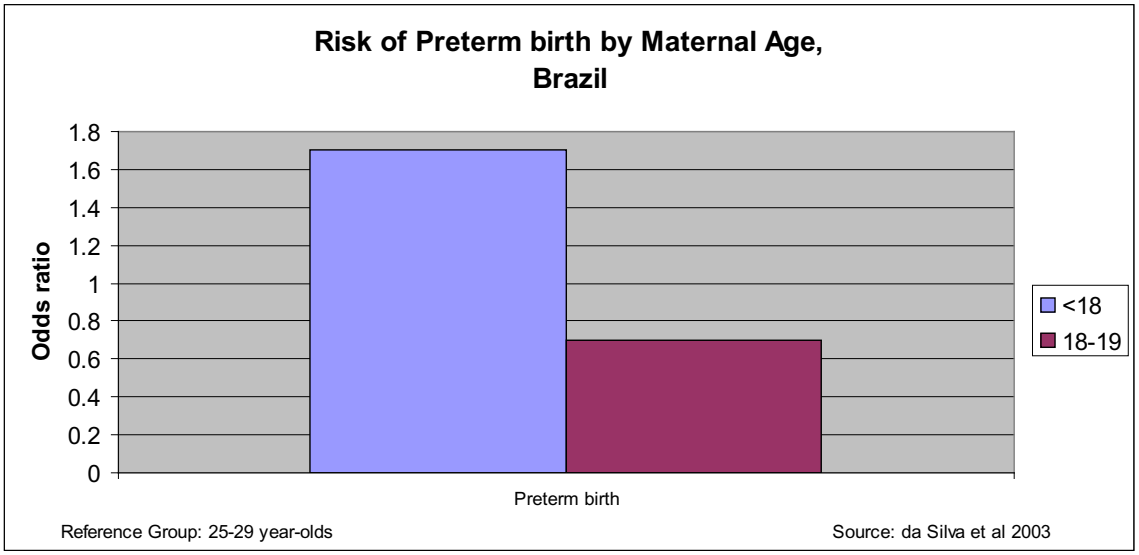

Risk of Adverse Birth Outcome by Maternal Age, U.S.
Odds ratio
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Neonatal mortality
Post-neonatal mortality
12-17
18-19
Reference Group: 20-34 year-olds
Source: Markowitz et al 2005

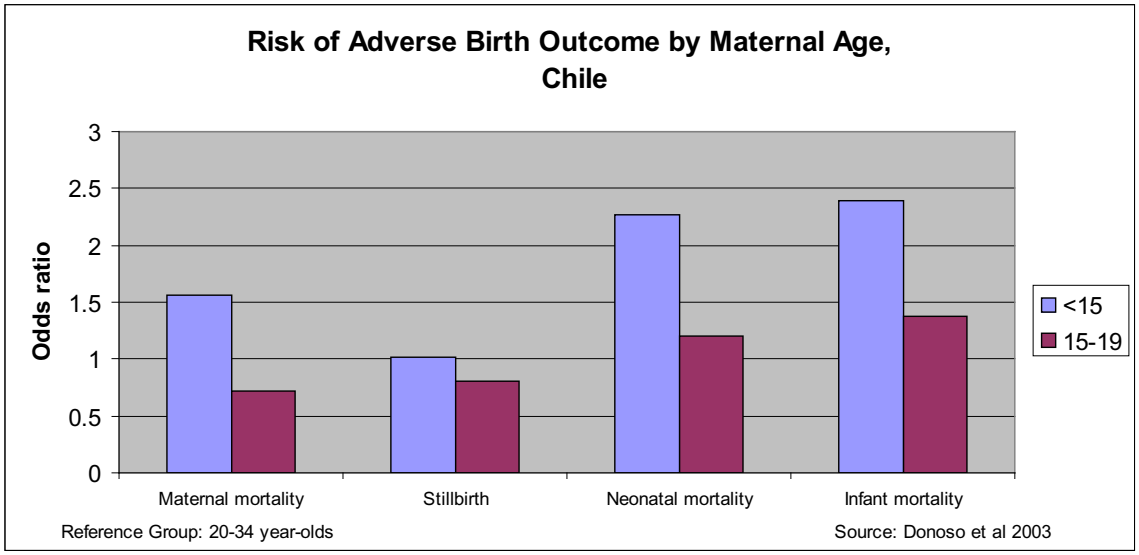

Risk of Adverse Birth Outcome by Maternal Age, U.S.
Odds ratio
3.5
3
2.5
2
1.5
1
0.5
0
Infant death
Neonatal death
Preterm delivery
Low birth weight
Preeclampsia
Eclampsia
11-15
16-19
Reference Group: 20-29 year-olds
Source: Gilbert et al 2004

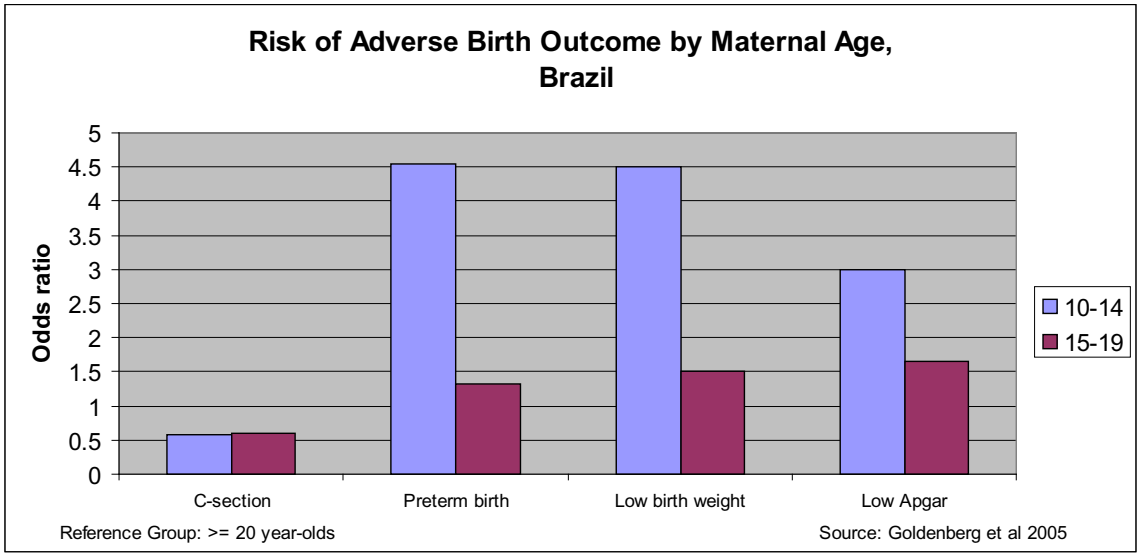

Risk of Adverse Birth Outcome by Maternal Age, U.S.
Odds ratio
2.5
2
1.5
1
0.5
0
Stillbirth - singletons
Stillbirth - twins
10-14
15-19
Reference Group: 20-24 year-olds
Source: Salihu et al 2006

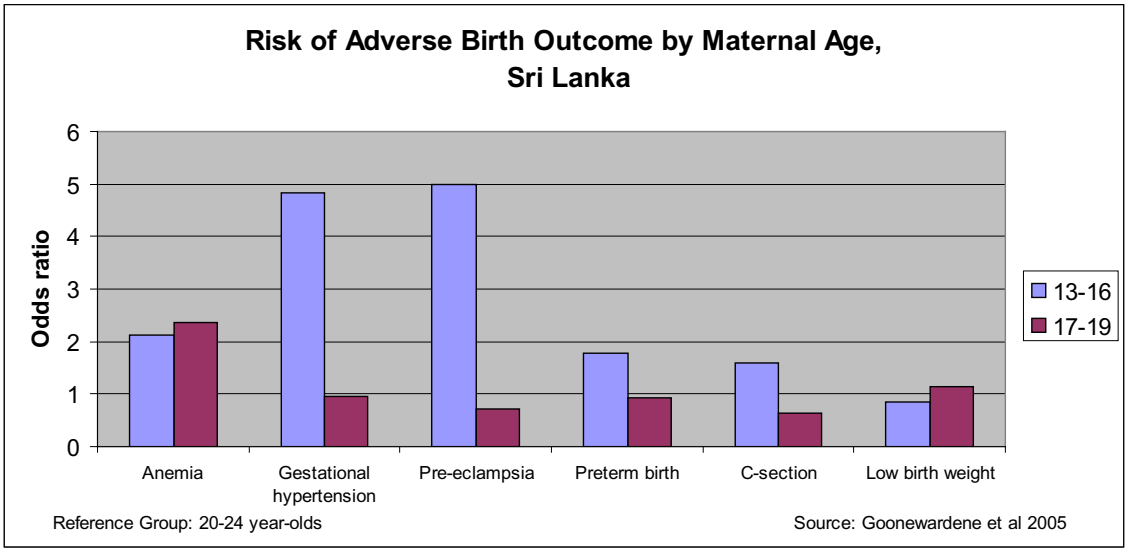

Risk of Adverse Maternal Outcome by Maternal Age, Latin America
Odds ratio
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Preeclampsia
Eclampsia
Gestational Diabetes
UTI
PROM
Third-trimester bleeding
Anemia
C-section
Operative vaginal delivery
Episiotomy
P-partum hemmorrhage
Puerperal endometritis
Maternal death
<=15
16-17
18-19
Reference Group: 20-24 year-olds
Source: Conde-Agudelo et al 2005

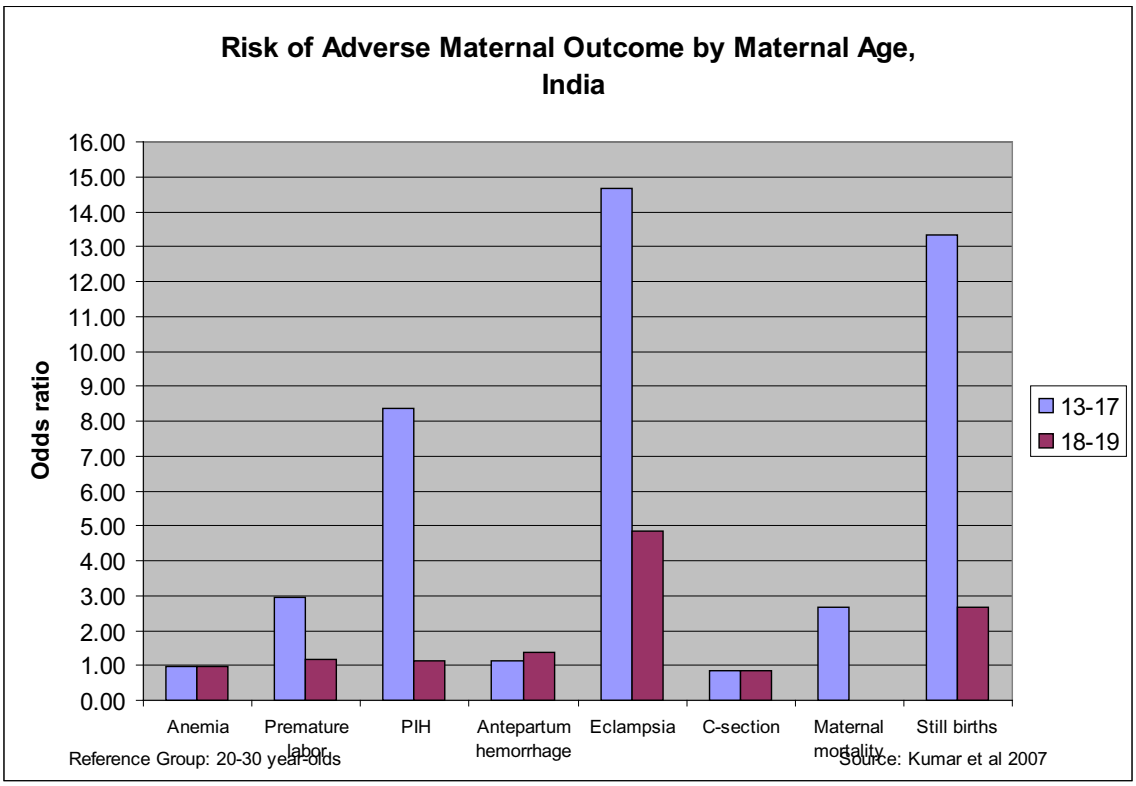

Risk of Adverse Perinatal Outcome by Maternal Age, Latin America
Odds ratio
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
LBW
Very LBW
Preterm delivery
Very preterm delivery
SGA
Fetal death
Early neonatal death
Low Apgar
<=15
16-17
18-19
Reference Group: 20-24 year-olds
Source: Conde-Agudelo et al 2005

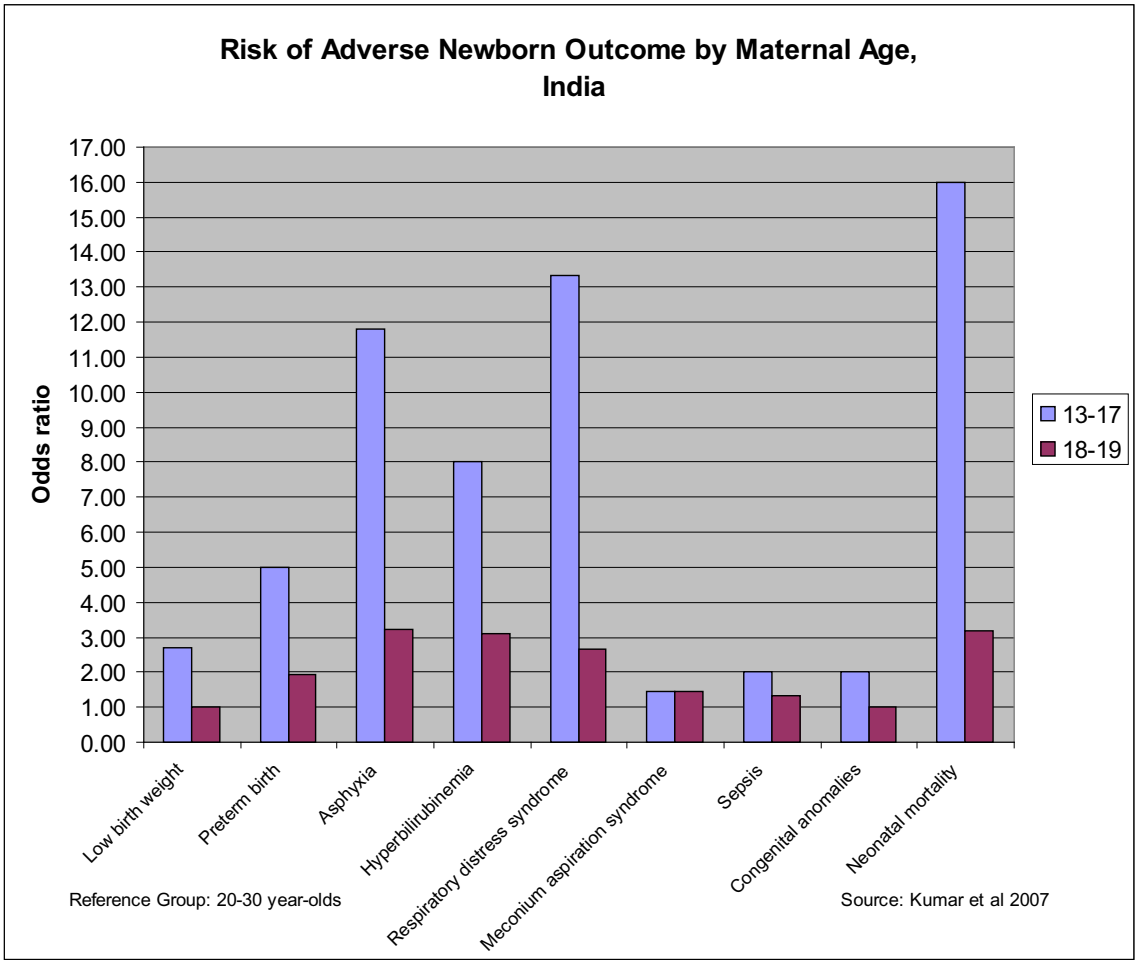

Risk of Preterm birth by Maternal Age, Brazil
Odds ratio
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Preterm birth
<18
18-19
Reference Group: 25-29 year-olds
Source: da Silva et al 2003

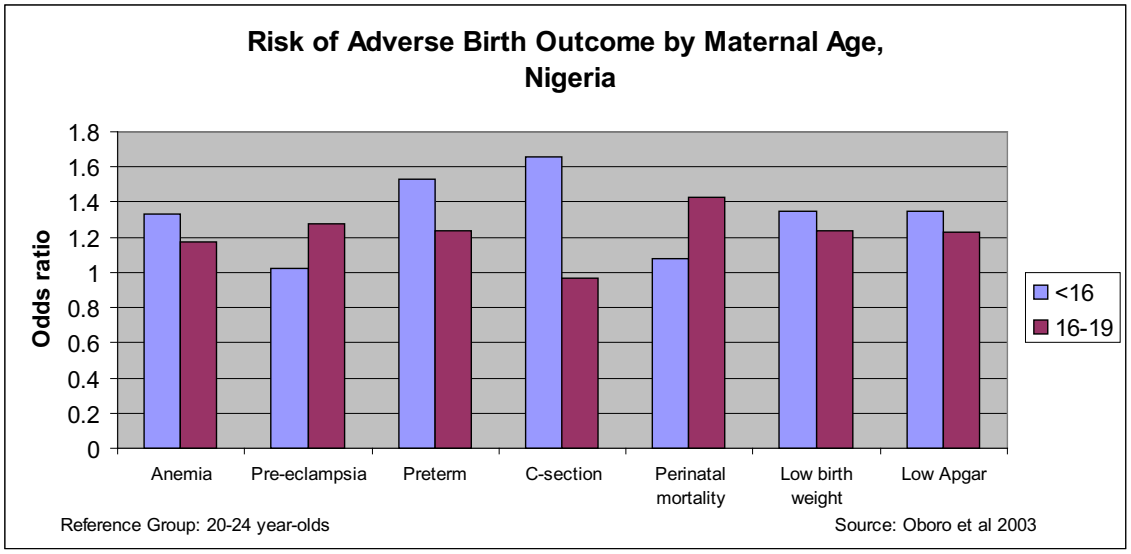

Risk of Adverse Birth Outcome by Maternal Age, Chile
Odds ratio
3
2.5
2
1.5
1
0.5
0
Maternal mortality
Stillbirth
Neonatal mortality
Infant mortality
<15
15-19
Reference Group: 20-34 year-olds
Source: Donoso et al 2003


Risk of Adverse Birth Outcome by Maternal Age, Brazil
Odds ratio
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
C-section
Preterm birth
Low birth weight
Low Apgar
10-14
15-19
Reference Group: >= 20 year-olds
Source: Goldenberg et al 2005


Risk of Adverse Birth Outcome by Maternal Age, Sri Lanka
Odds ratio
0
1
2
3
4
5
6
Anemia
Gestational hypertension
Pre-eclampsia
Preterm birth
C-section
Low birth weight
13-16
17-19
Reference Group: 20-24 year-olds
Source: Goonewardene et al 2005


Risk of Adverse Maternal Outcome by Maternal Age, India
Odds ratio
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
10.00
11.00
12.00
13.00
14.00
15.00
16.00
Anemia
Premature labor
PIH
Antepartum hemorrhage
Eclampsia
C-section
Maternal mortality
Still births
13-17
18-19
Reference Group: 20-30 year-olds
Source: Kumar et al 2007


Risk of Adverse Newborn Outcome by Maternal Age, India
Odds ratio
17.00
16.00
15.00
14.00
13.00
12.00
11.00
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
13-17
18-19
Low birth weight
Preterm birth
Asphyxia
Hyperbilirubinemia
Respiratory distress syndrome
Meconium aspiration syndrome
Sepsis
Congenital anomalies
Neonatal mortality
Reference Group: 20-30 year-olds
Source: Kumar et al 2007


Risk of Adverse Birth Outcome by Maternal Age, Nigeria
Odds ratio
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
<16
16-19
Anemia
Pre-eclampsia
Preterm
C-section
Perinatal mortality
Low birth weight
Low Apgar
Reference Group: 20-24 year-olds
Source: Oboro et al 2003

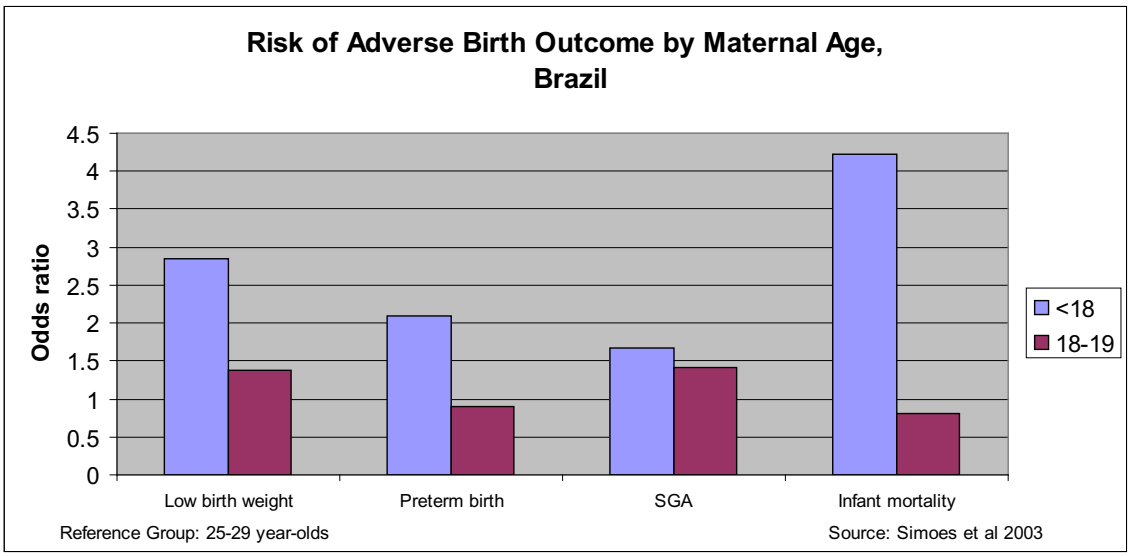
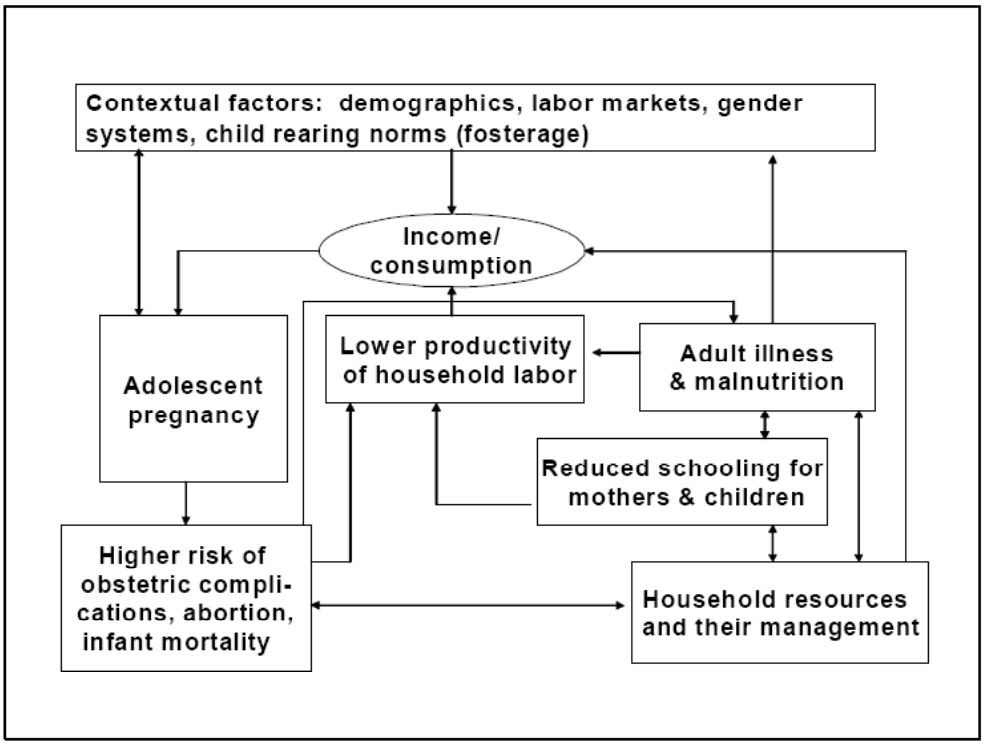


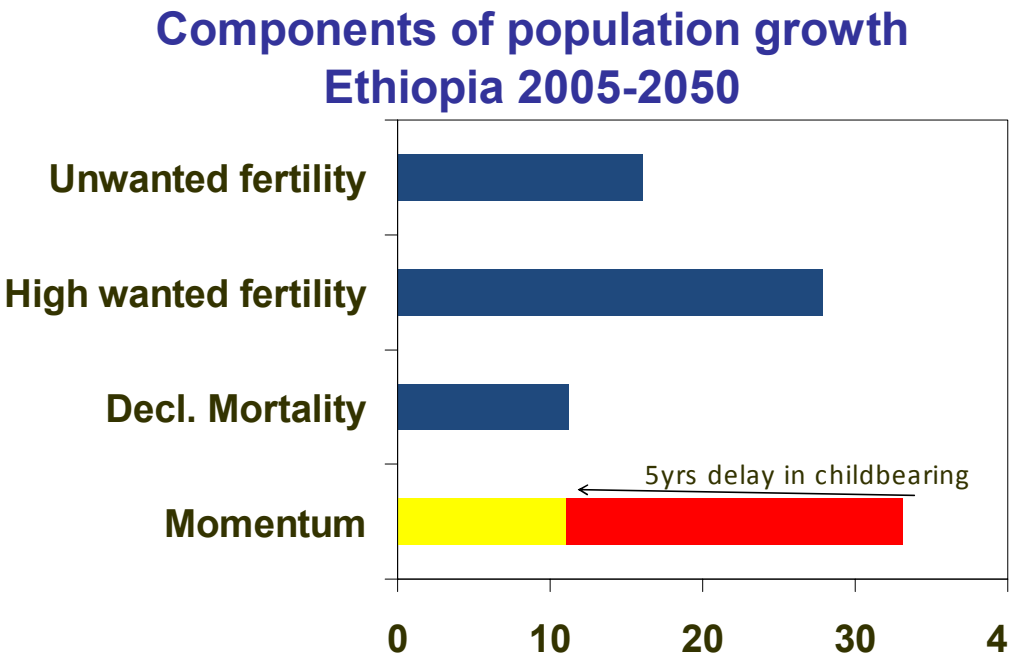
Figure 39: Channels Linking Early Pregnancy and Childbearing to Poverty

Figure 2: Channels linking early pregnancy and childbearing to poverty



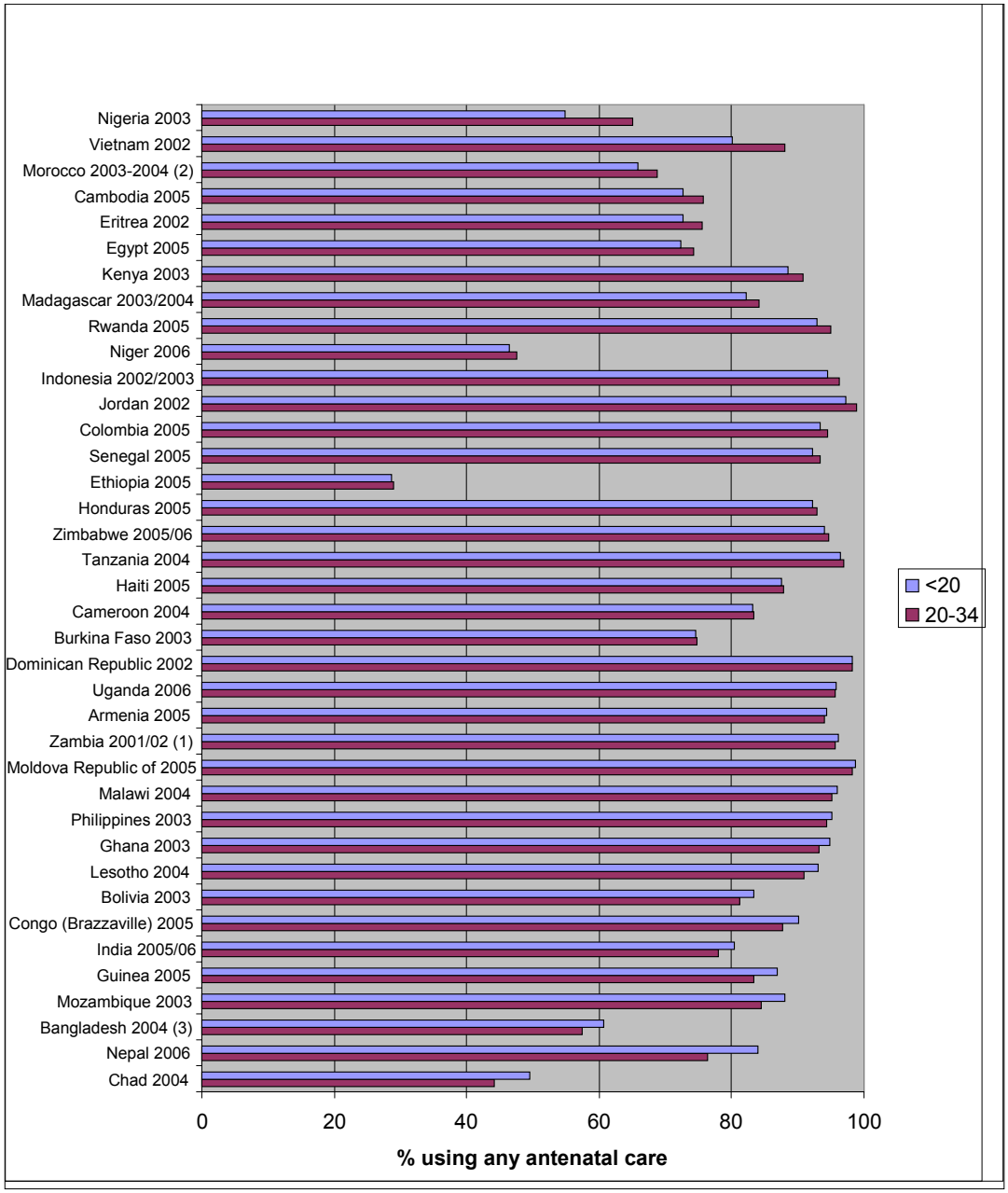
Source: (Greene & Merrick, 2005)

Figure 40: Impact of Childbearing Delay on Population Growth, Ethiopia



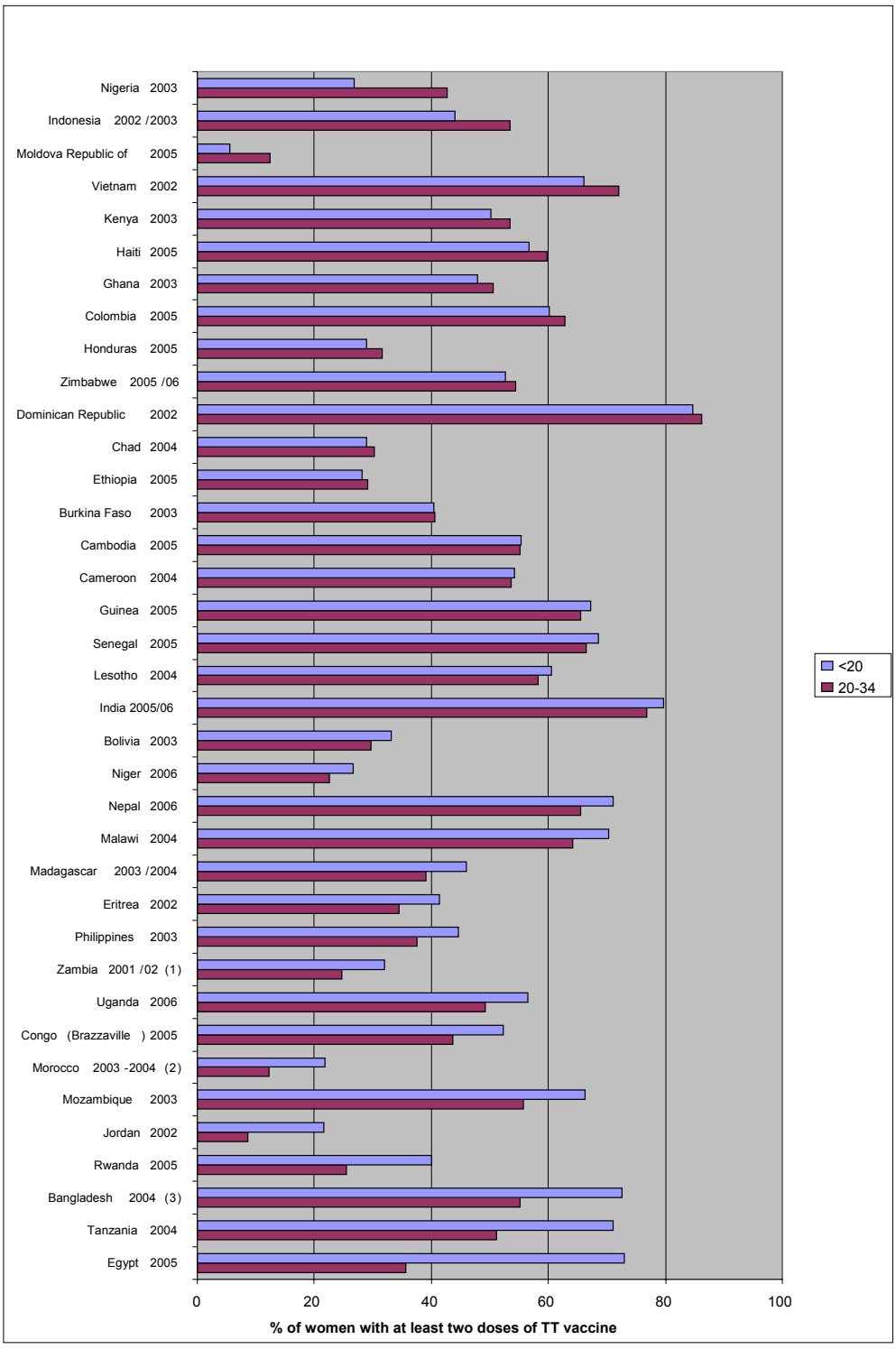
Source: United Nations 2005

Figure 41: Use of Antenatal Care, Women under 20 vs. Women 20-34



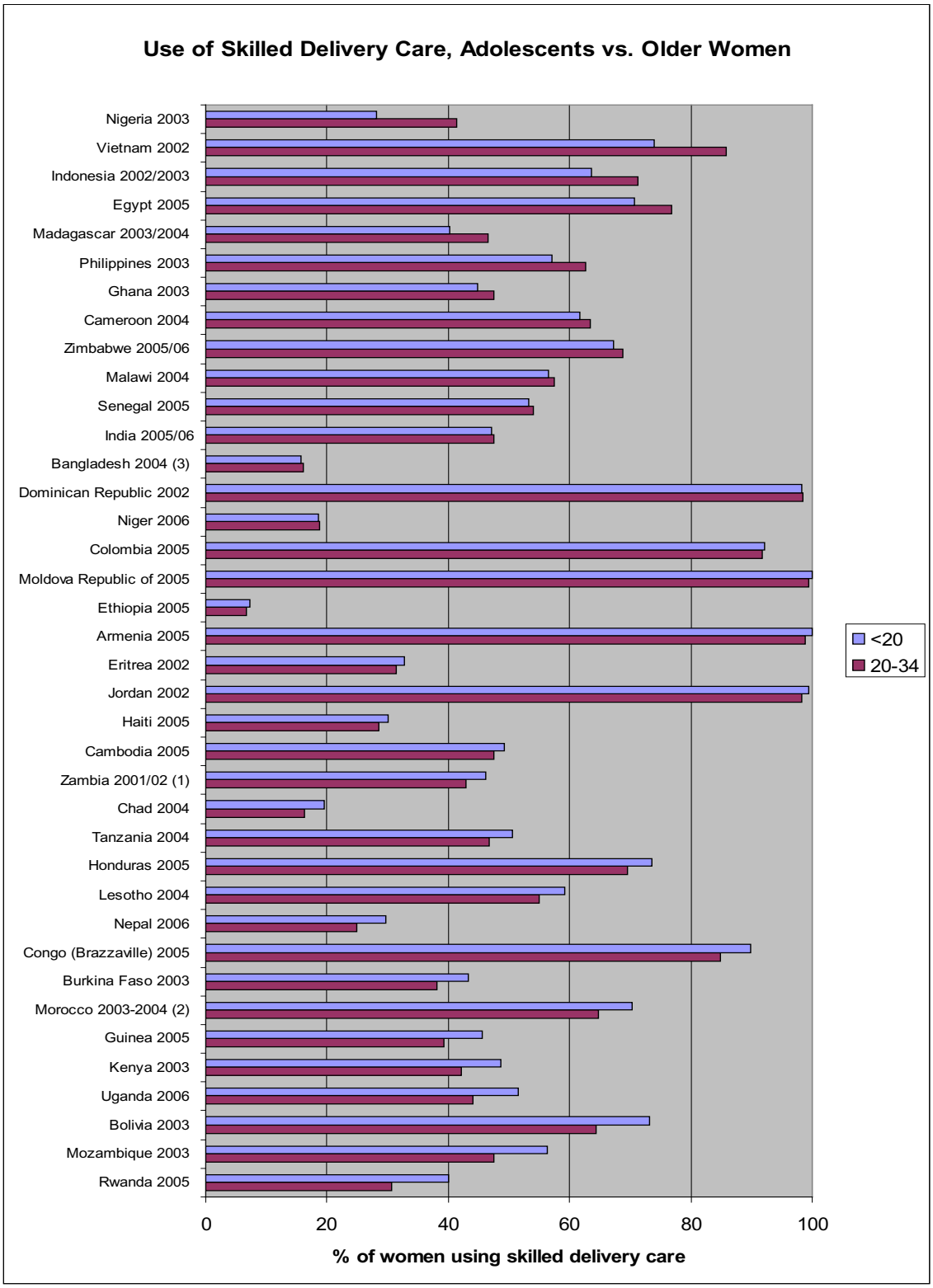
Source: (Macro International, 2008), (International Institute for Population Sciences (IIPS) & Macro International, 2007)

Figure 42: Use of Tetanus Toxoid Vaccine, Women under 20 vs. Women 20-34



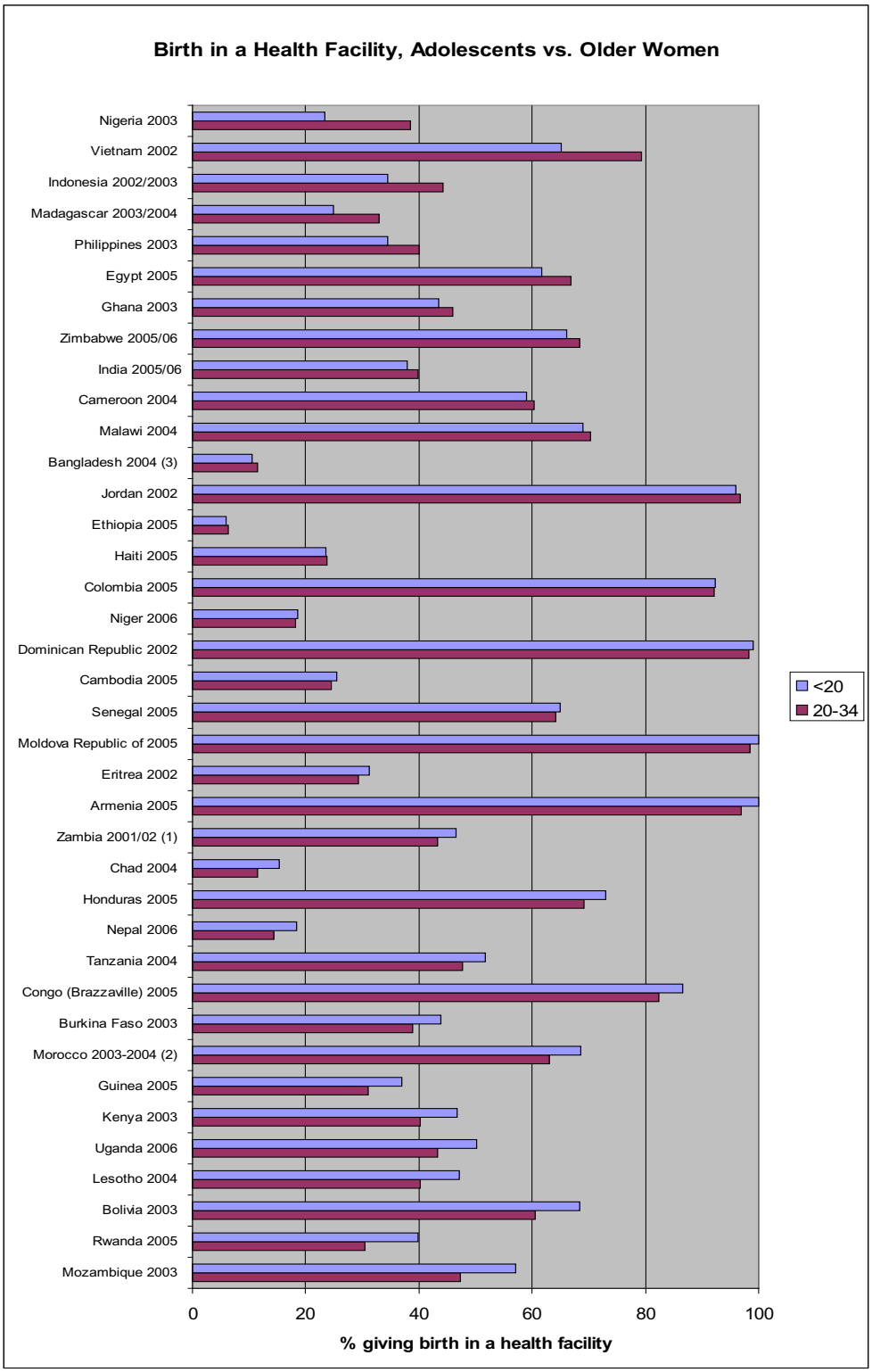
Source: (Macro International, 2008), (International Institute for Population Sciences (IIPS) & Macro International, 2007)

Figure 43: Use of Skilled Delivery Care, Women under 20 vs. Women 20-3



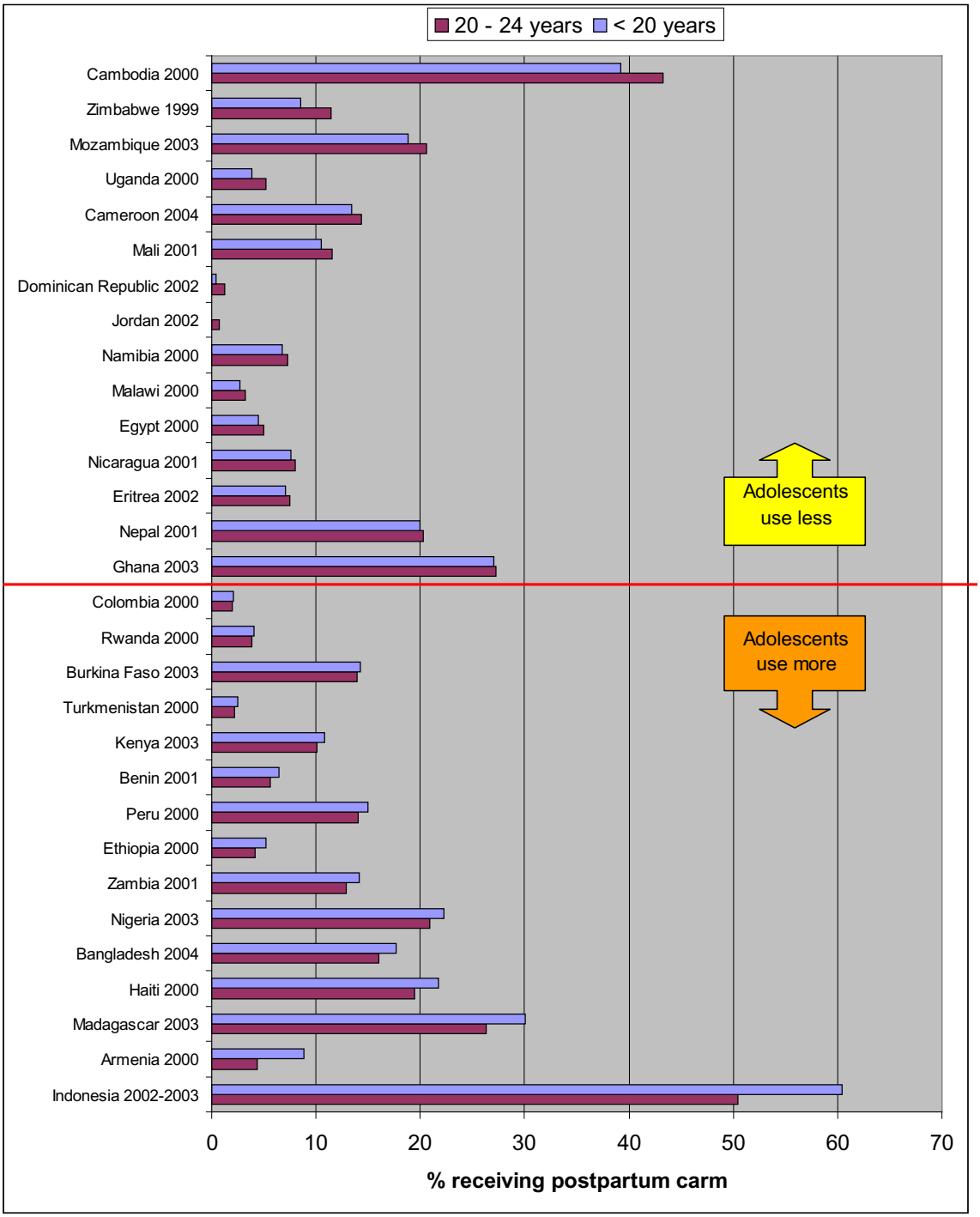
Source: (Macro International, 2008), (International Institute for Population Sciences (IIPS) & Macro International, 2007)

Figure 44: Birth in a Health Facility, Women under 20 vs. Women 20-34



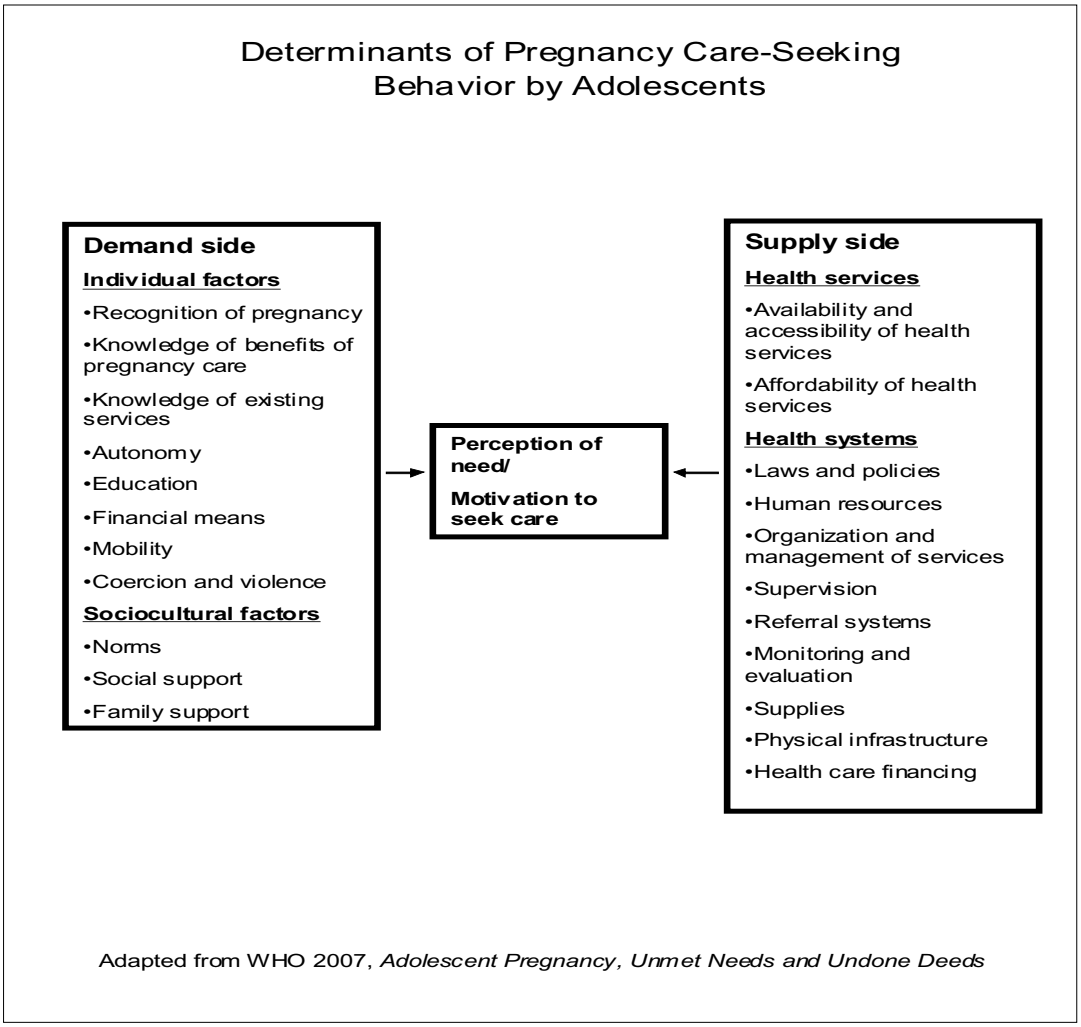
Source: (Macro International, 2008), (International Institute for Population Sciences (IIPS) & Macro International, 2007)

Figure 45: Proportion of All Women who Received Postpartum Care for the Most Recent Live Birth, Noninstitutional Births, Women <20 vs. Women 20-24



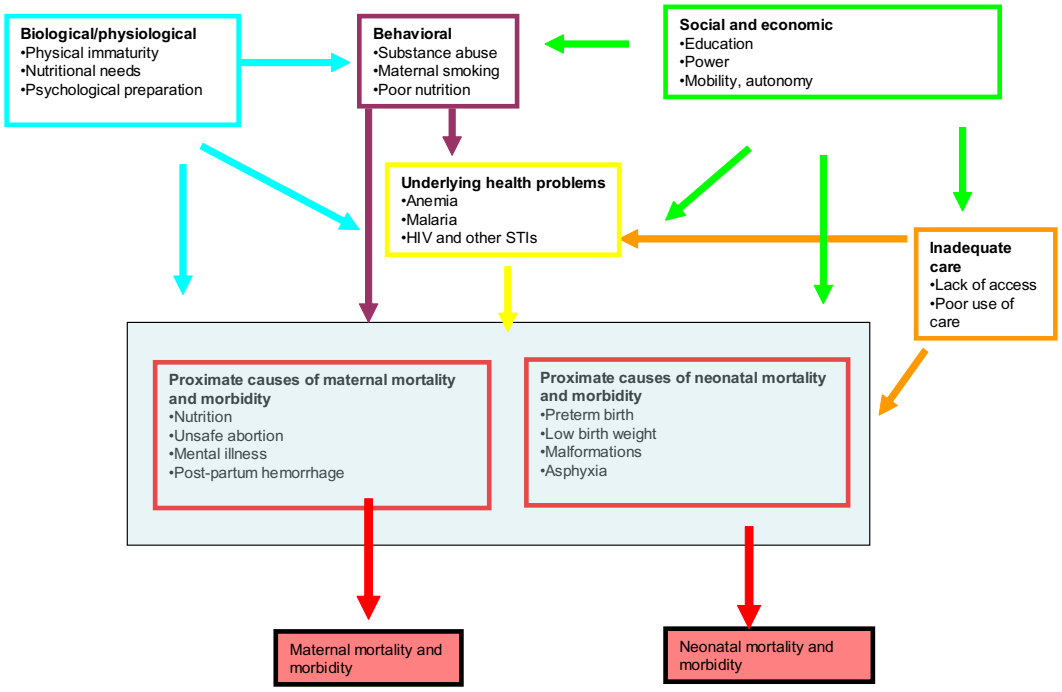
Source: (Fort & Kothari, 2006)

Figure 46: Determinants of Pregnancy Care-Seeking Behavior by Adolescents



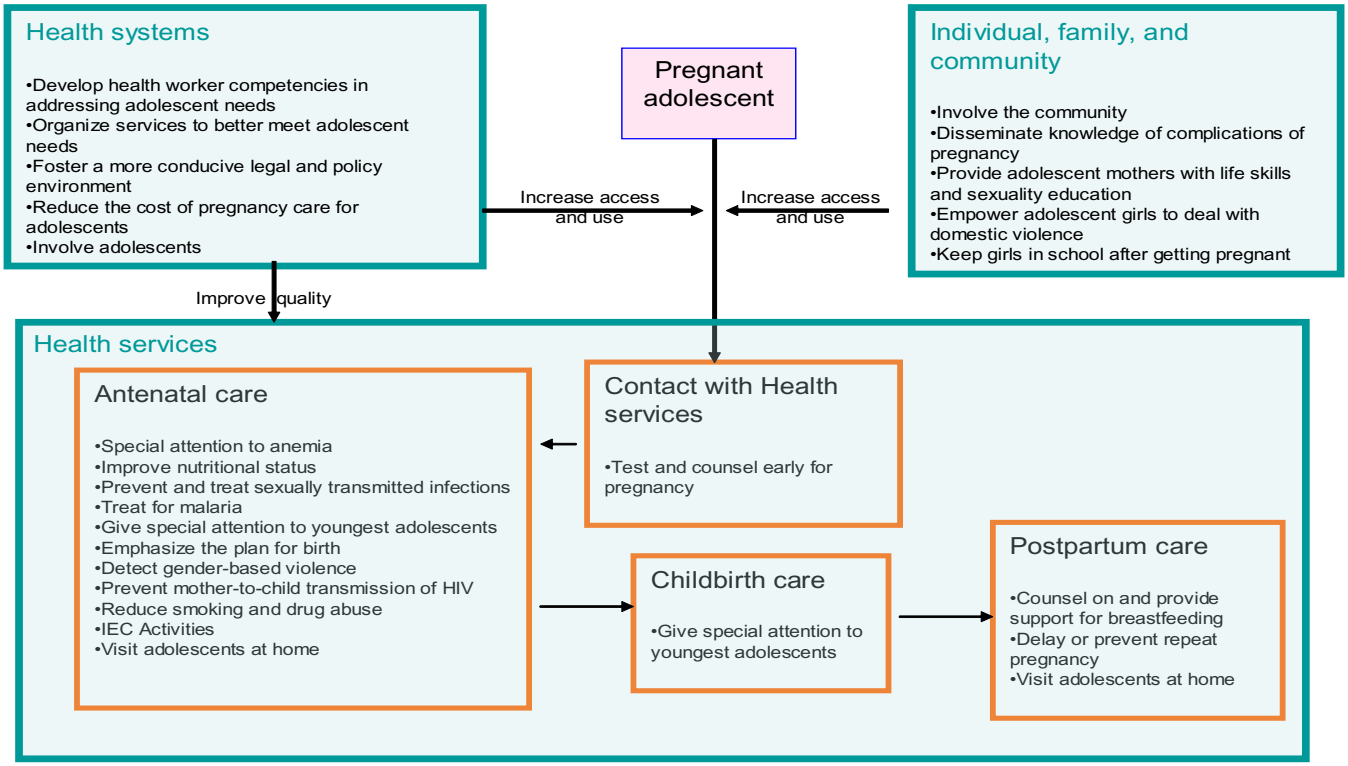
Source: Author, adapted from (World Health Organization, 2007a)

Figure 47: Why Health Risks are Higher for Adolescent Mothers and their Newborns



Source: The author

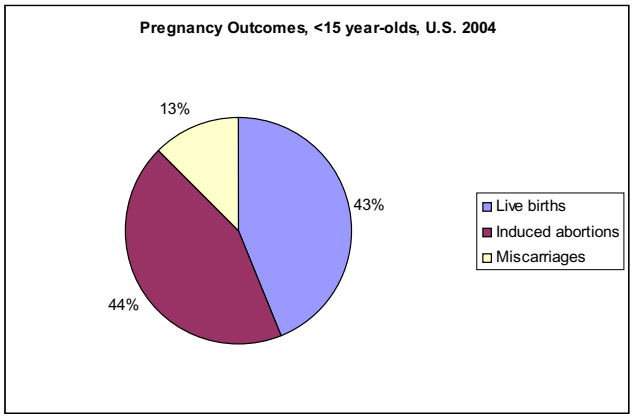
Figure 48: Recommended Interventions for Adolescent-Specific Content and Organization of Pregnancy Care

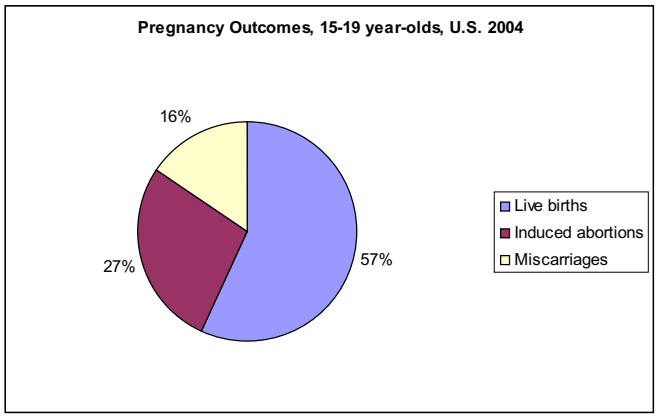


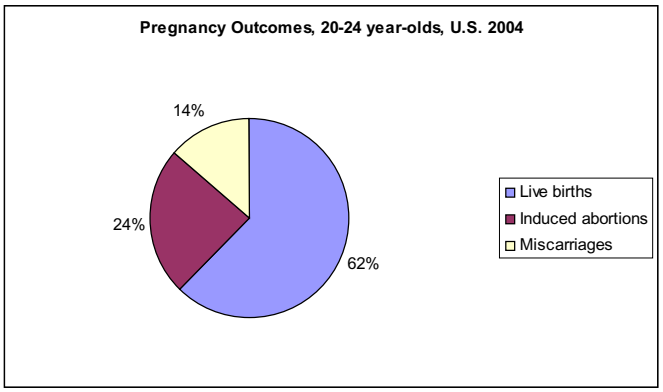
Adapted from WHO 2007, *Adolescent Pregnancy, Unmet Needs and Undone Deeds*

Source: Author, adapted from (World Health Organization, 2007a)

Figure 49: Distribution of Adolescent Pregnancy Outcome in the U.S., 2004

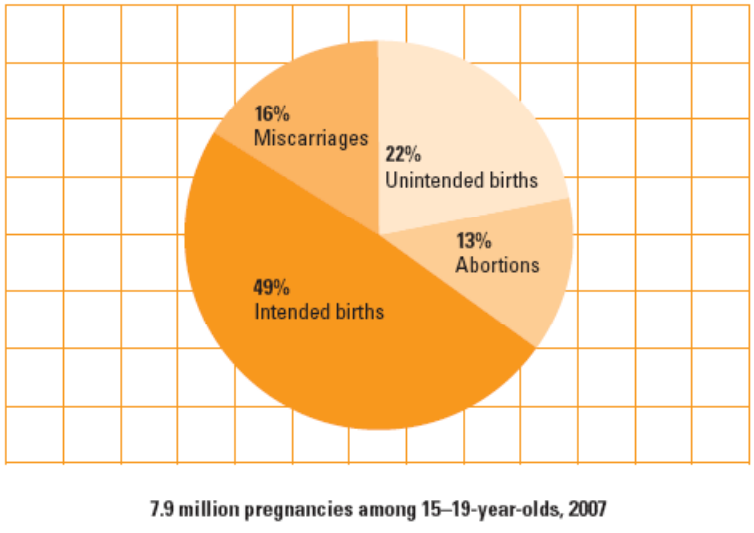






Source: (Ventura et al. 2008)

Figure 50: Distribution of Adolescent Pregnancies in sub-Saharan Africa by Planning Status and Outcome



Source: (Biddlecom et al. 2007)

Tables

Table 1: Fertility Rates of 15-19 year old Women and Percentage Change, by Region, 1995-2000, 2000-2005, and 2005-2010

Region	Period			Change 2005-10 vs. 1995-2000	
	1995-2000	2000-2005	2005-2010	Absolute change	% change
World	63.3	56.6	52.0	-11.32	-18%
More developed regions	28.5	24.3	21.3	-7.21	-25%
Less developed regions	69.4	61.8	56.5	-12.90	-19%
Least developed countries	124.1	115.9	103.3	-20.86	-17%
Less developed regions, excluding least developed countries	59.7	51.7	47.1	-12.51	-21%
Less developed regions, excluding China	85.4	76.3	68.9	-16.48	-19%
Sub-Saharan Africa	133.4	127.5	117.7	-15.72	-12%
Africa	115.3	110.2	102.9	-12.36	-11%
Eastern Africa	121.6	119.4	111.3	-10.34	-9%
Middle Africa	197.2	188.8	167.1	-30.08	-15%
Northern Africa	44.4	37.5	31.8	-12.57	-28%
Southern Africa	81.9	72.4	60.8	-21.10	-26%
Western Africa	138.5	130.6	122.8	-15.66	-11%
Asia	53.6	45.0	40.1	-13.50	-25%
Eastern Asia	9.3	9.2	9.2	-0.06	-1%
South-Central Asia	90.1	73.2	62.9	-27.17	-30%
South-Eastern Asia	42.7	38.7	33.3	-9.35	-22%
Western Asia	55.9	50.4	48.2	-7.61	-14%
Europe	23.8	19.7	17.2	-6.64	-28%
Eastern Europe	34.7	26.8	24.3	-10.46	-30%
Northern Europe	24.1	22.1	19.4	-4.69	-19%
Southern Europe	12.2	12.1	10.8	-1.36	-11%
Western Europe	9.7	9.0	7.2	-2.48	-26%
Latin America and the Caribbean	85.6	80.4	72.3	-13.23	-15%
Caribbean	77.7	68.5	64.5	-13.18	-17%
Central America	87.6	79.7	74.0	-13.53	-15%
South America	85.6	81.9	72.5	-13.09	-15%
Northern America	49.2	40.5	33.8	-15.39	-31%
Oceania	40.3	33.7	28.2	-12.11	-30%
Australia/New Zealand	21.4	18.6	16.3	-5.11	-24%
Melanesia	81.3	64.8	51.0	-30.36	-37%
Micronesia	61.6	45.3	36.9	-24.75	-40%
Polynesia	45.7	43.9	37.9	-7.81	-17%

Source: (Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, 2009)

Table 2: Fertility Rates of 15-19 year old Women and Percentage Change, by Region, 1995-2000, 2000-2005, and 2005-2010

Country	Rate	Country	Rate
Democratic Republic of the Congo	201	Bolivia	78
Chad	164	Jamaica	77
Mali	163	Brazil	76
Niger	157	Namibia	74
Guinea	152	Colombia	74
Uganda	150	Lesotho	73
Mozambique	149	Paraguay	72
Zambia	142	Bangladesh	72
Liberia	142	Somalia	70
Malawi	135	India	68
Madagascar	133	Yemen	68
Burkina Faso	131	Costa Rica	67
United Republic of Tanzania	130	Eritrea	67
Côte d'Ivoire	130	Sao Tome and Principe	66
Guinea-Bissau	129	Mexico	65
Cameroon	128	Togo	65
Nigeria	127	Zimbabwe	65
Sierra Leone	126	Ghana	64
Angola	124	Guyana	63
Equatorial Guinea	123	Saint Lucia	62
Afghanistan	121	Syrian Arab Republic	61
Congo	113	Uruguay	61
Nicaragua	113	Chile	60
Benin	112	South Africa	59
Dominican Republic	109	Saint Vincent and the Grenadines	59
Guatemala	107	Argentina	57
Central African Republic	107	Sudan	57
Ethiopia	104	Papua New Guinea	55
Senegal	104	Peru	55
Kenya	104	Timor-Leste	54
Nepal	101	Puerto Rico	54
Cape Verde	95	Bahamas	53
Honduras	93	French Polynesia	52
Mauritania	90	Botswana	52
Gabon	90	Guam	52
Venezuela (Bolivarian Republic of)	90	Vanuatu	47
Gambia	88	Haiti	46
Iraq	86	Pakistan	46
Swaziland	84	Comoros	46
Ecuador	83	Cuba	45
French Guiana	83	Philippines	45

Country	Rate	Country	Rate
El Salvador	83	Georgia	45
Panama	83	Mayotte	44
Occupied Palestinian Territory	79	Barbados	43
Belize	79	Grenada	42
Country	Rate	Country	Rate
Bulgaria	42	Belarus	21
Solomon Islands	42	Slovakia	21
Indonesia	40	Hungary	20
Suriname	39	Turkmenistan	20
Mauritius	39	Guadeloupe	19
Cambodia	39	Morocco	19
Egypt	39	Burundi	19
Turkey	39	Myanmar	18
Bhutan	38	Iran (Islamic Republic of)	18
Lao People's Democratic Republic	37	Bahrain	17
Thailand	37	Viet Nam	17
Rwanda	37	Mongolia	17
United States of America	36	Portugal	16
Armenia	36	Lebanon	16
Trinidad and Tobago	35	United Arab Emirates	16
Azerbaijan	34	Ireland	16
Republic of Moldova	34	Qatar	16
Réunion	34	Bosnia and Herzegovina	16
Aruba	33	Latvia	15
Kyrgyzstan	32	Iceland	15
Netherlands Antilles	32	Australia	15
Fiji	32	Montenegro	15
Romania	31	Israel	14
Kazakhstan	31	Albania	14
United States Virgin Islands	31	Croatia	14
Martinique	30	Poland	14
Sri Lanka	30	Maldives	13
Tajikistan	28	Kuwait	13
Ukraine	28	Uzbekistan	13
Samoa	28	Malaysia	13
New Caledonia	26	Austria	13
Saudi Arabia	26	Canada	13
Federated States of Micronesia	25	Luxembourg	12
Russian Federation	25	Spain	12
Brunei Darussalam	25	Malta	11
Jordan	25	Finland	11
United Kingdom	24	Czech Republic	11
Djibouti	23	Oman	10

Country	Rate	Country	Rate
Tonga	23	France	7
New Zealand	23	Tunisia	7
Serbia	22	Cyprus	6
Lithuania	22	Denmark	6
Macedonia	22	China, Hong Kong Special Administrative Region	6
Western Sahara	21	Switzerland	6
Estonia	21	Republic of Korea	5
Channel Islands	10	China, Macao Special Administrative Region	5
China	10	Italy	5
Greece	9	Slovenia	5
Norway	9	Japan	5
Germany	8	Singapore	5
Belgium	8	Netherlands	4
Sweden	8	Libyan Arab Jamahiriya	3
Algeria	7	Democratic People's Republic of Korea	0

Source: (Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, 2009)

Table 3: Percentage of Women Giving Birth by Age 16 and 18. Weighted Region and Income Level Averages, 51 DHS countries, mid-1990s to early 2000s

	% mothers by 16			% mothers by 18		
	20-24	30-34	40-44	20-24	30-34	40-44
Region						
Eastern/Southern Africa	8.5	13.3	16	26.9	34.3	38.4
Western/Middle Africa	13.4	18.6	20.6	30.9	36.3	38.6
South-central/South-eastern Asia	9.3	12.0	13.8	24.2	31.1	32.1
Former Soviet Asia	0.2	0.2	0.2	4.1	2.9	3.5
Caribbean/Central America	6.8	8.2	8.7	21.7	23.2	24
South America	4.3	3.7	3.4	16.3	14.4	12.3
Western Asia/Northern Africa	3.1	5.5	6.5	11.2	18.1	20.8
Income Level[a]						
Low	9.9	13.2	15.2	25.8	32.6	34.2
Lower Middle	2.9	4.0	5.1	11.3	14.3	16.1
Upper Middle	3.9	4.4	3.4	15.5	16.1	14.2
TOTAL—All DHS	8.5	11.3	12.9	23.1	28.9	30.2

[a]World Bank income classifications.

Source: (National Research Council & Institute of Medicine, 2005)

Table 4: Recent Findings on Births to Adolescents Under 15

Country (Citation)	Findings
Chile (Donoso *et al.* 2003)	Nationwide, for the period 1990-99 there was a significant increase in the number of live births to adolescents under 15 years old, while the numbers for the 15-19 cohort did not change significantly.
England and Wales (Office for National Statistics, 2007)	Nationwide, 2005 pregnancy and fertility rates in 14 year-old were 5.4 and 1.9 per 1000, respectively. In 13 year-olds, rates were 1.0 and 0.4.
French Guiana (Soula *et al.* 2006)	A retrospective hospital-based study in 2001 identified 181 births among adolescents aged 14 years and under, representing 1.55% of all births.
U.S. (Menacker *et al.* 2004)	Nationwide, 7,315 females aged 10-14 years delivered a live birth in 2002. The rate of births to 10-14 year olds was 0.7 per 1,000 in 2002, half of the rate during 1989-94. This rate peaked in 1989 (1.4 per 1,000).

Source: Author

Table 5: Recent Findings on Adolescents pregnancy and pregnancy rates

Country, Citation	Findings
U.S. (Ventura et al. 2008)	The U.S. teen pregnancy rate dropped 38% from 1990 to 2004. The declining teen pregnancy rate resulted in a "historic low" of 72.2 pregnancies per 1,000 women and girls ages 15 to 19 in 2004. Live births as a proportion of all pregnancies were 57% in the 15-19 age group versus 62% in the 20-24 age group (Figure 49).
Sub-Saharan Africa (Biddlecom et al. 2007)	The study estimated a total of 7.9 million pregnancies among women 15-19 in the region in 2007. 71% of these resulted in live births (22% unintended), 13% in induced abortion and 16% in miscarriages (Figure 50).
England and Wales (Office for National Statistics, 2007)	The conception rate per 1000 women ages 15-19 in 2005 was 60.1 (fertility rates of 35.9, abortion rate of 24.2).

Source: Author

Table 6: Indicators of Sexual and Reproductive Behaviors among Adolescents and Youth by Region, Sex, and Age Group, late 1990s to early 2000s

A. Sexual activity	**Females, 20-24**			**Males, 20-24**		
	Percent who initiated before age:			**Percent who initiated before age:**		
	15	18	20	15	18	20
Region						
East/Southern Africa	17	57	77	14	45	65
West and Middle Africa	21	59	77	12	40	61
Caribbean/Central America	13	44	62	31	70	84
South America	9	41	61	31	73	87
Former Soviet Asia	1	20	53	na	na	na
Middle East	na	na	na	na	na	na
South and Southeast Asia	na	na	na	na	na	na
B. Marriage	**Females, 20-24**			**Males, 20-24**		
	Percent who married before age:			**Percent who married before age:**		
		18	20		18	20
Region						
East/Southern Africa		37	55			14
West and Middle Africa		45	60			12
Caribbean/Central America		35	53			22
South America		23	38			14
Former Soviet Asia		16	50			na
Middle East		23	40			na
South and Southeast Asia		42	60			na
C. Childbearing	**Females, 20-24**			**Males**		
	Percent who had a child before age			**Percent who ever fathered a child at age**		
	16	18			15-19	20-24
Region						
East/Southern Africa	9	27			2	24
West and Middle Africa	13	31			2	13
Caribbean/Central America	7	22			2	27
South America	4	16			3	23
Former Soviet Asia	0	4			na	na
Middle East	3	11			na	na
South and Southeast Asia	9	24			na	na
D. Contraceptive use	**Sexually active females, 15-19**					
	Percentage using contraception					
Region	All	Unmarried				
East/Southern Africa	21	28				
West and Middle Africa	20	26				
Caribbean/Central America	24	na				
South America	28	38				
Former Soviet Asia	25	na				
Middle East	na	na				
South and Southeast Asia	na	na				

Source: (National Research Council & Institute of Medicine, 2005); n.a. = not available

Table 7: Studies Showing Higher Health Risk for Adolescents for at Least One Underlying Behavior or Condition or Adverse Maternal or Newborn Outcome Compared with Older Mothers, Unadjusted and Adjusted Risk

	Unadjusted Risk			Adjusted Risk			All Studies		
	Underlying	Maternal	Newborn	Underlying	Maternal	Newborn	Underlying	Maternal	Newborn
Total Number of Studies	23	51	61	9	19	39	27	59	72
Number Showing Higher Risk	17	30	56	6	11	32	21	35	66
% Showing Higher Risk	74%	59%	92%	67%	58%	82%	78%	59%	92%

Note: Rows do not add up because studies report both adjusted and unadjusted risk

Source: Studies cited in Appendix 3

Note: Adolescent age group and reference age group of older women varies by study

Table 8: Findings of Studies Comparing Health Risks of Adolescent Pregnancy, Risk in Adolescents for All Outcomes Compared with Older Mothers, Unadjusted and Adjusted Risk

	Unadjusted Risk			Adjusted Risk			All Studies		
	Underlying	Maternal	Newborn	Underlying	Maternal	Newborn	Underlying	Maternal	Newborn
Total Outcomes Measured	23	107	159	9	39	103	32	145	262
Number_									
Higher Risk in Adolescents	17	38	115	6	12	57	23	50	172
Same Risk in Adolescents	6	48	43	3	14	45	9	62	88
Lower Risk in Adolescents	0	21	1	0	12	1	0	33	2
Percentages:									
Higher Risk in Adolescents	74%	36%	72%	67%	32%	55%	72%	34%	66%
Same Risk in Adolescents	26%	45%	27%	33%	37%	44%	28%	43%	34%
Lower Risk in Adolescents	0%	20%	1%	0%	32%	1%	0%	23%	1%

Source: Studies cited in Appendix 3

Note: Adolescent age group and reference age group of older women varies by study

Table 9: Risk of Adverse Health Outcome in Adolescents versus Older Mothers

Higher risk	Same risk	Lower risk	Mixed evidence	No studies
Maternal health impact				
Nutrition Unsafe abortion Mental illness Post-partum hemorrhage	Maternal mortality Prolonged labor Hypertensive disease Iodine deficiency	C-section Diabetes Ante-partum hemorrhage	Obstetric fistulae	Violence against pregnant women
Long-term maternal health impacts				
Obesity Mental illness Premature death	Bone growth			
Neonatal health impact				
Neonatal mortality Infant mortality Preterm birth Low birth weight Malformations Asphyxia	Stillbirth Low Apgar		Small for gestational age Perinatal mortality	

Source: Studies cited in Appendix 3

Note: Adolescent age group and reference age group of older women varies by study

See Appendix 5 for description of methodology for constructing this table

Table 10: Risk of Adverse Underlying Behavior or Health Problem Associated with Adverse Pregnancy Outcomes in Adolescents versus Older Mothers

Higher risk	Same risk	Lower risk	Mixed evidence	Unknown
Substance abuse Maternal smoking Nutritional status Anemia Malaria HIV and other STIs				Female genital mutilation

Source: Studies cited in Appendix 3

Note: Adolescent age group and reference age group of older women varies by study

See Appendix 5 for description of methodology for constructing this table

Table 11: Recent Findings Comparing Maternal Mortality in Adolescents versus Older Women

Country, Citation	Findings
Matlab, Bangladesh (Chowdhury et al. 2007).	This 30-year study found that mortality was highest for women during their first pregnancies, those of higher pregnancy order, and those who were pregnant under 20 years old. However, adjustment for socioeconomic or demographic factors eliminated the higher risk for women under 20.
Latin America (Conde-Agudelo et al. 2005)	A large study in Latin America found rates of maternal mortality for adolescents who gave birth before 16 to be 4 times as high as for 20-24 year-old mothers, after adjusting for various confounding factors. Rates of maternal mortality in 16-19 year-olds were the same as for older mothers.
Bangladesh (Hill et al. 2003)	Results from a national survey in Bangladesh found a lower maternal mortality ratio in adolescents 15-19 compared to women 20-24 (170 versus 236); the pregnancy-related mortality ratio was also lower among adolescents (221 vs. 253), but higher among adolescents when calculated using the sibling history method (326 vs. 272).
U.S. (Berg et al. 2003)	A national population-based report summarizing surveillance data for pregnancy-related deaths in the United States for the period 1991 through 1997 showed that, compared with women aged 20 to 24 years, the pregnancy-related mortality ratio was higher for adolescents younger than 15 years (9.4 and 15.6 maternal deaths per 100,000 live births, respectively). The ratio for adolescents 15-19 was 8.4.
Chile (Donoso et al. 2003)	A national study in Chile found that adolescents under 15 had higher risks of maternal mortality (OR = 1.56; 95% confidence interval (CI): 0.50 to 4.31; P = 0.372) while teenage mothers from 15 to 19 years old had significantly lower risks of maternal mortality (OR = 0.72; 95% CI: 0.56 to 0.92; P < 0.008).
Nigeria (Airede & Ekele, 2003)	A hospital-based study in Nigeria found a maternal mortality ratio of 4863 in adolescents versus 2151 in adults.
India (Kumar et al. 2007)	A small hospital-based study found no significant differences in maternal mortality between adolescents and adults 20-30 years old.

Source: Studies cited in Appendix 3

Note: Adolescent age group and reference age group of older women varies by study

Table 12: Causes of Maternal Mortality among Adolescent Women ages 10-19 in Jos, Nigeria, 1991-2001

Causes	Number of deaths (% of total)
Direct Causes	19 (100)
Abortion	7 (37)
Sepsis	5 (26)
Eclampsia	5 (26)
Hemorrhage	2 (11)
Indirect causes	6
Sickle cell anemia	2
Meningitis	1
Hepatitis	1
Gestational trophoblastic disease	1
Pulmonary TB	1

Source: (Ujah et al. 2005)
Note: Hospital-based study

Table 13: Causes of Maternal Death among Adolescent Women ages 12-19 in Sokoto, Nigeria, 1990-1999

Causes	Number of deaths (% of total)
Eclampsia	21 (46)
Prolonged obstructed labor	14 (30
Anemia	5 (11)
Ruptured uterus	3 (7)
Postpartum hemorrhage	2 (4)
Abortion	2 (4)
Puerperal sepsis	2 (4)
Cerebrospinal meningitis	1 (2)
Congestive cardiac failure	1 (2)
Sickle cell disease	1 (2)
Total	**52 (112)**

Source: (Airede & Ekele, 2003)

Note: Total percentage is greater than 100 because in some cases two independent causes were deemed to be contributory to a death

Note: Hospital-based study

Table 14: Risk of Adverse Health Behavior or Underlying Health Problem in Adolescents, by Specific Behavior or Problem

	Undjusted Risk					Adjusted Risk				
	Health Behavior		Underlying Health Problem			Health Behavior		Underlying Health Problem		
	Smoking	Nutrition	Anemia	Malaria	STIs	Smoking	Nutrition	Anemia	Malaria	STIs
No. Studies	4	1	17	1	1	2	0	6	0	1
Risk in adolescents vs older mothers:										
Higher	4	1	11	1	1	1	0	4	0	1
Same	0	0	6	0	0	1	0	2	0	0
Lower	0	0	0	0	0	0	0	0	0	0
% of all studies:										
Higher	100%	100%	65%	100%	100%	50%	0%	67%	0%	100%
Same	0%	0%	35%	0%	0%	50%	0%	33%	0%	0%
Lower	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Source: The author from studies in Appendix 3

Table 15: Unadjusted Risk of Adverse Maternal Health Outcome in Adolescents, by Specific Outcome

	Maternal Health Outcome															
	Maternal Mortality	eclampsia, pre-eclampsia	Hyper-tension	C-section	Episio-tomy	PROM	Duration of labor	cervvag infection	Dia-betes	Compli cations	Ante-partum hemmoraghe	Post-partum hemmo-raghe	Homi-cide	Nutrition - BMI	Mental Illness	L-T Health
No. Studies	9	17	10	23	1	3	7	5	6	3	5	5	1	2	2	8
Risk in Adolescents versus Older Mothers:																
Higher	4	10	2	2	0	0	3	4	0	1	2	0	1	1	1	7
Same	3	7	6	10	1	2	3	1	4	2	3	5	0	0	0	1
Lower	2	0	2	11	0	1	1	0	2	0	0	0	0	1	1	0
% of all studies:																
Higher	44%	59%	20%	9%	0%	0%	43%	80%	0%	33%	40%	0%	100%	50%	50%	88%
Same	33%	41%	60%	43%	100%	67%	43%	20%	67%	67%	60%	100%	0%	0%	0%	13%
Lower	22%	0%	20%	48%	0%	33%	14%	0%	33%	0%	0%	0%	0%	50%	50%	0%

Source: The author from studies in Appendix 3

Table 16: Adjusted Risk of Adverse Maternal Health Outcome in Adolescents, by Specific Outcome

	Maternal Health Outcome															
	Maternal Mortality	eclampsia, pre-eclampsia	Hyper-tension	C-section	Episio-tomy	PROM	Duration of labor	cervvag infection	Dia-betes	Compli-cations	Ante-partum hemmo-raghe	Post-partum hemmo-raghe	Homi-cide	Nutrition - BMI	Mental Illness	L-T Health
No. Studies	4	4	0	6	0	3	1	0	3	0	3	3	0	1	1	9
Risk in Adolescents versus Older Mothers:																
Higher	1	0	0	0	0	0	0	0	0	0	0	3	0	1	1	6
Same	3	4	0	0	0	3	1	0	0	0	0	0	0	0	0	3
Lower	0	0	0	6	0	0	0	0	3	0	3	0	0	0	0	0
% of all studies:																
Higher	25%	0%	n.a.	0%	n.a.	0%	0%	n.a.	0%	n.a.	0%	100%	n.a.	100%	100%	67%
Same	75%	100%	n.a.	0%	n.a.	100%	100%	n.a.	0%	n.a.	0%	0%	n.a.	0%	0%	33%
Lower	0%	0%	n.a.	100%	n.a.	0%	0%	n.a.	100%	n.a.	100%	0%	n.a.	0%	0%	0%

Source: The author from studies in Appendix 3

Table 17: Recent Findings on Maternal Age and Fistula

Study	Design	Findings
Studies that report age at fistula development		
(Muleta et al. 2007) Ethiopia	National survey of women 15-49 in 19,153 households.	Overall fistula prevalence was 2.2 per 1000 women. For 35% of the 52 women with the condition, fistula occurred at ages 14-19.
(Holme, Breen & MacArthur, 2007 Zambia	Hospital-base study of 210 fistula patients	35% of patients developed fistula below age 20.
(Gessessew & Mesfin, 2003) Ethiopia	Hospital-based study of 193 fistula patients	Mean age at time of development of fistula was 24.7 years. 40% of fistula patients were under age 20.
(Mabeya, 2004) Kenya	Hospital-based study of 66 fistula patients	Sixty five percent of patients had onset of fistula at 20 years of age or less.
(Bangser, 2007) Tanzania and Uganda	Hospital and community-based study of 142 fistula patients	The mean age at which the fistula occurred was 23 years in Tanzania and 22 years in Uganda. Fewer than half of the Tanzanian participants were 19 years or younger and most Ugandan participants were between the ages of 15 and 19 years.
(Tsui et al. 2007) Niger, Nigeria, and Tanzania	National DHS survey	Birth at age <18 was not associated with prolonged labor (as a proxy for risk of fistula) after controlling for parity.
Studies that do not report age at fistula development		
(Ijaiya & Aboyeji, 2004) Nigeria	Hospital-based study of 34 fistula patients	26.5% of patients were under 20 years old.
(Wall et al. 2004) Nigeria	Hospital-based study of 899 fistula patients	Median age of fistula patients was 27 years (does not report age at which fistula developed); 47% of fistulas occurred at first birth.
(Meyer et al. 2007) Niger	Hospital-based study 58 fistula patients	Mean age of patients is 26 years (does not report age at fistula occurrence).
(Sombie et al. 2007) Burkina Faso	Study 1.5 million births in 47 hospitals identifying 347 women with fistula	Median age of women with fistula is 25 (does not report age at which fistula developed).
(Nafiou et al. 2007) Niger	Hospital-based study of 111 fistula patients	One-quarter of the patients were younger than 20 years.

Source: The author

Table 18: Unadjusted Risk of Adverse Newborn Health Outcome in Adolescents, by Specific Outcome

	Newborn Health Outcome														
	Perinatal Mortality	Neonatal Mortality	Infant Mortality	Stillbirth	LBW	Birth Weight	Size/IUGR	Preterm birth	NICU admission	Eclampsia	Asphyxia	Low Apgar	Malformed	Hospital-ization	L-T Health
No. Studies	4	15	11	15	32	9	8	39	3	0	2	9	6	1	5
Risk in adolescents versus older mothers:															
Higher	1	11	9	7	24	8	6	29	3	0	2	6	3	1	5
Same	3	4	2	7	8	1	2	10	0	0	0	3	3	0	0
Lower	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
% of all studies:															
Higher	25%	73%	82%	47%	75%	89%	75%	74%	100%	n.a.	100%	67%	50%	100%	100%
Same	75%	27%	18%	47%	25%	11%	25%	26%	0%	n.a.	0%	33%	50%	0%	0%
Lower	0%	0%	0%	7%	0%	0%	0%	0%	0%	n.a.	0%	0%	0%	0%	0%

Source: The author from studies in Appendix 3

Table 19: Adjusted Risk of Adverse Newborn Health Outcome in Adolescents, by Specific Outcome

	Newborn Health Outcome														
	Perinatal Mortality	Neonatal Mortality	Infant Mortality	Stillbirth	LBW	Birth Weight	Size/IUGR	Preterm birth	NICU admission	Eclampsia	Asphyxia	Low-Apgar	Malformed	Hospitalization	L-T Health
No. Studies	2	12	5	10	19	5	7	22	2	0	0	10	3	1	5
Risk in adolescents versus older mothers:															
Higher	1	7	3	2	13	1	4	16	0	0	0	3	2	1	4
Same	1	5	2	7	6	4	3	6	2	0	0	7	1	0	1
Lower	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
% of all studies:															
Higher	50%	58%	60%	20%	68%	20%	57%	73%	0%	n.a.	n.a.	30%	67%	100%	80%
Same	50%	42%	40%	70%	32%	80%	43%	27%	100%	n.a.	n.a.	70%	33%	0%	20%
Lower	0%	0%	0%	10%	0%	0%	0%	0%	0%	n.a.	n.a.	0%	0%	0%	0%

Source: The author from studies in Appendix 3

Table 20: Variations in Health Risks by Age of Adolescent Mother

Study	Country	Outcome Measure	Odds ratios by Adolescent Age Group			Reference Age Group
			10-14	15-19		20-24
(Berg *et al.* 2003)	U.S,	Pregnancy-related Mortality Ratio	1.66	0.84		
			<16	17-18	19-20	21-24
(Branum, 2006)	U.S.,	VPTB, non-Hispanic Whites	2.11	1.52	1.21	
			10-15	16-17	18-19	20-24
(Chen *et al.* 2007a)	U.S.	Gestational Age < 32 wks	1.91	1.34	1.11	
		Gestational Age < 37 wks	1.65	1.27	1.09	
		Birth weight < 1500 g	1.46	1.14	1.03	
		Birth weight < 2500 g	1.33	1.17	1.08	
		Birth weight < 10th ptile for gest. Age & sex	1.1	1.09	1.06	
		Apgar score < 4	1.29	1.06	0.95	
		Apgar score < 7	1.24	1.04	0.98	
		Neonatal death (<28days)	1.555	1.19	1.06	
			11-15	16-19		20-29
(Gilbert *et al.* 2004)	U.S.	Infant death	3.1	1.9		
		Neonatal death	2.7	1.8		
		Preterm delivery	1.9	1.33		
		Low birth weight	1.8	1.3		
		Preeclampsia	1.5	1		
		Eclampsia	2.8	1.7		
			12-17	18-19		20-34
(Markovitz et al. 2005)	U.S.	Neonatal mortality	1.43	1.15		
		Post-neonatal mortality	1.73	1.04		

Study	Country	Outcome Measure	Odds ratios by Adolescent Age Group			Reference Age Group
			10-14	15-19		20-24
(Salihu *et al.* 2006)	U.S.	Stillbirth - singletons	1.57	1.05		
		Stillbirth - twins	1.97	1.22		
(Conde-Agudelo *et al.* 2005)	Latin America		<=15	16-17	18-19	20-24
		Preeclampsia	1.08	1.04	1	
		Eclampsia	1.61	1.36	1.17	
		Gestational Diabetes	0.34	0.35	0.44	
		UTI	1.03	1.01	1	
		PROM	0.95	0.98	1.01	
		Third-trimester bleeding	0.24	0.59	0.7	
		Anemia	1.41	1.05	1	
		C-section	0.87	0.8	0.83	
		Operative vaginal delivery	1.44	1.29	1.16	
		Episiotomy	2.36	1.98	1.55	
		P-partum hemorrhage	1.59	1.31	1.18	
		Puerperal endometritis	3.81	2.08	1.52	
		Maternal death	4.09	0.98	1	
		LBW	1.62	1.27	1.2	
		Very LBW	1.25	1.24	1.1	
		Preterm delivery	1.66	1.25	1.15	
		Very preterm delivery	1.51	1.35	1.31	
		SGA	1.5	1.41	1.27	
		Fetal death	1.03	0.98	1	
		Early neonatal death	1.5	1.05	1.01	
		Low Apgar	0.97	0.98	1.01	
(da Silva et al. 2003)	Brazil		<18	18-19		25-29

Study	Country	Outcome Measure	Odds ratios by Adolescent Age Group		Reference Age Group
		Preterm birth	1.7	0.7	
			<15	15-19	20-34
(Donoso *et al.* 2003)	Chile	Maternal mortality	1.56	0.72	
		Stillbirth	1.02	0.81	
		Neonatal mortality	2.27	1.2	
		Infant mortality	2.39	1.38	
			10-14	15-19	>=20
(Goldenberg, Figueiredo & Silva, 2005)	Brazil	C-section	0.57	0.6	
		Preterm birth	4.55	1.32	
		Low birth weight	4.51	1.5	
		Low Apgar	3	1.65	
			13-16	17-19	20-24
(Goonewardene & eyagaha Waduge, 2005)	Sri Lanka	Anemia	2.13	2.35	
		Gestational hypertension	4.83	0.96	
		Pre-eclampsia	5	0.73	
		Preterm birth	1.78	0.93	
		C-section	1.59	0.65	
		Low birth weight	0.86	1.13	
(Kumar *et al.* 2007)	India		13-17	18-19	20-30
		Anemia	0.98	0.99	
		Premature labor	2.96	1.18	
		PIH	8.36	1.13	
		Antepartum hemorrhage	1.14	1.38	
		Eclampsia	14.67	4.83	
		C-section	0.85	0.83	
		Maternal mortality	2.67	n.a.	

Study	Country	Outcome Measure	Odds ratios by Adolescent Age Group			Reference Age Group
		Still births	13.33	2.67		
		Low birth weight	2.70	1.01		
		Preterm birth	4.98	1.92		
		Asphyxia	11.79	3.21		
		Hyperbilirubinemia	8.00	3.08		
		Respiratory distress syndrome	13.33333	2.666667		
		Meconium aspiration syndrome	1.454545	1.454545		
		Sepsis	2	1.333333		
		Congenital anomalies	2	1		
		Neonatal mortality	16	3.2		
			<16	16-19		20-24
(Oboro et al. 2003)	Nigeria	Anemia	1.33	1.17		
		Pre-eclampsia	1.02	1.28		
		Preterm	1.53	1.24		
		C-section	1.66	0.97		
		Perinatal mortality	1.08	1.43		
		Low birth weight	1.35	1.24		
		Low Apgar	1.35	1.23		
			<18	18-19		25-29
(Simoes et al. 2003)	Brazil	Low birth weight	2.85	1.37		
		Preterm birth	2.09	0.9		
		SGA	1.68	1.42		
		Infant mortality	4.23	0.8		

Source: The author from studies in Appendix 3

Note: odds ratios highlighted in yellow indicate no significant different from reference group

Table 21: Summary of Evidence on Poverty Reduction Effect of Early Childbearing by Type of Effect

Reproductive Health Outcome	Pathway to Poverty Effect Via:		
	Health	Education	Earnings, well-being, life options
Early Childbearing (14 studies)	Fairly strong evidence on adverse health effects of very early pregnancy, including life-long morbidities.	Some evidence on dropping out, but reasons other than pregnancy (poor performance, cost) often a more important factor.	More evidence for Latin America, where marriage age is later, than Africa and Asia, where early marriage and childbearing are linked.

Source: Adapted from (Greene & Merrick, 2005)

Table 22: Findings from Studies Comparing Use of Antenatal Care by Adolescents versus Older Women

Country, Citation	Findings
Ecuador (Hidalgo, Chedraui & Chavez, 2005)	37% of adolescents 15 and under had adequate prenatal care versus 95% of women ages 20-30
Thailand (Watcharaseranee, Pinchantra & Piyaman, 2006)	Adolescents had higher levels of inadequate antenatal care than women 20-25 (25.9% vs. 13.4%)
Nigeria (Loto et al. 2004)	Poor obstetric outcome of teenage pregnancy is related to non-utilization of prenatal care
Nigeria (Ebeigbe & Gharoro, 2007)	Teenagers were significantly more likely to be unbooked for antenatal care ($P < 0.0001$), book late ($P < 0.0001$) relative to older mothers
Thailand (Phupong & Suebnukarn, 2007)	Young adolescent mothers had about half the average number of antenatal visits (4.0 versus 8.2) compared to women 20-29, with about 15% of adolescents having no prenatal care versus just 3% of older mothers
Kenya (Taffa, 2003)	Two groups of mothers (adolescents vs. older women) were comparable in terms of the rate and timing of antenatal care visits
Philippines (Borja & Adair, 2003)	Adolescents in this sample were more socioeconomically disadvantaged, had poorer nutritional status during pregnancy, and received less prenatal care than adults.
Brazil (Simoes et al. 2003)	Adolescents showed lower socioeconomic and reproductive conditions than older women and a higher proportion of inadequate prenatal care (about 40% in women under 20 versus about 30% in women 20-29
Reunion (Dedecker et al. 2005)	Adolescents 13-17 year old mothers attended on average 8 prenatal consultations, however 4% had poor prenatal care compared to 18-29 year old mothers (less than 3 visits, OR 4.2, $P < 0.001$ vs. controls)
U.S (Markovitz et al. 2005)	Higher rates of inadequate prenatal care for adolescents 12-17 (20.7%) versus 18-19 year olds (14.7%) and 20-39 year-olds (7.0%).
Cameroon (Kongnyuy et al. 2007)	Adolescents used prenatal care less frequently than older mothers (72.8 % of mothers <20 had greater than or equal to 4 prenatal versus 89.4% of mothers 20-29)
U.S. (Chen et al. 2007a)	Compared with women aged 20–24 years, teenage mothers were more likely to have had inadequate prenatal care (8.57% of 10-19 year olds versus 4.75% of 20-20 year olds).
Thailand (Thato, Rachukul & Sopajaree, 2007)	Compared to the adult mothers, teenage mothers were less likely to make the first prenatal visit in their first trimester (16% and 38.9%, $p<.001$) and to have adequate prenatal care (83% and 91%, $p<.01$)
French Guiana (Soula et al. 2006)	Pre-natal monitoring was less frequent among the group of teenage mothers 14 and under versus 18-year old mothers
India (Sharma et al. 2003)	Among 64 adolescent and 175 adult primigravida in a cohort of 843 antenatal women found similar levels of tetanus toxoid immunization in the two groups.
India (Kumar et al. 2007)	Of 369 13-19 year-old mothers and 1107 20-30 year-olds, 52.9% of adolescents versus 68.7% of older mothers had adequate prenatal care. The proportion of under 17 year-olds with adequate prenatal care was just 18.4%.
Sri Lanka (Goonewardene & eyagaha Waduge, 2005)	No significant difference in bookings in first trimester and 5 or more antenatal visits between 13-19 year olds and 20-24 year olds
Brazil (Goldenberg et al. 2005)	Examining births to 7672 women in one city in Brazil, rates of adequate prenatal care were significantly lower for adolescents 10-14 (12%) and adolescents 15-19 (29%) compared with pregnant women 20 and older (40%)

Country, Citation	Findings
U.S. (Branum, 2006)	Adolescent mothers of twins were less likely than women 21-24 to have early prenatal care (69.8% of <16 year-olds vs. 73.9% of 17-18 year olds vs. 76.9 of 19-20 year olds vs. 82.8 of 21-24 year olds)
Latin America (Conde-Agudelo et al. 2005)	This study of almost one million births found that adolescent mothers were slightly more likely to have made no antenatal visits (23.6% of adolescents versus 22.0% of 20-24 year-olds)
Brazil (da Silva et al. 2003)	42% of adolescent mothers under 18 had adequate prenatal care versus 48.9% of 20-24 year-olds and 59.5% of 25-29 year olds.
Nigeria (Oboro et al. 2003)	Compared to 20-24 year-olds, adolescents 19 and under were more likely to book late for antenatal care (47% vs. 29%, p <0.001) and to have < 7 antenatal visits (33% vs. 14%, p<0.001)

Source: The author from studies in Appendix 3

Note: Adolescent age group and reference age group of older women varies by study

Table 23: Use of Antenatal, Delivery Care, and Child Vaccinations in Adolescents vs. Older Women

Service	Lower use in adolescents (# of countries)	Higher use in adolescents (# of countries)	No difference in use (# of countries)
Antenatal*	4	-	11
Delivery**	4	1	10
Vaccination:			
BCG	4	-	11
DPT	6		9
Measles	6		9
Polio	4		11

Source: (Reynolds et al. 2006)

*Defined as whether women had seen a skilled health care provider (defined as a doctor, person with midwifery training or "country-specific health professional") at least once during pregnancy.

** Defined as whether women had a skilled delivery attendant, defined as a person with midwifery skills (e.g., doctor, midwife or nurse) who had received the training necessary to manage normal delivery and to diagnose, manage or refer complications.

Table 24: Effectiveness of Adolescent-Specific Pregnancy Care Interventions

	Total number of studies and number showing significant impact for at least one major outcome indicator									
Main Intervention Goal	All Studies		Health-Seeking Behavior		Maternal Health		Newborn Health		Parenting; child development	
	# studies	Impact	# studies	impact	# studies	impact	# studies	impact	# studies	impact
Improve Pregnancy Outcomes [a]	24	23	18	16	6	4	10	9	9	8
Clinical Setting	6	6	6	6	1	1	2	2	0	0
Family, Community, and Work-place	7	7	6	4	3	2	6	5	2	1
School	4	3	1	1	1	0	0	0	2	2
Multiple Settings	7	7	5	5	1	1	2	2	5	5
Prevent Repeat Pregnancy	9	6	1	1	7	5	0	0	1	0
Abortion and Postabortion Care	3	3	1	1	2	2	0	0	0	0
Increase Financial Access [b]	1	1	1	1	0	0	0	0	0	0
All Programs	37	33	21	19	15	11	10	9	10	8

Table 25: Key Elements of Adolescent-Specific Pregnancy Care by Individuals, Families, and Communities

Strategic approach / intervention	Justification for taking a different approach for adolescents (compared to older women)	Evidence of Adolescent-Specific Intervention Effectiveness
Pregnancy		
Involve the community	Adolescent mothers are less likely to use adequate pregnancy care because of various demand side determinants that families and communities can influence	Very little evidence related to pregnancy care specifically. Some evidence from the broader adolescent health literature.
Disseminate knowledge of complications of pregnancy	Adolescent mothers are more likely to experience life-threatening pregnancy complications	No evidence of intervention effectiveness
Provide adolescent mothers with life skills and sexuality education	Adolescents have less autonomy, mobility, self-esteem, and decision-making abilities	Very little evidence related to pregnancy care specifically. Relatively strong evidence from the broader adolescent health literature.
Empower adolescent girls to deal with domestic violence	Pregnant adolescents are more likely to suffer from gender-based violence	Almost no evidence on intervention effectiveness
Childbirth		
Involve the community	Adolescent mothers are less likely to use adequate pregnancy care because of various demand side determinants that families and communities can influence	Very little evidence related to pregnancy care specifically. Some evidence from the broader adolescent health literature.
Postpartum and beyond		
Delay or prevent repeat pregnancy	Adolescents' relatively high unmet need for contraception and the inherent health risks of early childbearing.	See section 9.2.13
Keep girls in school after getting pregnant	Adolescents by definition are in the school-going age group	Relatively strong direct evidence (section 8.4).
Involve the community	Adolescent mothers are less likely to use adequate pregnancy care because of various demand side determinants that families and communities can influence	Very little evidence related to pregnancy care specifically. Some evidence from the broader adolescent health literature.

Source: The author

Table 26: Key Elements of Adolescent-Specific Pregnancy Care by Health Services

Strategic approach / intervention	Justification for taking a different approach for adolescents (compared to older women)	Evidence of Adolescent-Specific Intervention Effectiveness
Pregnancy Care		
Test and counsel early on pregnancy	Adolescents tend to delay seeking abortion, resort to the use of less skilled providers, use more dangerous methods, and delay seeking care for complications. They are therefore more likely to suffer serious complications and even death, particularly the unmarried adolescents.	Very little research available
Place special attention on diagnosing and treating anemia	Greater susceptibility of adolescents to anemia compared to older mothers	Very limited evidence on adolescent-specific approaches
Improve nutritional status	Higher likelihood of low birth weight babies to adolescent mothers; Nutritional needs specific to adolescents	Very little evidence on intervention effectiveness in pregnant adolescents
Prevent and treat sexually transmitted infections during pregnancy	Higher likelihood of low birth weight babies to adolescent mothers Higher rates of sexually transmitted infections in pregnant adolescents	Very little evidence on intervention effectiveness in pregnant adolescents; promising evidence from broader adolescent reproductive health literature
Treat for malaria	Pregnant adolescents—especially first time mothers—are particularly susceptible to malaria	Little evidence on the effectiveness of adolescent-specific interventions
Give special attention to youngest adolescents	Risks to the adolescent mother and her newborn increase as age decreases, particularly to adolescents under 16 years old	No evidence on effectiveness of such interventions
Emphasize the plan for birth	Higher incidence of premature delivery	No evidence on effectiveness of such interventions
Visit adolescents at home	Relative social isolation, lack of mobility, and lower likelihood of seeking care at static health facilities	Mixed direct evidence on intervention effectiveness (section 8.4.1)
Detect gender-based violence	Higher vulnerability of adolescent mothers to gender-based violence compared to older women	Little evidence on the effectiveness of adolescent-specific interventions
Prevent mother-to-child transmission of HIV	Higher HIV infection rates in adolescent mothers versus older women; lower uptake of key PMTCT services	Some direct evidence on effectiveness of adolescent-specific components of PMTCT, especially VCT

Strategic approach / intervention	Justification for taking a different approach for adolescents (compared to older women)	Evidence of Adolescent-Specific Intervention Effectiveness
Reduce smoking and drug abuse	Higher rates of smoking and drug abuse among adolescent mothers	Very little evidence on intervention effectiveness in pregnant adolescents; Promising evidence from broader adolescent smoking cessation literature
Reach adolescents through IEC activities	Family and community barriers to the use of services by pregnant adolescents	Very little evidence on intervention effectiveness in pregnant adolescents; promising evidence from broader adolescent reproductive health literature
Childbirth Care (Care during labor & delivery)		
Give special attention to youngest adolescents	Risks to adolescents mother increase as age decreases	Very little evidence on intervention effectiveness in pregnant adolescents
Postpartum care for mothers and newborns		
Counsel on and provide support for breastfeeding	Lower likelihood that adolescent mothers will breastfeed their newborns appropriately	Some direct evidence from adolescent-focused pregnancy care interventions
Delay or prevent repeat pregnancy	Less use of and access to contraceptive information and services; greater likelihood that early childbearing will lead to repeat pregnancies. Relatively high unmet need for contraception and heightened health risks for adolescent mothers and their babies	Evidence of effectiveness is mixed
Visit adolescents at home	Less likelihood that adolescent mothers will use clinical services	Evidence summarized in section 8.4.1
Postnatal newborn care		
Visit adolescents at home	Relative social isolation, lack of mobility, and lower likelihood of seeking care at static health facilities	Mixed evidence on intervention effectiveness

Source: The author

Table 27: Key Elements of Adolescent-Specific Pregnancy Care by Health Systems

Strategic approach / intervention	Justification for taking a different approach for adolescents (compared to older women)	Evidence of Adolescent-Specific Intervention Effectiveness
Financing		
Reduce the cost of pregnancy care for adolescents	Adolescents have fewer financial resources than older women	Limited evidence (section 8.4.4)
Health care human resources		
Develop health worker competencies in addressing adolescent needs	Adolescents are less likely to use adequate pregnancy care Adolescents have special information and psychosocial needs	Some evidence related to pregnancy care specifically (see section 8.4.1), plus evidence from the broader literature on effectiveness of youth-friendly services.
Laws and policies		
Foster a more conducive legal and policy environment	Laws and policies in most countries are not favorable to enhancing access to and quality of care for pregnant adolescents	No hard intervention evidence about the effectiveness of legal and policy action but many promising approaches
Other health systems issues		
Organize services to better meet adolescent needs	Relatively low use of pregnancy care by adolescents because of	Some evidence related to pregnancy care specifically (see section 8.4.1), plus evidence from the broader literature on effectiveness of youth-friendly services.
Involve adolescents	Programs often do not appropriately serve adolescents, thus reducing use of needed care	Some intervention evidence about the effectiveness of "youth involvement," but many promising approaches

Source: The author

Table 28: Actions to Foster a Conducive Legal and Policy Environment for Pregnancy Care for Adolescents

1. Addressing the context for reproductive intentions
Publicizing and enforcing existing laws on the minimal age of marriage and establishing statutory marriage law applicable to all marriages.
Provide linkages with alternative options, e.g. increasing the age at marriage could be linked with universal education, availability of vocational training
Providing opportunities for formal education.
2. Addressing access to pregnancy care
Minimize restrictions or remove barriers to pregnant adolescents' access to services
Ensure dissemination of policies for making the adolescents aware of their rights and available services
Ensure that pregnant and parenting adolescents return to school
Ensure that reproductive health information and services for married and unmarried pregnant adolescents are legally available and widely accessible
3. Addressing unique pregnancy care needs of adolescents
Enact operational policies that recognize the age-specific medical problems affecting young women. Policy should acknowledge that the treatment and management of adolescent mothers differ in important ways from that of adult women.
Foster education policies and other policies that prevent expulsion of pregnant girls from school.
Integrating services to identify, refer and prevent domestic violence in primary health or reproductive health-care programs for adolescents.
Sensitizing safe motherhood programs to be particularly vigilant and responsive to the condition of physically abused adolescents during pregnancy and the postpartum period.
Enabling pregnant and parenting girls to continue their schooling. Traditionally, pregnant school girls have been forced to leave school. Policies designed to keep girls in school allow them to acquire education and develop skills that enhance their ability to care for themselves and their families and to increase their long-term employment opportunities.

Source: Adapted from (World Health Organization, 2007a; Youth-policy.com, 2008)

Table 29: School Policies Related to Pregnancy

Country	Policy
	Expulsion
Mozambique	Young women are expelled from school once it is discovered that they are pregnant.
Togo	Young women are required to drop out of school once it is discovered that they are pregnant.
Zanzibar	Young women are required to drop out of school once it is discovered that they are pregnant.
Mali	Pregnant young women are expelled and not allowed to reenter school after delivery.
	Continuation
Cameroon	Maternity leave is not required and is negotiable for pregnant young women, who may return to school immediately after the delivery. They can arrange for extra classes so as not to fall behind in their studies because of pregnancy.
Peru	The New Code of Children and Adolescents asserts that mothers who are children or adolescents shall not be hindered from beginning or continuing their education.
Madagascar	Young women may return to school immediately after the delivery, and maternity leave is not compulsory.
Namibia	After delivery, a young woman may return immediately to school upon the approval of a social worker who has confirmed that the baby has adequate child care. The policy takes into account the academic, physical, and psychological needs of mother and baby and provides for action against men (particularly teachers) responsible for the pregnancy.
Chile	A law was approved in 2000 that guarantees the rights of young women to continue and complete their education despite pregnancy and to demand necessary facilities from their schools. As of 2004, pregnant young women or young mothers cannot be prevented from registering for classes or be expelled from school, even if their attendance rate is below 85 percent.
Burkina Faso	Pregnant young women may remain in school during their pregnancy and may return directly after delivery.
	Reentry
Guinea-Conakry	Young women are temporarily suspended from school during pregnancy and allowed to reenter after a specified amount of time after delivery.
Kenya	As of 1994, young women may return to school after a specified period of compulsory maternity leave. School administers decide whether they may reenter the same school or be transferred to another school.
Botswana	Pregnant young women are barred from taking exams. It is encouraged that young men responsible for pregnancies discontinue their studies for a period of time and young women take a year-long maternity leave after delivery. Before a young woman is readmitted to school, she must produce the birth certificate for her baby, produce her own identity certificate, meet the age admission requirement, and produce a testimonial and school report from her previous school.
Malawi	The policy was recently changed so that both young women and young men must drop out of school until the baby is born and may return to school once child care arrangements have been made.
Zambia	As of 1997, young women are required to take a 12-month leave from school after delivery. Very few young women return to school because of stigma and fears of abuse at school.

Source: (National Research Council & Institute of Medicine, 2005)

Table 30: Level of Evidence for the Recommended Adolescent-specific Pregnancy Care Interventions

		Level of evidence			
Intervention category	Total # of interventions	Some direct, from evaluation of pregnancy care interventions	Indirect, from broader ARH literature	Both direct and indirect	No hard evidence from any source
Individual, family, and community	5	1	2	--	2
Health services	14	3	3	1	7
Health systems	5	1		3	1
Total	24	5	5	4	10

Source: The author

Table 31: Summary of Action Plan for Mainstreaming Adolescent Pregnancy in Making Pregnancy Safer Efforts

Action	Responds to
Advocate for attention to adolescent pregnancy	
Help governments to analyze the scope of adolescent pregnancy and its impact on health and well-being	Under-use of existing information for advocacy purposes
Mainstream adolescent pregnancy concerns into efforts to increase community awareness and demand for quality pregnancy care	Need for greater focus on subnational and community efforts
Pilot adolescent-specific advocacy approaches at the country level	Lack of experience advocating on adolescent pregnancy
Develop a consistent policy framework on adolescent pregnancy	Lack of an existing policy framework
Support changes in the legal and policy environment.	Need for policy reform
Provide technical support	
Review MPS-related national policy documents	Need to operationalize policy framework
Disseminate information on adolescent pregnancy through various channels	The varied information requirements of multiple audiences
Review all IMPAC tools and guidelines with an adolescent lens, and revise according to evidence base	Need to reflect the latest evidence on adolescent pregnancy care
Support implementation of adolescent-friendly care for pregnant adolescents	Technical support needs at the country level
Review preservice curricula	Lack of knowledge on what preservice institutions are teaching on adolescent pregnancy
Develop a tool to enable an adolescent-focused review of MPS-related policy documents and promote consistency with care recommendations	Need to operationalize policy framework
Monitor progress	
Promote the collection and use of data on the scope of adolescent pregnancy	Gaps in knowledge
Promote better age-specific data on health impacts, including on maternal and newborn mortality, and on cause of maternal death	Gaps in knowledge
Encourage collection, synthesis, and analysis of better age-specific information on use of key maternal health services	Gaps in knowledge
Catalog coverage of adolescent pregnancy care programs	Lack of information on the scope of pregnancy care programs that target adolescents
Support research	
Define and support a research agenda on adolescent pregnancy	Paucity in knowledge of health impact, program approaches, determinants of use, etc.
Pilot adolescent-specific technical and program approaches at the country level	Lack of a good evidence base on effective interventions
Improve the evidence base on costing of adolescent-focused approaches	Insufficient knowledge

Action	Responds to
Build effective partnerships	
Harmonize the actions of the various WHO departments dealing with adolescent pregnancy	Coordination requirements
Harmonize and collaborate with outside partners	Coordination requirements
Ensure consistency in data and on recommendations for interventions	Need to speak with a single voice
Use or adapt tools and guidelines as appropriate	Need to conserve scarce resources
Provide expertise to partner organizations on adolescent pregnancy issues	Capacity-building needs in partner organizations
Mainstream adolescent pregnancy issues in other safe motherhood and adolescent health awareness-raising and advocacy initiatives	Need for creating synergies among the various initiatives

Source: The author

Appendix 1: Summary of key findng

Key findings on scope of adolescent pregnancy

Question	Key finding
Population	
How many adolescents are there worldwide?	The current world population of adolescents ages 10-19 is about 1.2 billion, the largest cohort of adolescents ever. Females represent about 48% of the total in the 10-19 cohort, or currently about 600 million worldwide.
What proportion of the world's population are adolescents?	About one of every five people alive (18%) is an adolescent.
What are projected trends in number of adolescents?	This total number of adolescents worldwide is projected to peak in the year 2030 at about 1.3 billion, with about 90% living in developing countries. The proportion of the total population that are adolescents is projected to decline from 18% currently to about 13% by 2050.
To what extent do these projections vary by region?	Trends in the growth of the adolescent age group vary markedly by region. The population of adolescents has already peaked in the developed world and in East and South Eastern Asia. Adolescent populations have yet to peak in Latin American and the Caribbean, South Central Asia, West Asia, and sub-Saharan Africa.
Births	
How prevalent is adolescent childbearing?	About 15 million adolescent girls under age 20 give birth each year
What percent of births worldwide are to adolescents?	Roughly 11% of all births worldwide are to adolescents
Where does adolescent childbearing occur?	Half of all births to adolescents occur in just seven countries: India, Nigeria, Democratic Republic of Congo, Brazil, Bangladesh, China, and Ethiopia; just 15 countries account for two-thirds of the total births to adolescents worldwide.
Is adolescent childbearing a developed or developing country phenomenon?	The vast majority of births to adolescents—almost 95%—occur in developing countries.
To what extent does adolescent childbearing vary across countries and regions?	The prevalence of adolescent childbearing varies substantially by region and country. Births to adolescents as a percent of all births ranges from about 3% in Eastern Asia to 18% in Latin America and the Caribbean.
What is the rate of adolescent fertility?	The fertility rate worldwide for women ages 15-19 was estimated to be 52.0 per thousand for the 2005-2010 period, meaning that on average 5.2% of adolescents give birth each year.
To what extent do rates vary by country and region?	Adolescent fertility rates are highly variable between regions and countries. Adolescent fertility rates range from less than 1% per year in places like Japan and Korea, to over 20% per year in Democratic Republic of Congo.

Question	Key finding
To what extent do rates vary by levels of economic development?	Adolescent fertility rates in the less developed countries are more than twice as high compared to rates in more developed countries. The adolescent fertility rate in the least developed countries is almost five times the rate in the more developed countries.
What is the distribution of births within the adolescent age group?	Most of the childbearing in the 15-19 age group occurs in women 17-19 years old. Depending on the country, between 10 and 40% of adolescents 15-19 who give birth are 15 or 16 years old.
What is the prevalence of childbearing in the youngest adolescents?	Based on an average in 51 developing countries, about 9% of adolescents have given birth by age 16. Scattered evidence shows that a significant number of adolescents 10-14 give birth in some countries, although this number represents a relatively small proportion of all births to adolescents.
What are the long-term trends in adolescent childbearing?	Rates of adolescent childbearing have dropped in most countries and regions in the past three decades.
What has been the magnitude of the recent decline in adolescent fertility rates?	In developing countries with recent national surveys, declines in adolescent fertility rates in the past two decades averaged between 16% in Eastern and Southern Africa to 50% in North Africa/West Asia/Europe.
Is childbearing falling faster among the youngest adolescents?	Yes. In almost all developing countries with national surveys, the proportion of women giving birth by age 16 has fallen faster than the proportion giving birth by age 18.
Abortion	
How many adolescents resort to induced abortion?	Relatively few countries have reliable data on abortions to adolescents. However, an indirect estimate based on the number of live births yields a figure of 5.7 million induced abortions per year.
To what extent to adolescents resort to unsafe abortion?	Adolescents 15-19 undergo approximately 2.5 million unsafe abortions per year.
What proportion of unsafe abortion is to adolescents?	About 14% of all unsafe abortions are to adolescents 15-19.
How does the proportion of unsafe abortion to adolescent vary by region?	Unsafe abortion is far more concentrated among adolescents in Africa than in other regions; adolescents 15-19 in Africa account for about 25% of unsafe abortion in the regions versus less than 10% in Asia and about 15% in Latin America and the Caribbean.
Pregnancy	
How many adolescents get pregnant?	Because of the uncertainty over the extent of abortion, no good estimate exists worldwide on the number of adolescent pregnancies. However, an indirect estimate based on the number of live births yields a figure of 25.9 million pregnancies per year to adolescents worldwide.

Key findings on context for adolescent pregnancy

Question	Key finding
Planning status of pregnancy	
What proportion of adolescent pregnancies are planned?	Worldwide, about 75% of adolescent pregnancies are planned.
To what extent does the planning status of adolescent pregnancies vary by country?	Wide variation exists in the proportion of adolescent pregnancies that are planned, from 42% in Colombia to 93% in Egypt, based on recent national survey results. Proportions of planned adolescent pregnancies are lower in U.S. and other developed countries.
To what extent does planning status of adolescent pregnancy vary by marital status?	Married adolescents are typically twice as likely to plan their pregnancy as unmarried adolescents.
How does planning status in adolescent pregnancy compare with planning status in older women?	In developing countries, there is no clear pattern.
Childbearing within marriage	
What percentage of births to adolescents occur within marriage?	Worldwide in developing countries, about 90% of births to adolescents occur within marriage.
To what extent does childbearing within marriage vary by region?	The proportion of adolescents giving birth within marriage is close to 100% in Western Asia/Northern Africa, the former Soviet Asia, and South-Central and South-Eastern Asia, while between 70-80% in South America and in sub-Saharan Africa.
What is the trend in the proportion of first births to adolescents that occur within marriage?	The overall trend is slightly downward, especially in South America and Eastern/Southern Africa.
Coerced sex and pregnancy	
To what extent is coerced sex a problem for adolescents?	Studies in a wide range of developed and developing countries report rates of sexual abuse of between 1% and 21% among girls under age 15. Between 0.4 and 30% of women report their first sexual experience as coerced.
To what extent is intimate partner violence a problem for adolescents?	Studies report that between 3.6 and 50.0% of young women ages 15-19 report being subject to at least one act of physical violence by their intimate partner in the past year.
Is intimate partner violence more of a problem for adolescents?	Yes. In most countries, rates of current physical violence by an intimate male partner are highest in the 15-19 age group.
How many pregnancies result from non-consensual sex?	The scattered information available from developed countries shows that 30 – 60% of adolescent pregnancies may result from non-consensual sex. Virtually no information is available from developing countries.
Proximate factors influencing the context for adolescent pregnancy	
What are the trends in age at puberty/menarche?	Worldwide, both boys and girls are experiencing puberty at an earlier age
What are the trends in age at first marriage?	Age at first marriage has gradually increased in most regions, with the exception of Latin America
What are the trends in the initiation of sexual activity?	Most young people initiate sexual activity in adolescence. However, age at initiation is not decreasing and may be increasing in sub-Saharan Africa.

Question	Key finding
What are the trends in premarital sexual activity?	Premarital sexual activity is increasing in most developing countries.
What are levels of contraceptive use among adolescents?	Use of contraception is low among both married and unmarried adolescents.
To what extent is there unmet need for contraception among adolescents?	About one fourth of adolescents have an unmet need for contraception.
How does unmet need for contraception for adolescents compare with unmet need among older women?	Adolescents have greater unmet need for contraception than older women.
Underlying social, economic, and cultural factors influencing the context for adolescent pregnancy	
What underlying factors are associated with adolescent pregnancy?	There are several well-established associations between exposure to adolescent pregnancy and underlying and inter-related contextual factors. For example, higher likelihood of becoming pregnant is linked to lower educational attainment, rural residence, lower socioeconomic status, and less exposure to mass media.

Key findings on health impacts

Question	Key finding
Health of mothers	
Is adolescent pregnancy risky to the health of mothers?	The findings are not clear-cut, but the evidence appears to support the existence of an independent effect of early maternal age on maternal health problems, even after controlling for factors such as giving birth for the first time, socioeconomic differences, and use of prenatal care.
Does the health risk to the adolescent mother increase as age at childbearing decreases?	Yes. Many studies show that health risks progressively increase as adolescent age falls. An adolescent who gives birth before age 16 faces much higher risk compared to a women in her 20s. Giving birth between 16 and 17 may raise the risk to the adolescent mother. If an 18 or 19-year-old gives birth, she probably faces the same risk as someone in her 20s.
Is there an age before which getting pregnant is "unsafe" for mothers?	The evidence is fairly clear that childbearing before 16 carries inherently higher health risks for mothers. These health risks appear to decrease gradually as adolescent childbearing age increases.
Is adolescent childbearing inherently riskier to the health of mothers in some countries or regions than in others?	Not enough information is available to definitively answer this question. Studies from various countries, including in both developed and developing countries, have found increased risk of health problems associated with adolescent pregnancies, compared with the risks associated with women giving birth in their 20s. A greater proportion of studies in developed countries versus developing countries found adolescent mothers and their newborns at higher risk than older mothers.
How much more risky is adolescent childbearing compared to childbearing in one's twenties?	Different studies give different answers as to the magnitude of the increased risk of early childbearing. Large-scale controlled studies have found a two- to four-fold higher risk of maternal death in mothers under 16 compared to mothers in their twenties. Studies that did not control for possible confounding factors found risks for adolescents to be 50-100% higher.
Causes, number, and burden of disease of maternal death	
Are causes of maternal death different in adolescents compared to older mothers?	Not enough is known about cause of death by maternal age to answer this question.
How many adolescents die each year from maternal causes?	About 66,000 a year die from maternal causes.
What proportion of all maternal deaths are to adolescent mothers?	12.9% of all deaths from maternal conditions are to adolescents.
What is the pregnancy-related burden of disease for adolescents?	Pregnancy-related health problems caused adolescent women ages 10-19 to lose 7,787,000 DALYs in 2002, making pregnancy-related disease the leading cause of burden of disease in adolescents.
What proportion of pregnancy-related burden of disease is attributable to adolescents?	Maternal conditions in adolescents account for 23% of all DALYs lost from maternal conditions in women of all ages.

Question	Key finding
Risk of underlying health behaviors or existing health problems that affect maternal and newborn health outcomes	
Which underlying health behaviors or existing health problems are more pronounced for adolescents compared with older mothers?	There is fairly strong evidence that adolescent mothers have higher risk of substance abuse, maternal smoking, poor nutrition, anemia, malaria, and HIV and other sexually transmitted infections compared with older mothers.
What do we know about other underlying health behaviors or existing health problems?	There is no evidence on whether female genital mutilation affects adolescent mothers differently from older mothers.
Risk of specific maternal health problems	
Which specific maternal health problems appear to be more pronounced among adolescents compared with older mothers?	Conditions for which there is fairly strong evidence on the association between adolescent childbearing and maternal health problems include poor nutrition during pregnancy, unsafe abortion complications, mental illness, and post-partum hemorrhage.
Which maternal health conditions appear to carry the same risk in adolescents as for older women?	Conditions which appear to carry no added risk for adolescents include prolonged labor, hypertensive disease and iodine deficiency.
Which maternal health conditions appear to carry lower risk in adolescents as for older women?	Conditions which appear to carry lower risk for adolescents include ante-partum hemorrhage, diabetes, and caesarean section.
Health of newborns	
Is adolescent pregnancy risky to the health of newborns?	The evidence is fairly strong of an independent effect of early maternal age on newborn health problems, even after controlling for factors such as giving birth for the first time, socioeconomic differences, and use of prenatal care.
Does the health risk to the newborn increase as age at childbearing decreases?	Yes. Studies show that health risks increase at younger ages. A baby born to an adolescent under 16 faces much higher risk compared to one born to a women in her 20s. Giving birth between 16 and 17 still carries a higher risk to the newborn. Babies born to 18 or 19-year-olds also appear to be at higher risk.
Is there an age before which getting pregnant is "unsafe" for newborns?	Childbearing under age 20 places newborns at higher risk.
Is adolescent childbearing inherently riskier to the health of newborns in some countries or regions than in others?	Not enough information is available to sufficiently answer this question. However, studies from various countries, including in both developed and developing countries, have found increased risk of health problems in babies born to adolescent mothers.
How much more risky to the health of newborns is adolescent childbearing compared to childbearing in one's twenties?	Different studies give different answers as to the magnitude of the increased risk of early childbearing. A large U.S. study found a 55% higher risk of neonatal death to babies of mothers ages 10-15, a 19% higher risk in babies of 16-17 year-olds, and a 6% higher risk in babies of 18-19 year-olds (Chen et al. 2007a). A large study in Latin America found a 50% higher risk of neonatal death to babies of mothers under 16 (Conde-Agudelo et al. 2005). Unadjusted neonatal death risk levels are typically 50-100% higher in newborns of adolescents versus newborns of older women.

Question	Key finding
Causes and number of newborn deaths	
Are causes of newborn death different in babies of adolescents compared to babies of older mothers?	Not enough is known about cause of newborn death by age of mother to answer this question.
How many newborns of adolescents die each year?	Not enough is known about newborn death by age of mother to answer this question.
What proportion of all newborn deaths are to babies of adolescent mothers?	Not enough is known about newborn death by age of mother to answer this question.
Risk of specific newborn health problems	
Which newborn health problems appear to be more pronounced among babies of adolescents compared with babies of older mothers?	Conditions for which there is fairly strong evidence on the association between adolescent childbearing and newborn health problems include preterm birth, low birth weight, small for gestational age, asphyxia, and malformations.
Which newborn health conditions appear to carry the same risk in babies of adolescents as in babies of older women?	Conditions which appear to carry no added risk for newborns of adolescents include low Apgar scores, and stillbirth.
Which newborn health conditions appear to carry lower risk in babies of adolescents as for babies of older women?	No conditions appear to carry lower risk for newborns of adolescents.
Other health impacts of adolescent childbearing	
What other health risks (or benefits) are associated with adolescent pregnancy?	Early childbearing may independently raise the risk of mother's premature death later in life, increase mental illness, increase obesity, and reduce mother's final adult height. However, it does not appear to affect maternal bone growth.

Key findings on use of pregnancy care by adolescents

Question	Key finding
Care during pregnancy	
Are adolescents relatively disadvantaged with regard to use of antenatal care, compared to older women?	Evidence from most studies shows that adolescents are disadvantaged in their use of care relative to older women. Almost all small-scale studies find substantially worse use of antenatal care by pregnant adolescents. Information from national surveys, however, shows that adolescent fare worse in some countries but better in others.
Are adolescents relatively disadvantaged with regard to use of PMTCT, compared to older women?	Yes. Evidence from national surveys shows that in the large majority of countries adolescents are less knowledgeable about AIDS transmission, less likely to know about ways to prevent maternal to child transmission of HIV, and less likely to counseled and tested for HIV.
Are adolescents relatively disadvantaged with regard to use of abortion and postabortion care, compared to older women?	Several small-scale studies show that compared to older women, a young woman is more likely to wait until the later stages of pregnancy to seek abortion, resort to an unskilled abortion provider or use dangerous methods to self-abort, and delay seeking care for complications.
Childbirth care	
Are adolescents relatively disadvantaged with regard to use of skilled delivery care, compared to older women?	Evidence from national surveys gives a mixed answer to this question. In some countries, adolescents use less skilled birth attendance, while in others they have the same or greater use. Other relatively high-quality studies have mostly reported no differences between adolescents and older women.
Are adolescents more or less likely to deliver in a health institution, compared to older women?	Evidence from national surveys gives a mixed answer to this question. In some countries, adolescents are less likely to deliver their baby in a health institution, while in others they have the same or greater likelihood. Evidence from other studies have also shown mixed results.
Postpartum maternal care	
Are adolescents relatively disadvantaged with regard to use of postpartum maternal care, compared to older women?	Evidence from national surveys gives a mixed answer to this question.
Newborn care (birth and immediate postnatal)	
Are adolescents more or less likely to breastfeed their newborns, compared to older women?	Some recent evidence from the U.S. suggests that adolescents are less likely to breastfeed their newborns. Generally, however, very little is known about breastfeeding rates by age of mother.
Are adolescents more or less likely to immunize their newborns, compared to older women?	Evidence, almost all of it from national surveys, does not give a clear answer to this question. In some countries, adolescent mothers are less likely to immunize their baby, while in others they have the same or greater likelihood.
Postnatal newborn care	
Are adolescents relatively disadvantaged with regard to use of postnatal newborn care, compared to older women?	Not enough information is available to be able to answer this question.

Key findings on social and economic impacts of adolescent pregnancy

Question	Key finding
What is the impact of adolescent pregnancy on the social and economic opportunities and status of adolescent mothers and their children?	Numerous studies have shown an association between adolescent pregnancy and negative social and economic effects on both the mother and her child. However, the evidence is still inconclusive about the whether adolescent pregnancy is the cause or consequence of adverse socioeconomic outcomes for the individual.
What impact does adolescent pregnancy have on national social and economic progress?	To the extent that early childbearing increases population momentum, a major factor driving rapid population growth in developing countries, early childbearing could impede economic and social progress.

Key findings on social and econimic impacts of adolescent pregnancy

Question	Key finding
What is the impact of adolescent pregnancy on the social and economic opportunities and status of adolescent mothers and their children?	Numerous studies have shown an association between adolescent pregnancy and negative social and economic effects on both the mother and her child. However, the evidence is still inconclusive about the whether adolescent pregnancy is the cause or consequence of adverse socioeconomic outcomes for the individual.
What impact does adolescent pregnancy have on national social and economic progress?	To the extent that early childbearing increases population momentum, a major factor driving rapid population growth in developing countries, early childbearing could impede economic and social progress.

Key findings on use of pregnancy care by adolescents

Question	Key finding
Care during pregnancy	
Are adolescents relatively disadvantaged with regard to use of antenatal care, compared to older women?	Evidence from most studies shows that adolescents are disadvantaged in their use of care relative to older women. Almost all small-scale studies find substantially worse use of antenatal care by pregnant adolescents. Information from national surveys, however, shows that adolescent fare worse in some countries but better in others.
Are adolescents relatively disadvantaged with regard to use of PMTCT, compared to older women?	Yes. Evidence from national surveys shows that in the large majority of countries adolescents are less knowledgeable about AIDS transmission, less likely to know about ways to prevent maternal to child transmission of HIV, and less likely to counseled and tested for HIV.
Are adolescents relatively disadvantaged with regard to use of abortion and postabortion care, compared to older women?	Several small-scale studies show that compared to older women, a young woman is more likely to wait until the later stages of pregnancy to seek abortion, resort to an unskilled abortion provider or use dangerous methods to self-abort, and delay seeking care for complications.
Childbirth care	
Are adolescents relatively disadvantaged with regard to use of skilled delivery care, compared to older women?	Evidence from national surveys gives a mixed answer to this question. In some countries, adolescents use less skilled birth attendance, while in others they have the same or greater use. Other relatively high-quality studies have mostly reported no differences between adolescents and older women.
Are adolescents more or less likely to deliver in a health institution, compared to older women?	Evidence from national surveys gives a mixed answer to this question. In some countries, adolescents are less likely to deliver their baby in a health institution, while in others they have the same or greater likelihood. Evidence from other studies have also shown mixed results.
Postpartum maternal care	
Are adolescents relatively disadvantaged with regard to use of postpartum maternal care, compared to older women?	Evidence from national surveys gives a mixed answer to this question.
Newborn care (birth and immediate postnatal)	
Are adolescents more or less likely to breastfeed their newborns, compared to older women?	Some recent evidence from the U.S. suggests that adolescents are less likely to breastfeed their newborns. Generally, however, very little is known about breastfeeding rates by age of mother.
Are adolescents more or less likely to immunize their newborns, compared to older women?	Evidence, almost all of it from national surveys, does not give a clear answer to this question. In some countries, adolescent mothers are less likely to immunize their baby, while in others they have the same or greater likelihood.
Postnatal newborn care	
Are adolescents relatively disadvantaged with regard to use of postnatal newborn care, compared to older women?	Not enough information is available to be able to answer this question.

Key findings on determinants of pregnancy case-seeking behaviour

Question	Key finding
Demand Side Determinants	
Do adolescents have less autonomy than older women when it comes to decisions about seeking pregnancy care?	Yes. Several studies in developing countries find that adolescents have less autonomy compared to older women.
Does the influence of education level on health-seeking behavior vary according to the mother's age?	Although education is generally associated with improved health-seeking behavior, there is no evidence that this effect is greater for adolescents that for older women.
Are financial constraints a greater factor in health-seeking behavior for adolescents compared with older women?	Yes. Although no study compares the relative influence of financial constraints by age, it can be inferred that financial constraints play a greater role in adolescent decision-making because adolescents have fewer resources and have less control over the resources they do have.
Do adolescents have less ability to leave their homes to seek health care compared to older women?	Yes. Pregnant and mothering adolescents have more limited mobility compared to older women, especially after marriage
Does coercion and violence in pregnancy affect pregnant adolescents to a greater degree than older women?	Adolescents may suffer more from violence and coercion during pregnancy than older women. Those pregnant adolescents who do endure coercion and violence may be affected more than older women who suffer from coercion and violence in pregnancy.
Do social and cultural factors affect use of pregnancy care differently in adolescents compared to older women?	No. There is no evidence that the various social and cultural factors influencing use of care affect adolescents any differently than older women.
Supply Side Determinants	
Is distance to health care a more important determinant of service use for adolescents than for older women?	Distance is an important determinant of use of services, but there is no information on whether it affects adolescents to a greater or lesser degree.
To what extent does the treatment adolescents receive from health care workers affect their use of services?	Evidence shows that judgmental attitudes and lack of knowledge of how to deal with the special needs of adolescents can negatively affect their use of services.
To what extent do features of the policy, legal, and regulatory environment affect adolescent use of pregnancy?	The policy, legal, and regulatory environment can have a profound impact on access to and use of pregnancy care.

Key findings on program effectiveness

Question	Key finding
What countries or regions furnish the majority of evidence on the effectiveness of adolescent-specific pregnancy care?	About four-fifths of the evidence on program effectiveness comes from studies in the U.S. and other developed countries.
Are adolescent-specific approaches to pregnancy care effective?	Almost all of the 37 programs analyzed were effective in improving at least one key outcome of either health-seeking behavior, maternal and newborn health, parenting skill, or child development. However, many programs were not able to influence other key outcomes.
What do adolescent pregnancy care programs cost? Are they cost-effective and cost-beneficial?	Almost no evidence exists on the costs, cost-effectiveness, or cost-benefit of adolescent pregnancy care programs. Only one intervention study reported costs and cost-benefit (Key *et al.* 2008).
What is the scope of current adolescent-specific approaches to pregnancy care?	Very little information exists about the scope of such approaches. What little information that does exist points to a general lack of such programs.

Appendix 2: Detail on Studies on Risk of Maternal Death in Adolescents vs. Older Women

Key findings on scope of adolescent pregnancy

						Rates of Maternal Death				Crude odds ratio			Adjusted odds ratio		
						Adolescents		Older Women							
Country	Study	Time Period	Population	Ado-lescent deaths	Measure	Age Group	Level	Age Group	Level	Ratio of adolescent to older group	Signifi-cance Level	Signifi-cant?	Ratio of adolescent to older group	Signifi-cance level	Sig-nifi-cant?
Bangladesh 15-19	Hill et al 2003	1999-2001	national survey	131	MM ratio	15-19	170	20-24	237	0.72	n.a.	n.a.	n.a.	n.a	n.a
Chile 15-19	Donoso et al 2003	1990-99	national study	75	MM ratio	15-19	19.3	20-34	26.8	0.72	95% CI: 0.56 to 0.92; P < 0.008	yes	n.a.	n.a.	n.a.
United States 15-19	Berg et al 2003	1991-1997	death certifi-cates	3201	PRMR	15-19	8.4	20-24	9.4	0.89	census	yes	n.a.	n.a.	n.a.
Latin America 18-19	Conde-Agude-lo et al 2005	1985-2003	hospital-based	76	MMrate	18-19	40	20-24	41	0.98	n.a.	n.a.	1.00	(0.72-1.3), 95% CI	no
Latin America 16-17	Conde-Agude-lo et al 2005	1985-2003	hospital-based	48	MMrate	16-17	40	20-24	41	0.98	n.a.	n.a.	0.98	(0.66-1.32), 95% CI	no
Brazil 15-19	Family Care International 1998 cited in Mathur et al 2003	n.a.	n.a.	n.a.	MM ratio	15-19	90	20-34	70	1.29	n.a.	n.a.	n.a.	n.a.	n.a.
Mozambique <20	Granja et al 2001 cited in Treffers	1989-1993	hospital-based	53	Mmratio	<20	387	>20	294	1.32	n.a.	n.a.	n.a.	n.a.	n.a.
Latin America <20	Conde-Agude-lo et al 2005	1985-2003	hospital-based	186	MMrate	<20	54	20-24	41	1.32	n.a.	n.a.	1.12	(0.87-1.37), 95% CI	no
Netherlands	Schuitemaker et al 1998 cited in Treffers	1983-1992	community-based	n.a.	MM ratio	n.a.	11.9	25-29	8.3	1.43	95% CI: 0.4-4.1	no	n.a.	n.a.	n.a.
Bangladesh <20	Chowdhury et al 2007	1976-2005	community-based	769	Rate per 100K preg	≤ 19	430	20-29	282	1.52	p < 0.0001	yes	0.92	p = 0.462	no
Chile <15	Donoso et al 2003	1990-99	national study	4	MM ratio	<15	41.9	20-34	26.8	1.56	95% CI: 0.50 to 4.31; P = 0.372	no	n.a.	n.a.	n.a.

						Rates of Maternal Death				Crude odds ratio			Adjusted odds ratio		
United States <15	Berg et al 2003	1991-1997	death certificates	3201	PRMR	< 15	15.4	20-24	9.4	1.64	census	yes	n.a.	n.a.	n.a.
Senegal 15-19	Ronsmans et al 2001 cited in Treffers	?	population-based	?	MMrate	15-19	n.a.	20-24	n.a.	1.70	CI: 0.9 - 3.5	no	n.a.	n.a.	n.a.
West Africa 15-19	Bouvier-Colle et al 2001 cited in Treffers	?	population-based	?	Mmrate	15-19	350.4	20-24	204	1.72	95% CI: 175-627	no	n.a.	n.a.	n.a.
Indonesia 15-19	Family Care International 1998 cited in Mathur et al 2003		n.a.	n.a.	MM ratio	15-19	1050	20-34	575	1.83	n.a.	n.a.	n.a.	n.a.	n.a.
Bangladesh 15-19	Family Care International 1998 cited in Mathur et al 2003		n.a.	n.a.	MM ratio	15-19	825	20-34	450	1.83	n.a.	n.a.	n.a.	n.a.	n.a.
India 15-19	Krishna 1995 Cited in the Fact Sheet on Adolescent Health 2007, WHO SEARO.	n.a.	n.a.	n.a.	MM ratio	15-19	645	20-34	342	1.89	n.a.	n.a.	n.a.	n.a.	n.a.
Nigeria < 20	Airede and Ekele 2003	1990-1999	hospital-based	46	MM ratio	<20	4863	>=20	2151	2.26	n.a.	n.a.	n.a.	n.a.	n.a.
Nigeria 15-19	Family Care International 1998 cited in Mathur et al 2003		n.a.	n.a.	MM ratio	15-19	540	20-34	215	2.51	n.a.	n.a.	n.a.	n.a.	n.a.
Ethiopia 15-19	Family Care International 1998 cited in Mathur et al 2003		n.a.	n.a.	MM ratio	15-19	1250	20-34	420	2.98	n.a.	n.a.	n.a.	n.a.	n.a.
Ethiopia 15-19	Kwast 1986 cited in Treffers		community-based	8	MMrate	15-19	1270	25-29	360	3.53	n.a.	yes	n.a.	n.a.	no
Latin America <16	Conde-Agudelo et al 2005	1985-2003	hospital-based	62	MMrate	≤ 15	185	20-24	41	4.51	n.a.	n.a.	4.09	(3.86-4.34), 95% CI	yes

						Rates of Maternal Death				Crude odds ratio			Adjusted odds ratio		
Nigeria <15	Harrison et al 1985a cited in Treffers	1985 (?)	hospital-based	n.a.	Mmrate	< 15	2700	20-24	400	6.75	n.a.	n.a.	n.a.	n.a.	n.a.
Bangladesh 15-19	Ronsmans and Campbell 1998	1982-1993	community-based	66		15-19	n.a.	20-29	n.a.	n.a.	n.a.	n.a.	1.65	95% CI: 1.12-2.45	yes

Source: Author

Appendix 3: Studies Comparing Health Impact of Pregnancy in Adolescents versus Older Women

Citation	Location	Study Design	Analytic Methods	Adolescent Age Group	Refer-ence Age Group	Controlled for
Developed Countries						
(Alexander, Salihu & Rouse, 2004), Survival of triplets who are born to teen mothers in the United States	U.S.	A retrospective cohort study of 354 triplet births to teenage mothers and 6858 to young mature mothers (20-29 years) who were delivered from 1995 through 1998.	Compared the occurrence of stillbirth and neonatal and infant mortality rates between the 2 categories by means of the generalized estimating equation. Similar analyses were conducted for singleton pregnancies and twin pregnancies.	<20	20-29	no
(Berg et al. 2003), Pregnancy-Related Mortality in the United States, 1991–1997	U.S.,	Describes trends in pregnancy-related mortality and risk factors for pregnancy-related deaths in the United States for the years 1991 through 1997. n = 3200 pregnancy-related deaths	In collaboration with the American College of Obstetricians and Gynecologists and state health departments, the Pregnancy Mortality Surveillance System, part of the Division of Reproductive Health at the Centers for Disease Control and Prevention, has collected information on all reported pregnancy-related deaths occurring since 1979. Data include those present on death certificates and, when available, matching birth or fetal death certificates. Data are reviewed and coded by clinically experienced epidemiologists. The pregnancy-related mortality ratio was defined as pregnancy-related deaths per 100,000 live births.	<15 15-19	20-24	no
(Boden, Fergusson & John, 2008). Early motherhood and subsequent life outcomes	New Zealand	Data were gathered as part of the Christchurch Health and Development Study, a 25-year longitudinal study of a birth cohort of New Zealand children. Information was obtained on: (a) the history of pregnancy and parenthood for female participants over the period 15-21 years; (b) measures of DSM-IV mental disorders and suicidal behavior over the interval 21-25 years; (c) measures of educational achievement over the interval 21-25 years; (d) measures of welfare dependence, workforce participation, and income over the interval 21-25 years; and (e) childhood, family and related confounding factors.	bivariate, multivariate	<21	>21	social, background, and family factors

Citation	Location	Study Design	Analytic Methods	Adolescent Age Group	Refer-ence Age Group	Controlled for
(Branum, 2006), Teen maternal age and very preterm birth of twins	U.S.	Cross-sectional analysis of the US 1995--2000 Matched Multiple Birth Data Set.	Calculation of the risk of very preterm birth (< 33 weeks' gestation) for teen and young adult mothers of twins (= 16 years, 17-- 18 years, 19--20 years), compared to 21--24 year olds, stratified by race/ethnicity. Adjusted odds ratios were estimated controlling for marital status and entry into prenatal care	<=16, 17-18, 19-20	21-24	marital status, entry into prenatal care, parity
(Briggs, Hopman & Jamieson, 2007), Comparing pregnancy in adolescents and adults: obstetric outcomes and prevalence of anemia	Canada	A retrospective chart review of 207 adolescents (<or19 years old) and 415 adults (>or20 years old) whose prenatal care was provided by a single obstetrician in Kingston, Ontario, and who had a live singleton birth at >or24 weeks gestation between 1996 and 2004	Multivariate logistic regression	<=19	>=20	First birth, low pre-pregnancy BMI, smoking, low pre-delivery Hb concentration, UTI during pregnancy, infant sex, anemia
(Chen et al. 2007b), Teenage pregnancy and congenital anomalies: which system is vulnerable?	U.S.	A retrospective cohort study of 5 542 861 nulliparous pregnant women younger than 35 years of age with a live singleton birth between 1995 and 2000 in the USA	Multiple logistic regression	13-19	20-34	state, year of birth, race, education, marital status, tobacco and alcohol use during pregnancy, initiation of prenatal care, sex of infant
(Chen et al. 2007a), Teenage pregnancy and adverse birth outcomes: a large population based retrospective cohort study	U.S.	A retrospective cohort study of 3,886,364 nulliparous pregnant women <25 years of age with a live singleton birth during 1995 and 2000 in the United States.	multivariate	10-19	20-24	State of birth, maternal race, marital status, tobacco smoking and alcohol drinking during pregnancy, prenatal care status
(Delpisheh et al. 2006), Adolescent smoking in pregnancy and birth outcomes	U.K.	A retrospective cohort analysis of 534 adolescents (<or=19 years) and 8972 adults who delivered singleton births between 1998-2003 at the Liverpool Women's Hospital.	Chi-square, analysis of variance (ANOVA), and independent sample t-tests, stepwise logistic regression	<=19	>=20	no
(Dewan et al. 2003), The effects of smoking on birthweight-for-gestational-age curves in teenage and adult primigravidae	U.K.	A retrospective analysis of the perinatal database at the Liverpool Women's Hospital for the years 1997-1999 for teenage and adult primigravidae. N= 1157 primigravidae	Odds ratios and their 95% confidence intervals (95% CI) were calculated, and Chi-squared tests were used for comparison of proportion. Regression analysis was used to estimate smoothed quadratic curves for birthweight for gestational age.	<20	>=20	First birth

Citation	Location	Study Design	Analytic Methods	Adolescent Age Group	Refer-ence Age Group	Controlled for
(Ekeus et al. 2006), Psychiatric morbidity is related to parental age: a national cohort study	Sweden	This was a cohort study based on Swedish national registers. A national cohort of 292129 children born to primiparas women during 1973-1979 was followed prospectively from 1987 to 2002 in registers.	Multivariate Cox analyses of proportional hazards were used to estimate the relative risk of hospital admission for schizophrenia, alcohol and illicit drug abuse, suicide attempts and deaths.	12-19	25-29	first birth, age, sex, child welfare intervention, illicit drug abuse in parents, alcohol addiction in parents, psychiatric illness in parents, housing, residency, social welfare, ethnicity, SES, single parenthood and paternal age
(Figueiredo, Pacheco & Costa, 2007), Depression during pregnancy and the postpartum period in adolescent and adult Portuguese mothers	Portugal	The Edinburgh Postnatal Depression Scale (EPDS) was administered to 108 (54 adult and 54 adolescent) Portuguese women at 24-36 weeks of pregnancy and at 2-3 months postpartum.	Bivariate, multivariate stepwise regression	<18	19-40	socio-demographics
(Galvez & Myles, 2005), Teenage pregnancy in the Texas Panhandle	U.S. (Texas)	Chart review of Medicaid patients (513 teenage [under 20 years] and 174 adult controls [ages 25-34]) delivered (excluding multiple gestation) in Amarillo, Texas, from January 1999 to April 2001		<20	25-34	
(Gilbert et al. 2004), Birth outcomes in teenage pregnancies	U.S. (California)	A data-set linking birth and death certificates with maternal and neonatal hospital discharge records in California was utilized to identify nulliparous women (11 to 29 years of age) who delivered between January 1,1992 and December 31,1997. Pregnancy outcomes of early (11-15 year) and late (16-19 year) teenagers were compared to those of a control group of women aged 20-29.	Odds ratios with a 99% confidence interval calculated for age and racial groups and compared to white women 20-29	11-15, 16-19	20-29	First birth
(Gillmore et al. 2006), Women Who Gave Birth as Unmarried Adolescents: Trends in Substance Use from Adolescence to Adulthood	U.S.	The data come from an ongoing longitudinal study of 240 young women who were unmarried, pregnant, and under age 18 at enrollment. They have been interviewed regularly from pregnancy through 11.5 years postpartum. The data are based on self-reported substance use verified by random urinalysis for drug metabolites.	A trend analysis was conducted using the GLM-repeated measures; study compared drug use in sample to that in the Monitoring the Future Study, a national probability sample of U.S. adolescents and adults	<17	n.a.	No

Citation	Location	Study Design	Analytic Methods	Adolescent Age Group	Refer-ence Age Group	Controlled for
(Gupta, Kiran & Bhal, 2008), Teenage pregnancies: Obstetric characteristics and outcome	U.K. (Glamorgan region)	Pregnancy outcomes of primigravid women were compared in age groups less than 20 years (n = 4126) and 20 to less than 35 years (n = 17,615).	Student's t-test was used for continuous variables, Chi square, Fishers exact test was used for categorical variables.	<20	20-35	First birth
(Haldre et al. 2007), Is a poor pregnancy outcome related to young maternal age? A study of teenagers in Estonia during the period of major socio-economic changes (from 1992 to 2002)	Estonia	Registry study using the data from the Estonian Medical Birth Registry (EMBR) for years 1992-2002; EMBR data were linked with infant deaths in the Estonian Mortality Database. Study population included 51,890 women aged 13-24 years, arranged into three groups: < or =17, 18-19, and 20-24.	Crude odds ratios (OR), adjusted ORs and their 95% confidence intervals (CI) for the different outcomes were estimated using multiple logistic regression analysis.	13-17 18-19	20-24	First birth, sethnicity, marital status, place of residence, calendar year, , smoking, antenatal care
(Hand et al. 2006). Psychiatric symptoms among postpartum women in an urban hospital setting	U.S.	The object of this study was to evaluate postpartum women for psychiatric symptomatology including cognitive disturbances, anxiety, depression, and anger to better meet their needs for support and involve them in the care of their infants. Interviews were done of 52 postpartum mothers at the Bronx Lebanon Hospital Center within 5 days of delivery and determined the presence of psychiatric symptoms using the 29-item Psychiatric Symptom Index.	Abstract does not report in detail	?	?	?
(Harden et al. 2007). A behavior genetic investigation of adolescent motherhood and offspring mental health problems	Australia	The present study examines the relations between adolescent motherhood and children's behavior, substance use, and internalizing problems in a sample of 1,368 children of 712 female twins from Australia.	Bivariate, multivariate controlling for background factors	<=20	>20	twins, home environment
(Henretta, 2007), Early childbearing, marital status, and women's health and mortality after age 50	U.S.	Data are drawn from the Health and Retirement Study birth cohort of 1931-1941. N=4,335	Cox regression analysis	<20	>=20	early and later socio-economic status

Citation	Location	Study Design	Analytic Methods	Adolescent Age Group	Refer-ence Age Group	Controlled for
(Howie et al. 2003), Excessive maternal weight gain patterns in adolescents	U.S.	Data from the Centers for Disease Control & Prevention 2000 natality file were analyzed to examine weight gain among adolescents (< or=19 years) compared with their older counterparts (> or=20 years). Using the Institute of Medicine guidelines, excessive weight gain was defined as more than 40 pounds. Study population was restricted to singleton births, delivered after 36 weeks of gestation, who did not live in California. Maternal weight gain distributions were tabulated by maternal age and other maternal characteristics. Demographic characteristics potentially associated with maternal weight gain were compared for adolescents and older mothers. Further evaluated the role of parity and maternal race on the relationship between excessive weight gain and maternal age.	Odds ratios and 95% confidence intervals were estimated using logistic regression.	<=19	>=20	maternal race/ethnicity, education, parity, region, and gestational age
(Ickovics et al. 2003), High postpartum rates of sexually transmitted infections among teens: pregnancy as a window of opportunity for prevention	U.S. (Connecticut)	203 pregnant and 208 non-pregnant adolescents aged 14-19 years were recruited from 10 community based health clinics in Connecticut, United States.	All proportions were compared using likelihood ratio x2 tests. Logistic regression provided an estimate of the interaction between group (pregnant v non-pregnant) and time. Odds ratios (OR) and 95% confidence intervals (CI) were computed to compare the occurrence of new STI infections between the pregnant and non-pregnant groups at 6 and 12 month follow up interviews.	14-19 pregnant	14-19 non-pregnant	no
(Kirchengast & Hartmann, 2003), Impact of maternal age and maternal somatic characteristics on newborn size	U.S.	In the present study the impact of maternal age and maternal somatic characteristics such as prepregnancy weight, stature, or pregnancy weight gain on newborn somatometric features (birth weight, birth length, head circumference, and arcomial circumference) using a dataset of 8,011 single term births were analyzed.		12-16	17-19 and 20-29	
(Klerman, 2006), Risk of poor pregnancy outcomes: Is it higher among multiparous teenage mothers?	U.S.	Review of 3 cross-sectional and 5 longitudinal studies.	Multi-study review	Various	Various	Various

Citation	Location	Study Design	Analytic Methods	Adolescent Age Group	Refer-ence Age Group	Controlled for
(Krulewitch, Roberts & Thompson, 2003), Adolescent pregnancy and homicide: findings from the Maryland Office of the Chief Medical Examiner, 1994-1998	U.S. (Maryland)	This study investigates the relationship between homicide and pregnancy among teens in Maryland. The purpose of this study is to compare women whose deaths had been evaluated by the medical examiner and who had evidence of pregnancy to women without evidence of pregnancy, with a particular focus on adolescents.			adult	
(Lu, Sung & Li, 2003), Demographic characteristics and trends in the prevalence of low birth weight from singleton pregnancies in Taiwan, 1978-1997	Taiwan	This study examined trends in LBW in Taiwan between 1978 and 1997, and assessed the risk of LBW associated with sex, birth order of infant, and parental age at delivery.	Information on live born singletons for the study period was retrieved from the Taiwan birth registry. Calculated biannual trends for overall LBW rates and for specific demographic factors. Log-linear models with a Poisson assumption were used to assess the linear trend of the LBW rates and the interaction between time and selected demographic factors. Log-linear models were also used to estimate the independent effect of individual demographic factors on the risk of LBW.	<20	20-24	parental age, sex, birth order, parental education, marital status
(Markovitz et al. 2005), Socioeconomic factors and adolescent pregnancy outcomes: distinctions between neonatal and post-neonatal deaths?	U.S. (Missouri)	population-based cohort study using linked birth-death certificate data for Missouri residents during 1997-1999. Infant mortality rates for all singleton births to adolescent women (12-17 years, n = 10,131; 18-19 years, n = 18,954) were compared to those for older women (20-35 years, n = 28,899).	Logistic regression was used to estimate adjusted odds ratios (OR) and 95% confidence intervals (CI) for all potential associations	12-17, 18-19	20-35	race, education, parity, marital status, smoking, prenatal care, poverty
(Martens, Derksen & Gupta, 2004), Predictors of Hospital Readmission of Manitoba Newborns Within Six Weeks Postbirth Discharge: A Population-Based Study	Canada N = 68 681	A cross-sectional, population-based study was conducted of all infants who were born from 1997 through 2001, linkable to the birth mother, and discharged alive from the hospital (N = 68 681) using hospital discharge files in the Canadian province of Manitoba.	Univariate and multivariate logistic regression. preterm, low birth weight, neighborhood income, geographic location (the North, Rural South, and Urban areas of Winnipeg and Brandon), breastfeeding status, length of stay, maternal age, and type of delivery.	<=19	>19	gestational age, region, type of feeding at hospital discharge (breastfed or not), income quintile, type of delivery (vaginal or cesarean, birth weight and maternal length of stay

Citation	Location	Study Design	Analytic Methods	Adolescent Age Group	Refer-ence Age Group	Controlled for
(Meade & Ickovics, 2005), Systematic review of sexual risk among pregnant and mothering teens in the USA: pregnancy as an opportunity for integrated prevention of STD and repeat pregnancy	U.S.	Review of 51 studies that met inclusion criteria	review article	Various	various	Various
(Mittendorfer-Rutz, Rasmussen & Wasserman, 2004), Restricted fetal growth and adverse maternal psychosocial and socioeconomic conditions as risk factors for suicidal behaviour of offspring: a cohort study	Sweden	Obstetric, neonatal, and maternal risk factors for suicide and attempted suicide in 713370 young adults, born in Sweden between 1973 and 1980, who were followed-up until Dec 31, 1999, were examined by data linkage between Swedish registers.	Univariate and multivariate hazard ratios, derived from proportional-hazard models.	<=19	>20	gestational age, sex, mother's education, and parity
(Mohsin et al. 2007), Social influences for smoking in pregnancy in south western Sydney antenatal clinic attendees	Australia	This study examined the needs of and barriers to smoking cessation of 677 women who attended antenatal clinics in south-west Sydney.	Bivariate and multivariate logistic regression	<20	20-34	Age, gestational weeks at 1st antenatal visit, employment, marital status, clinic site
(Otterblad et al. 2004), Premature death among teenage mothers	Sweden	Population-based cohort study. Information on the women's social background and social situation after first birth was obtained from Population Censuses. The women were followed up with regard to cause of death from December 1, 1990 to December 31, 1995. Swedish women born 1950-1964 who had their first infant before the age of 30 years (N= 460,434)	Mortality rate ratios and 95% confidence intervals (CI) were calculated.	?	?	socioeconomic background
(Raatikainen et al. 2006), Good outcome of teenage pregnancies in high-quality maternity care	Finland	Analyzed a population-based database of 26,967 singleton pregnancies during 1989-2001. Only 185 of these mothers were under 18 years old. Data were collected using a self-administered questionnaire at 20 weeks of pregnancy and clinical records of pregnancy, delivery and newborn child. The information covered maternal risk factors, pregnancy characteristics and obstetric outcomes.	Odds ratios (ORs) for adverse pregnancy outcomes in teenage compared with older mothers were obtained from multiple logistic regression models.	<18	>=18	birth outcomes controlled for obstetric risk factors

Citation	Location	Study Design	Analytic Methods	Adolescent Age Group	Refer-ence Age Group	Controlled for
(Reefhuis & Honein, 2004), Maternal age and non-chromosomal birth defects, Atlanta--1968-2000: teenager or thirty-something, who is at risk?	U.S. (Atlanta)	1,050,616 singleton infants, born after > or = 20 weeks gestation in the five counties of metropolitan Atlanta from 1968 through 2000 who did not have a chromosomal abnormality and whose mother was 14 to 40 years old, 32,816 of them were identified with birth defects. Birth defect cases were ascertained by the Metropolitan Atlanta Congenital Defects Program (MACDP), denominator information was obtained using birth certificate data. Infants with any chromosomal diagnosis were excluded.	Effect estimates were calculated using 5-year maternal age categories with 25-29 years as the referent. Multiple logistic regression was used to adjust for maternal race, parity, infant sex, and birth year	14-19	25-29	race, parity, infant sex, birth year
(Reid, Dickinson & Doherty, 2003), The epidemiologic incidence of congenital gastroschisis in Western Australia	Australia	A population-based incidence study of N=122 cases of congenital gastroschisis from 1980 to 2001. Maternal and perinatal outcome data were collected to ascertain incidence, treatment, and outcome trends.		<20	>=25	
(Reime, Schucking & Wenzlaff, 2008), Reproductive outcomes in adolescents who had a previous birth or an induced abortion compared to adolescents' first pregnancies	Germany	This retrospective cohort study used perinatal data prospectively collected by obstetricians and midwives from 1990-1999 (participation rate 87-98% of all hospitals) in Lower Saxony, Germany. From the 9742 eligible births among adolescents, women with multiple births, >1 previous pregnancies, or a previous spontaneous miscarriage were deleted and 8857 women <19 years remained. Of these 8857 women, 7845 were nulliparous, 801 had one previous birth, and 211 had one previous induced abortion. The outcomes were stillbirths, neonatal mortality, perinatal mortality, preterm births, and very low birthweight.	Bivariate and multivariable logistic regression	13-18	13-18 with previous birth	nationality, partner status, smoking, prenatal care, and BMI
(Salihu et al. 2006), Childhood pregnancy (10-14 years old) and risk of stillbirth in singletons and twins	U.S.	The analysis involved 17.8 million singletons and 337,904 individual twins. Analyzed singleton and twin pregnancies that occurred in children (10-14 years old) in the United States from 1989 to 2000. Estimated the absolute and relative risks of stillbirth by using 15- to19-year-old and 20- to 24-year-old mothers as comparison groups	Bivariate and multivariate logistic regression	10-14, 15-19	20-24	race, marital status, parity, prenatal smoking, year of birth, adequacy of prenatal care received, and sex of the infant.

Citation	Location	Study Design	Analytic Methods	Adolescent Age Group	Refer-ence Age Group	Controlled for
(Ward et al. 2005), Bone status during adolescence, pregnancy and lactation	U.S.	Review article	review article	Various	Various	Various
Developing Countries						
(Abdullah et al. 2007), Health and nutritional status of children of adolescent mothers: experience from a diarrhoeal disease hospital in Bangladesh	Bangladesh	Five hundred and thirty-nine first birth-order children of both sexes, aged 1-48 month(s) were studied. All study children had adolescent mothers aged < or =19 years (when attending hospital), who attended (as a patient) the Dhaka hospital of ICDDR, B during 2000-2005. A similar group of children (n = 540) of mothers aged 25-29 years (when attending hospital) constituted the comparison group.	Bivariate and multivariate logistic regression analysis, adjusting for covariates.	<=19	25-29	First birth, maternal education, duration of hospital stay, vitamin A supplementation, pneumonia, DPT immunization, infancy (age <12 months), stunting, underweight and wasting z-score<−2
(Airede & Ekele, 2003), Adolescent maternal mortality in Sokoto, Nigeria	Nigeria	This was a retrospective, cross-sectional study of adolescent maternal deaths that occurred at UDUTH, Sokoto from January 1990 to December 1999. 946 live births (LB) from adolescents and 46 maternal deaths during the study period.	simple bivariate analysis; not controlled for possible confounding factors.	<20	>20	no
(Al-Ramahi & Saleh, 2006), Outcome of adolescent pregnancy at a university hospital in Jordan	Jordan	This is a retrospective study comparing the obstetric outcome of 267 adolescent pregnancies to 500 adult women pregnancies during the same period at a university hospital	Student's t-test and chi-square	<20	25-30	No
(Borja & Adair, 2003), Assessing the net effect of young maternal age on birthweight	Philippines	214 adolescent and 415 adult primiparae and their infants from the Cebu Longitudinal Health and Nutrition Survey, a community-based survey in Metro Cebu, Philippines	Bivariate and multivariate analysis	14-18	19-36	First birth, and socio-economic, biological, and behavioral risk factors
(Brennan et al. 2005), Teenage births and final adult height of mothers in India, 1998-1999	India	It draws on data on the height of ever-married women aged 15-49 and their birth histories collected in India's National Family Health Survey in 1998-99	Multivariate	<20	>=20	standard of living, urban-rural residence, state of origin in India and age of the women

Citation	Location	Study Design	Analytic Methods	Adolescent Age Group	Refer-ence Age Group	Controlled for
(Casanueva et al. 2006), Adolescents with Adequate Birth Weight Newborns Diminish Energy Expenditure and Cease Growth	Mexico	Determined the effects of maternal age and weight status on adjustments in gestational weight gain, resting energy expenditure (REE), and growth among adolescents. Weight, and growth rates of pregnant adolescents (PA) < or =17 y during late pregnancy were compared with changes in nonpregnant adolescents (NPA) over a 5-mo period. REE was also measured monthly in the PA group.	Paired t-tests and general linear models for repeated measures were used for the analysis; height was included as a confounding variable.	<=17 pregnant	non-pregnant adolescents	height
(Conde-Agudelo et al. 2005), Maternal-perinatal morbidity and mortality associated with adolescent pregnancy in Latin America: Cross-sectional study	Latin America	Studied 854,377 Latin American women who were younger than 25 years during 1985 through 2003 using information recorded in the Perinatal Information System database of the Latin American Center for Perinatology and Human Development, Montevideo, Uruguay.	Adjusted odds ratios were obtained through logistic regression analysis. The estimates were adjusted for the following potential confounding factors: parity, mother's education, marital status, cigarette smoking, interpregnancy interval, prepregnancy body mass index, weight gain during pregnancy, history of miscarriage, LBW, perinatal death, and chronic hypertension, gestational age at first attendance for antenatal care, number of antenatal visits, geographic area, hospital type, and year of delivery.	<=15, 16-17, 18-19	20-24	parity, mother's education, marital status, cigarette smoking, interpregnancy interval, prepregnancy body mass index, weight gain during pregnancy, history of miscarriage, LBW, perinatal death, and chronic hypertension, gestational age at first attendance
(Chowdhury et al. 2007). Determinants of reduction in maternal mortality in Matlab, Bangladesh: a 30-year cohort study	Bangladesh	Background Research on the effectiveness of strategies to reduce maternal mortality is scarce. Aimed to assess the contribution of intervention strategies, such as skilled attendance at birth, to the recorded reduction in maternal mortality in Matlab, Bangladesh. Examined and compared trends in maternal mortality in two adjacent areas over 30 years, by separate analyses of causes of death, underlying sociodemographic determinants, and areas and time periods in which interventions differed.	Analyzed survey data that was routinely collected between 1976 and 2005 for about 200 000 inhabitants of Matlab, in Bangladesh, in adjacent areas served by either the International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B) or by the government. Used logistic regression to assess time trends in maternal mortality. Separately analyzed deaths due to direct obstetric causes, abortion-related causes, and other causes.	<=19	20-29	socio-economic and demo-graphic factors

Citation	Location	Study Design	Analytic Methods	Adolescent Age Group	Refer-ence Age Group	Controlled for
(da Silva et al. 2003), Young maternal age and preterm birth	Brazil	The relation between young maternal age and PTB was studied in a city located in Brazil, an underdeveloped country, where the prevalence of teenage pregnancy was high, 29%. A systematic sampling of 2541 hospital births, stratified by hospital, was performed in Sao Luis, Northeast Brazil, from March 1997 to February 1998.	The risks of PTB for infants born to two groups of young mothers (<18 and 18-19 years) were calculated with and without adjustment for confounding factors (family income, marital status, mode of delivery, parity, health insurance, and short maternal stature) in a logistic regression model, using mothers 25-29 years of age as the reference group	<18, 18-19	25-29	family income, marital status, parity, mode of delivery, maternal stature, and health insurance
(Dedecker et al. 2005), [Obstetrical risk factors of 365 primiparous adolescent pregnancies in Reunion Island]	Reunion	Retrospective study, between 2001 and 2002, comparing primiparous adolescents (13-17 years, n = 365), with primiparous controls (18-29 years, n = 2050).	The analysis included demographical factors, maternal medical histories, prenatal follow-up, obstetrical risk factors, delivery modes and neonatal characteristics.	13-17	18-29	First birth
(Donoso et al. 2003), Natalidad y riesgo reproductivo en adolescentes de Chile, 19901999	Chile	All births 1990-1999, from Demography Yearbook (Anuario de demografia) volumes published by Chile's National Institute of Statistics. N=9550 (<15) N=386829 (15-19) N=1980375 (20-34)	Bivariate	<15, 15-19	20-34	No
(Ebeigbe & Gharoro, 2007), Obstetric complications, intervention rates and maternofetal outcome in teenage nullipara in Benin City, Nigeria	Nigeria	An audit to determine the incidence of births to teenage nullipara, pregnancy complications, obstetric intervention rates, maternal and fetal outcomes in 114 teenage nullipara compared with 700 randomly selected older nullipara (age 20-29 years), was undertaken in a tertiary Institution.	2-sided P value determined using Fisher's exact test.	<20	20-29	First birth
(Gichuhi et al. 2005), Predictors of mortality in HIV-1 exposed uninfected post-neonatal infants at the Kenyatta National	Kenya	Prospective cohort study. SETTING: Kenyatta National Hospital, Nairobi, Kenya. SUBJECTS: Three hundred and fifty one HIV-1 exposed uninfected post-neonatal infants who survived to one year of age.	Multivariate analysis			
(Gigante et al. 2005), Pregnancy increases BMI in adolescents of a population-based birth cohort.	Brazil	Adolescents born in 1982 in Pelotas, Brazil, are being followed in a birth cohort study. Information on social and biological determinants of nutritional status was collected in early life. Both in 1997 and in 2001, 464 girls were located through household visits, 16% of whom had had a pregnancy in this period. N=464	Changes in height, weight, and BMI between 1997 and 2001 were analyzed in relation to the occurrence of pregnancy, after adjustment for previous anthropometric status, as well as social and biological characteristics.	<20	20-29	Adjusted for skin color, maternal age, weight, and length at 2 y, and for weight and height at 4 y. Pregnancy was also adjusted for age at menarche as a continuous variable

Citation	Location	Study Design	Analytic Methods	Adolescent Age Group	Refer-ence Age Group	Controlled for
(Goldenberg et al. 2005), Adolescent pregnancy, prenatal care, and perinatal outcomes in Montes Claros, Minas Gerais, Brazil	Brazil	The aim of the present study was to measure the proportion of adolescent pregnancies in Montes Claros, Minas Gerais, Brazil. From a total of 7,672 live births in 2001, the estimated proportion of births by adolescent mothers was 21.5%.	Bivariate, re-analysis controlling for adequacy of prenatal care	10-14, 15-19	>=20	adequacy of prenatal care
(Goonewardene & eyagaha Waduge, 2005), Adverse effects of teenage pregnancy	Sri Lanka	A prospective cohort study at the University Obstetrics Unit, Teaching Hospital, Galle.	Sociodemographic data, details of antenatal care and family support, antenatal complications, gestation at delivery, mode of delivery, the proportion of unplanned pregnancies, and the possible effects of contraceptive counseling, in two groups of pregnant teenagers (13-16 years, n = 95 and 17-19 years, n = 250) were compared with a control group of pregnant women (20-24 years, n = 275).	13-16, 17-19	20-24	
(Hamada et al. 2004) [Pregnancy and delivery in adolescents: characteristics and profile of 311 cases]	Morocco	From January 1999 to December 2000, there were 311 teenagers who gave birth in the "Les orangers" maternity hospital in Rabat, Morocco. Compared these adolescents with 155 women aged more than 18 years who delivered during the same period.		<18	>18	
(Hidalgo et al. 2005), Obstetrical and neonatal outcome in young adolescents of low socio-economic status: a case control study	Ecuador	Compared obstetrical and neonatal outcome of early adolescent nulliparas (< or =15 years). with outcome of nulliparous women aged 20-30 years. 201 early adolescent nulliparous patients of low socio-economic status were enrolled at the Enrique C. Sotomayor Obstetrics and Gynecology Hospital, Guayaquil-Ecuador, and matched for gestational age with 201 low socio-economic nulliparous controls aged 20-30.	Bivariate analysis Matched on gestational age and socioeconomic status	<=15	20-30	gestational age, socio-economic status
(Hill et al. 2003), Adult Female Mortality: Levels And Causes	Bangladesh	National DHS.	Bivariate, no significance testing reported	15-19	20-24	no

Citation	Location	Study Design	Analytic Methods	Adolescent Age Group	Refer-ence Age Group	Controlled for
(Isaranurug, Mo-Suwan & Choprapawon, 2006), Differences in socio-economic status, service utilization, and pregnancy outcomes between teenage and adult mothers	Thailand	Population-based prospective cohort study conducted in four districts located in different geographical areas of Thailand All pregnancies occurring within one year, in each of the selected districts as of October 2000, were identified and recruited as the study's cohorts. Data was collected by interviewing cohort-respondents and through reviewing medical records.	Bivariate analysis only, did not control for socioeconomic and other factors	<20	>=20	no
(Kac et al. 2003), [Menarche, early pregnancy, and obesity in selected Brazilian women from a health care center in Belo Horizonte, Minas Gerais, Brazil]	Brazil	486 Brazilian childbearing-age women aged 15-59 residing in the municipality of Belo Horizonte, Minas Gerais State.	Body fat (BF) was measured through impedance analysis, and obesity was defined as BF > 30%. The association between obstetrics factors and obesity was evaluated through multivariate logistic regression.	<18	>=18	total income, smoking, alcohol consumption, and physical activity
(Kalanda et al. 2006). Chronic malnutrition in pregnant adolescents in rural Malawi: an anthropometric study	Malawi	This paper outlines the anthropometry of adolescents living in poor rural communities in southern Malawi. A cross-sectional descriptive analysis of 991 women who attended for their first antenatal visit before 18 weeks' gestation at two rural hospitals in 1993-94. Of these, 190 were adolescent (12-19 years).	bivariate	12-19	>19	No
(Keskinoglu et al. 2007). Perinatal Outcomes and Risk Factors of Turkish Adolescent Mothers	Turkey	The aim of this study was to determine obstetric and neonatal outcomes and risk factors in adolescent pregnant women and to compare perinatal outcomes among the teen age groups and between adolescent and adult women. Retrospective study including adolescent pregnant women and adult women. SETTING: A public maternal hospital. MAIN OUTCOME MEASURES: This retrospective cohort study included 945 teenagers who gave birth at year 2004 in a maternity hospital in Izmir.	Dependent variables included perinatal and maternal outcomes. Independent variables were miscellaneous socio-demographic characteristics and obstetric complications. Chi-square, Fisher exact test, and t-tests were used for the comparison of the adolescent group and adult women.	12-19	>=20	No
(Kongnyuy et al. 2007), Adverse Perinatal Outcomes of Adolescent Pregnancies in Cameroon	Cameroon	A cross-sectional study to compare the outcomes of 268 singleton, adolescent pregnancies with 832 controls, delivered in four referral hospitals in Yaounde (Cameroon), between November 2004 and April 2005	Bivariate analysis; Limited multivariate analysis	<=19	20-29	maternal age, gravidity, antenatal visits, marital status, employment status, education

Citation	Location	Study Design	Analytic Methods	Adolescent Age Group	Refer-ence Age Group	Controlled for
(Koum et al. 2004). Characteristics of antepartum and intrapartum eclampsia in the National Maternal and Child Health Center in Cambodia	Cambodia	To measure maternal and perinatal outcome and analyze risk factors for antepartum and intrapartum eclampsia, which is one of main causes of high maternal mortality at the top referral hospital in the Kingdom of Cambodia. A hospital-based retrospective study of 164 antepartum and intrapartum eclampsia cases out of 20,449 deliveries.	Not clear from the abstract	<20	>=20	No
(Kumar et al. 2007), Outcome of teenage pregnancy	India	A retrospective case control study was performed over a period of 5 years.	Bivariate analysis only. Date were retrieved from hospital records. All teenage mothers (aged 13-19 completed years at delivery) delivering in the University Hospital were taken as cases. Next 3 consecutive deliveries in the age group 20-30 year were selected as controls for each case. For statistical analysis, the cases were further subdivided into 2 groups, less than or equal to 17 years (Group A) and 18-19 years (Group B). Groups were compared for obstetric complications and neonatal outcome.	<20	20-30	No
(Kyamusugulwa, 2006), [Low birth weight in Maniema (Democratic Republic of Congo)]	DRC	Studied birth weight in two maternity units in the province of Maniema from November 2003 to October 2004: there were 938 births, 450 at Kama and 488 at Kipaka.		14-17	?	

Citation	Location	Study Design	Analytic Methods	Adolescent Age Group	Refer-ence Age Group	Controlled for
(Loto et al. 2004)Poor obstetric performance of teenagers: is it age- or quality of care-related?	Nigeria	studied prospectively the effect of antenatal care on the obstetric performance of teenagers seen at a university teaching hospital over a 14-month period.	All teenagers (less than 20 years of age) seen at the obstetric unit during the study period were recruited into the study. The next two women aged 23 – 29 years of the same booking status and parity seen after each teenage mother acted as controls. Cases and controls were recruited into the study through the antenatal clinic for booked cases or when they first presented at the hospital with complications or delivery for unbooked cases. They were followed-up throughout the antenatal period until the time of the postnatal visit. Observed complications in the cases and controls were tested for significance using the w2 test or unpaired t-test as appropriate. A P-value of less than 0.05 was considered significant.	<20	23-29	antenatal care use
(Magadi et al. 2007), Size of newborn and caesarean section deliveries among teenagers in sub-Saharan Africa: evidence from DHS	20 countries in sub-Saharan Africa	This paper uses DHS data from 20 countries in sub-Saharan Africa, collected in the late 1990s and early 2000s, to examine perceived size of newborn and Caesarean section deliveries among teenagers in the region.	A comparison between teenagers and older women, based on logistic regression analyses for individual countries, as well as multilevel logistic analyses applied to pooled data across countries, and controlling for the effects of important socioeconomic and demographic factors,	15-19	20-34	parity, educational attainment, urban/rural residence, maternal BMI, maternal height
(Malviya et al. 2003), Anthropometric profile and perinatal outcome of babies born to young women (< 18 years)	India	There were 4556 deliveries at the two hospitals during the study period. Of these, 57 were below 18 years of age accounting for 1.25% cases and they served as the study group. Another 128 consecutive primiparous women more than 18 years of age were enrolled as the control group. 21 women (16.4%) in the control group were between 18-19 years of age.	Bivariate analysis ANOVA (but not reported)	<18	>18	

Citation	Location	Study Design	Analytic Methods	Adolescent Age Group	Refer-ence Age Group	Controlled for
(Miglioli et al. 2007), The association of pregnancy history with areal and volumetric bone mineral density in adolescence	Brazil	A cross-sectional study of 119 adolescents ranging from 12-20 years of age was conducted; 30 of these girls had a history of full-term pregnancy. The adolescents were selected during a routine visit to the Adolescent Gynecology Outpatient Facility, completed a questionnaire, and had a physical examination to evaluate weight, height and Tanner stage.	Multiple regression analysis	12-20	12-20 non-pregnant	chronologic and gynecologic age
(Nasreen, Haque & Hasan, 2006), Pregnancy outcome in adolescent and adult - a case comparison study	India	adolescent pregnancy with comparison to adults in Mymensingh Medical College Hospital, Mymensingh. It was a case-comparison study. The study population was the mothers who admitted and delivered at the Obstetrics and Gynaecology ward of hospital during April-June 2003. Sample size was 220 mothers, out of which 110 were primigravidae adolescent mothers and 110 were adults.				First birth
(Oboro et al. 2003), Pregnancy outcomes among nulliparous teenagers in suburban Nigeria	Nigeria Rural district hospitals	1394 nulliparous mothers aged <or=19 during 1996-2001 at three district general hospitals were studied retrospectively. Comparison group: 1488 older nulliparae aged 20-24 years who delivered during the study period.	Chi-square used to analyze differences in categorical variables. For each pregnancy outcome, odds ratio with 95% CI were computed. A p value less than .05 or 95 CI not including the value 1.00 was considered significant.	<=15, 16-19	20-24	First birth
(Pardo, Nazer & Cifuentes, 2003), [Prevalence of congenital malformations and low weight at birth among teenage mothers]	Chile	894 teenage (10-19) and 806 older mothers (>20). The births occurred in a hospital between 1982 and 2001, were analyzed using the Latin American Collaborative Study for Congenital Malformations (ECLAMC) data base. Mothers were classified as teenagers when their age ranged between 10 and 19 years old and older when their age was over 20 years old. All women were subdivided as cases and controls.	Bivariate only	10-19	>20	No

Citation	Location	Study Design	Analytic Methods	Adolescent Age Group	Refer-ence Age Group	Controlled for
(Phupong & Suebnukarn, 2007), Obstetric outcomes in nulliparous young adolescents	Thailand	A retrospective case control study was undertaken. The pregnancies of 121 nulliparous women under age 15 delivered at Department of Obstetrics and Gynecology, Faculty of Medicine, Chulalongkorn University between January 1994 and December 2004 were compared to 121 nulliparous controls age 20-29. Multiple gestations were excluded.	Bivariate analysis only	<15	20-29	First birth
(Sharma et al. 2003), Pregnancy in adolescents: a community based study	India	There were 64 adolescent and 175 adult primigravida in a cohort of 843 antenatal women. A nested case control study design was used in a resettlement colony of east Delhi	Bivariate analysis only.	<20	median age 21	First birth
(Simoes et al. 2003), [Characteristics of adolescent pregnancy in Sao Luis, Maranhao, Brazil]	Brazil	Data were collected from a cross-section of 2,429 deliveries by women residing in the municipality of Sao Luis, Brazil, of which 94% were hospital births. Women were categorized into six age groups. The two groups of teenagers (under 18 and 18-19 years) were compared to four groups of older women. Comparison was also made between the two teenage groups.	The chi-square test was used to compare proportions and prevalence ratio was used as an effect measure.	<18, 18-19	25-29	No
(Soula et al. 2006), [Pregnancy and delivery among adolescents under 15: a study of 181 cases in French Guiana]	French Guiana	A retrospective field-case study between the 1(st) and the 31(st) December 2001 identified 181 births among adolescents aged 14 years and under. Comparisons were made with 181 births among 18-year-old first-time mothers taking place over the same period.	Bivariate analysis	<=14	18	First birth
(Stewart et al. 2007), Preterm delivery but not intrauterine growth retardation is associated with young maternal age among primiparae in rural Nepal	Nepal	This study utilized data from a randomized controlled trial of micronutrient supplementation during pregnancy in south-eastern Nepal. Women of parity 0 or 1 and of age <or= 25 years who gave birth to a singleton live born infant who was measured within 72 h of delivery were included (n = 1393).	Bivariate, multivariate	<=18	19-25	ethnicity, BMI, height, literacy, smoking

Citation	Location	Study Design	Analytic Methods	Adolescent Age Group	Refer-ence Age Group	Controlled for
(Taffa, 2003), A comparison of pregnancy and child health outcomes between teenage and adult mothers in the slums of Nairobi, Kenya	Nairobi, Kenya	teenage (aged less than 20 years) and adult (20-34 years of age) mothers. A total of 226 teenage and 205 adult mothers met the study criteria out of the 3,256 women in the reproductive age group (15-49 years) and 318 adolescent girls (12-14 years of age) covered by the Nairobi Cross-sectional Slums Survey (NCSS).	The main comparison involved socio-de-mographic variables, events during preg-nancy, obstetric outcome, child morbidity and mortality and care provided during an illness episode.	<20	20-34	socio-economic factors
(Thato et al. 2007), Obstetrics and perinatal outcomes of Thai pregnant adolescents: A retrospective study	Thailand	:The purpose of this study was to compare pregnancy outcomes in adolescent females aged 19 and younger with those of adult women aged 20-34 years. A retrospective case control study was designed to address the purpose of the study. Participants of this study consisted of 401 randomly selected adolescent females and 815 adult mothers who gave birth at a regional hospital in Bangkok from 2001 to 2003	Multivariate logistic regression	<=19	20-34	maternal occupations, parity, and number of prenatal visits
(Trivedi & Pasrija, 2007), Teen-age pregnancies and their obstetric outcomes	India	In total, 13,210 women were included in the study, of whom 840 were teenagers (<19 years) and 12,370 were > or =20 years.	Antepartum, intrapartum and postpartum events were recorded and comparative analy-sis was done.	<19	>=20	no
(Tsui et al. 2007), The role of delayed childbearing in the prevention of obstetric fistulas	Niger, Nigeria, Tanzania	Used DHS data to examine the role of delayed childbearing in the prevention of obstetric fistulas	Methods: Data on 4798 deliveries in Niger (1995–1998), 3552 in Nigeria (1996–1999), and 6789 in Tanzania (1991–1996) were analyzed with logistic regression models	<18	>18	parity
(Usta et al. 2008), Obstetric outcome of teenage pregnan-cies compared with adult pregnancies	Lebanon	Retrospective chart review of singleton births > or =24 weeks' gestational age at the American University of Beirut from 1994 to 2003. Adolescents (<20 years) were com-pared to subsequently delivered women aged 25-30 years (controls), n=486 each.	bivariate, multivariate logistic regression for some calculations	<20	25-30	parity (in some calcula-tions)

Citation	Location	Study Design	Analytic Methods	Adolescent Age Group	Refer-ence Age Group	Controlled for
(Watcharaseranee et al. 2006), The incidence and complications of teenage pregnancy at Chonburi Hospital	Thailand	The study group consisted of primigravida women aged 13-20 years (2,490) who gave birth at Chonburi Hospital from 1 January 2000 to 31 December 2005. The control group consisted of primigravida women aged 20-25 years (3,909)who gave birth during the same period. Demographic, obstetric, and neonatal complications information were collected and compared between the study and control groups.	Bivariate analysis only	13-20	20-25	No
(Wort, Warsame & Brabin, 2006), Birth outcomes in adolescent pregnancy in an area with intense malaria transmission in Tanzania	Tanzania	A cross-sectional descriptive analysis of 528 adolescents and 1,156 adults, malaria prevalence, and birth weight outcomes for women delivering in Kilosa Hospital between June 2001 and October 2002.	Univariate logistic regression, categorical data evaluated using chi-square or Fisher's exact; continuous variables evaluated with students t.	<20	>=20	Parity
(Zeteroglu, Sahin & Gol, 2005), Cesarean delivery rates in adolescent pregnancy	Turkey	The study was conducted at two centers, one of which is a university hospital in a rural area and the other a community hospital in capital city, for 5 years (1999-2003). The subjects were < 18 years old adolescent mothers. The adult controls (18 years) were further divided in two age groups: 18-35 years and > 35 years. A total of 40,391 pregnant women were evaluated in both hospitals.	Chi-square test for bivariate analysis	<=18	18-35	No

Appendix 4: Studies evaluating the effectiveness of pregnancy care interventions

Appendix 5: Methodology for constructing Table 9 and Table 10

These tables summarize the risk of adverse health outcomes in adolescent mothers versus older mothers. To construct these two tables, we combined findings from the previous and current reviews. First, we assigned each outcome a risk classification based on the overall finding from the previous reviews (column A in the table below). Second, for the current review, we assigned each outcome a risk classification based on the following criteria:

- If 60% or greater of studies have a similar risk finding, we classify the outcome according to that risk (higher, same, or lower)
- If less than 60% of studies have a similar risk finding, we classify the evidence as "mixed"

We carried out this analysis separately for both unadjusted (column B) and adjusted risk (column C) studies. Third, we combined the classifications from the previous review, and the unadjusted and adjusted findings from the current review. Fourth, we made a final classification (column D) for Tables 8 and 9 using the following criteria:

- Where there was agreement in the risk classification in all three, we assigned that risk classification
- Where there was no information from previous reviews, we used information from the current review only
- Where there was no information from the current review, we used the information from the previous review
- If disagreement in classification existed, the findings from adjusted studies in the current review dominated the findings from unadjusted studies in the current review and dominated findings from the previous review

	Review			
	Previous (A)	Current		Classification
		Unadjusted (B)	Adjusted (C)	for tables 8 and 9 (D)
Maternal health				
Nutrition in pregnancy	?	M	+	+
Unsafe abortion	+	?	?	+
Hypertensive disease	=	M	=	=
Iodine deficiency	=	?	?	=
Violence against pregnant women	?	?	?	?
Prolonged and obstructed labor	=	M	=	=
C-section	-	M	-	-
Obstetric fistulae	+		?	M
Ante-partum hemorrhage	?	=	-	-
Post-partum hemorrhage	?	=	+	+
Diabetes	?	=	-	-
Mental illness	?	+	+	+
Maternal mortality	+	M	=	=
Newborn Health				
Preterm birth	+	+	+	+
Low birth weight	+	+	+	+
Small for gestational age	M	+	M	M

	Review			
	Previous (A)	Current		Classification
		Unadjusted (B)	Adjusted (C)	for tables 8 and 9 (D)
Asphyxia	?	+	?	+
Apgar	?	+	=	=
Malformations	?	M	+	+
Stillbirth	+	M	=	=
Perinatal mortality	+	=	M	M
Neonatal mortality	+	+	M	+
Infant mortality	+	+	+	+
Underlying Behaviors and Health Problems Associated with Adverse Pregnancy Outcomes				
Substance abuse	+	?	?	+
Maternal smoking	+	+	+	+
Poor nutrition	?	+	?	+
Anemia	+	+	+	+
Malaria	+	+	M	+
HIV and other STIs	+	+	+	+
FGM	?	M	?	?

Key

Sign	Risk in adolescents vs. older women
+	higher
=	same
-	lower
0	mixed evidence
M	mixed evidence
?	no studies

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