

REGIONAL RESEARCH NETWORK – IDB

**ADOLESCENTS AND YOUNG ADULTS IN LATIN AMERICA:  
CRITICAL DECISIONS AT A CRITICAL AGE**

**1. TEENAGE CHILDBEARING IN LATIN AMERICAN COUNTRIES**

Draft Report

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Bogota, April 14, 2000

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## **Acknowledgements**

## Abstract

### 3. INTRODUCTION

The biological aspects of adolescence such as entry into puberty have been acknowledged as a time of transition in almost all societies. The duration and defining characteristics of adolescence vary across time, cultures and socioeconomic situations. As societies develop, the period of transition between childhood and adulthood tends to be prolonged.

In many Latin American countries, and particularly in the urban areas, the adolescent experience is becoming increasingly pronounced as a particular stage of the life cycle, and in this respect resembling more economically developed countries (Singh and Wulf, 1990). Adolescence for many Latin American young people is no longer an abrupt rupture from childhood to adolescence, but rather a stage of life that is being continually prolonged and includes the ages of 10 to 24. A number of authors have reviewed the development of the biological and social definitions of adolescence in the Latin American context. Monroy de Velasco (1985) suggests that adolescence is a function of the culture of origin and that in Latin America it is still an urban phenomenon. She notes that while in rural areas of the developed world adolescence is a stage of life for young people, in Latin America rural youth experience puberty without going through adolescence. In some societies, puberty is the only distinguishing characteristic of adolescence that marks an abrupt change to adulthood. Torres-Rivas (1988) presents a complementary set of conclusions after reviewing the development of adolescence in several Latin American countries. He suggests that while adolescence has always existed in a biological sense, its sociocultural sphere is more a function of economic development, structural transformation and modernization. In some societies, children progress directly to adulthood. This may be particularly true of families and communities where children are unable to advance beyond basic levels of education and progress directly into the labor market.

During the adolescent period there is a psychosocial change through which the individual initiates a process of development and maturation of their personality, sense of identity, capacity for abstract thought and play a role in the family and community environment (Suárez Ojeda et al., 1985; Elliott and Feldman, 1990). Adolescence may be divided into early, middle and late substages. The first stage roughly corresponds to ages 10 or 11 through 14 when profound physical and social changes coincide with puberty. The middle stage is sometimes the final stage and usually goes from age 15 to 17. It is a stage of increasing independence from parents and family. School dropout or early pregnancy may make this stage shorter. The last stage may extend as far as the late twenties for those youth who remain in the school system or who accomplish other goals that may delay their entry into the workforce and family life (Elliott and Feldman, 1991; Crockett and Petersen, 1994).

Youth and adolescents are periods of transition in which young people make a number of long and short-run choices that define their current and future health and well-being, as well as how they will devote their time as adults. The series of evolutionary experiences may include: the acceptance of their sexuality; the formation of peer alliances; the pursuit of independence from parents and adults; the search for economic security and independence; the choice of an occupation and the means to learn that occupation; the development of skills and concepts for participation in civic activities; the pursuit of responsible social conduct; preparation for marriage and family life; and, the development

of values (Monroy de Velasco, 1985 citing Havighurst). The decisions adolescents make will strongly affect their educational attainment and employment opportunities. Teenage pregnancy and childbearing is a matter of special interest due to the socio-economic consequences of this behavior. As some studies have shown, teenage fertility have negative economic, social and health consequences for the young mothers as well as for their children (Buvinic, 1998; Burt, 1998; Gage, 1995; Alan Guttmacher Institute, 1997; Singh and Wulf, 1990; Hayes, 1987). For example, a panel established by the National Research Council (Hayes, 1987) concluded that "Women who become parents as teenagers are at greater risk of social and economic disadvantage throughout their lives than those who delay children until their twenties. They are less likely to complete their education, be employed, to earn high wages, and to be happily married." (pp. 138). And Gage (1995) concluded that "Teenage women suffer from higher rates of pregnancy complications than older women and their babies also suffer from low birth weight and heightened risks of mortality" (pp. 35). For these reasons, this paper tries to document trends in teenage fertility levels and to analyze its demographic and socioeconomic determinants for some Latin American countries.

The data derive from the Demographic and Health Surveys (DHS), an international research effort coordinated by Macro International in cooperation with national governments and organizations, and funded by the United States Agency for International Development. DHS are large nationally representative household surveys whose main purpose is to inquire about family planning and child and maternal health. The surveys are ideal for comparison since they have been carried out using a nearly identical questionnaire in all countries. The questionnaire contains a birth history of all household women aged 15-49 as well as questions on age at first marriage and first intercourse. We use the DHS from six Latin American and Caribbean (LAC) countries: Bolivia, Brazil, Colombia, Guatemala, Peru and Dominican Republic, for which there is available data for the second half of the 90's. The omission of some LAC countries naturally limits the global generalizations that can be drawn. In a similar vein, this report is limited in scope by the population covered in the available surveys. While the experience and needs of all adolescents are important, DHS concentrate primarily on women aged 15 and older; this report necessarily share those limitations: adolescents younger than 15 are not included. Thus, given the data set we use, we broadly define adolescents as young women aged 15-19.

Among the selected LAC countries there exists great diversity of economic, social and demographic indicators such as per capita income, poverty conditions, stage of the demographic transition, secondary school enrollment, and degree of urbanization (Table 1). Thus, whereas Brazil has almost completed the fertility transition (low fertility level), Guatemala and Bolivia still are in an intermediate stage (high fertility levels). The other countries, Peru, Colombia and Dominican Republic, can be classified in an stage of advanced transition (medium low fertility levels). The selected countries also show different degrees of development. By 1997, the inequalities across countries are significant: the per capita Gross National Product (GNP) of Brazil (\$3214, the richest among the selected countries) is 3.6 times the GNP of the poorest country, Bolivia (\$892), and 3.3 times the GNP of the next poorest country, Guatemala (\$964) (Table 1). In general, countries with the lowest income levels show the lowest percentage of people living in urban areas, the highest infant mortality rate, the lowest indexes of secondary school enrollment and the highest total fertility rate. Regardless of where people live, the economic resources available to them may determine what level of education young people receive and what health and social services they have access to.

Table 1 about here

## 4 LEVELS AND TRENDS IN TEENAGE FERTILITY

### 4.1 Adolescent fertility levels

The levels of teenage fertility in the late 90's are diverse among the selected LAC countries<sup>1</sup>. Peru shows the lowest adolescent fertility indicators: a fertility rate<sup>2</sup> of 75 per thousand, 10.9% of adolescents are mothers, and the mean number of children ever born (CEB) is 0.13. On the other hand, Guatemala and Dominican Republic, two Caribbean countries, show the highest teenage fertility levels: fertility rates above 110 per thousand, around 18% of adolescents are mothers and a mean number of CEB of 0.24. The other countries, Bolivia, Brazil and Colombia are in the middle: a total fertility rate of 84-89 per thousand, 11-14% of adolescents are mothers and a mean number of CEB of 0.16-0.18 (Table 2 ). The socioeconomic circumstances surrounding adolescent fertility levels are diverse that they defy generalization. For example, Bolivia being one of the poorest countries, with the highest total fertility rate and infant mortality rate, one of the lowest index of secondary school enrollment among women, is not the country with the highest teenage fertility indicators. Brazil, the richest country with the lowest total fertility rate, the highest proportion of urban population, is not the country with the lowest adolescent fertility level. Peru is not the country with the highest female secondary school enrollment but it has the lowest adolescent fertility. On the contrary, Guatemala, one of the poorest countries with the lowest female secondary school enrollment, is one of the countries with the highest adolescent fertility.

Table 2 about here

Throughout much of the countries, having a child before age 15 is rare, typically fewer than 2% of women give birth by this age. In rural Bolivia, however, a little more than 5% of women aged 15 are already mothers (Figure 1b). Bearing a child at 17, 18 or 19 years of age, however, is a more common experience, especially for rural women. While childbearing before age 18 is uncommon in urban areas, 25% to 30% of rural women 18 years old and almost half of rural women 19 years old are mothers in all countries (Figures 1a-b).

Figures 1 a -b about here

The social context of adolescent fertility not only varies across countries but also within countries. Teenage fertility is generally higher in rural than in urban areas. Urban women may delay the birth of their first child because they have better access than rural women do to education and jobs, and thus more reason to wait before starting a family. However, the rural/urban differences varies across countries: it ranges from 2.5 in Peru to 1.5 in Guatemala and Brazil (Figure 2). These differentials led Peru to be the country with the lowest urban adolescent fertility but Brazil be the one with the lowest teenage fertility in rural areas. Guatemala and Dominican Republic show the highest levels in urban as well as in rural areas. Urban adolescent fertility shows a higher variation across countries than rural fertility does. In urban areas, teenage fertility rate ranges from 55 in Peru to 99 per thousand in Guatemala. The range of variation in rural areas is from 122 in Brazil to 160 in Dominican Republic. In all selected countries, rural adolescent fertility seems to be the norm: 40%

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<sup>1</sup> The charts and tables are organized according to the proportion of adolescent mothers. Thus, Peru, the focus country with the smallest proportion of adolescent mothers is always represented at the top of the chart or table. Dominican Republic and Guatemala, the focus countries with the largest proportion of adolescent mothers are always at the bottom.

<sup>2</sup> Teenage fertility rate is measured as the number of births per 1,000 women aged 15-19 years.

to 50% of 19 years old women have already had their first birth and nearly 20% of them have had at least 2 children (Figure 1b).

Figure 2 about here

Region of residence is also an important factor in teenage fertility differentials in all countries (Figure 3). However, the regional differences vary across countries: they are stronger in Peru, Bolivia and Colombia, while they are lower in Guatemala, Dominican Republic and Brazil. It seems that the higher the teenage fertility level, the lower the regional differences. Regional differentials are higher in Peru and Bolivia where the lowest teenage fertility was observed. In contrast, Guatemala and Dominican Republic have lower regional differences but a higher adolescent fertility level.

Figure 3 about here

In all countries, education is another variable that clearly differentiates teenage fertility: high levels of education are universally associated with low early childbearing (Figure 4). As woman's level of education increases, she becomes more likely to obtain accurate information about health care and contraception, and thus better prepared to plan her pregnancies. Indeed, in every country, the proportion of adolescent mothers is 5 to 6 times higher among no educated adolescents than among adolescents with secondary education.

Figure 4 about here

#### **4.2. Trends in teenage fertility**

Fertility of women aged 15-19 is a censored information since this cohort has not lived through the complete years of this age interval (for example, women aged 15 still have to go through the ages of 16 to 19; and women aged 19 still have to go through the rest of the age 19). Thus, to get a more accurate information to measure trends in adolescent fertility is better to use the previous experience up to age 20 of women aged 20 years or more, by 5-years age groups. Instead of looking just at cumulated indicators by age 20, we look at the pattern at each age up to age 20.

Trends in teenage fertility can not be generalized. Figures 5a-b and 6 show that early childbearing has different patterns of change across countries by area of residence. We can identify three different patterns. First, Brazil and Colombia, where the proportion of women who bear their first child at each age has increased in both rural and urban areas but the change has been lower in urban areas (Figures 5a-b). For example, Brazilian urban women aged 20-24 have a higher probability (30%) than women 25 years ago (women currently aged 45-49 years) (25%) of bearing a first child before age 20 (Figure 6). Among Brazilian rural women, the same probability increased from 28% to 41%. Second, Bolivia and Peru, where urban adolescent fertility by age has recently declined and rural adolescent fertility has increased. The case of Bolivia is outstanding since rural teenage fertility shows the largest increase among all countries: the proportion of women with a child born by age 20 increases from 32% to 54%. Third, Guatemala and Dominican Republic, where adolescent fertility by age shows an erratic trend with little change in urban and rural areas. The three different patterns of change have a common characteristic: teenage fertility has increased or remained constant in rural areas but has declined or remained constant in urban areas, leading to an increase in rural/urban differences.

Figures 5 a-b about here

Figure 6 about here

## 5. THE PROXIMATE DETERMINANTS OF TEENAGE FERTILITY

With the aim to identify all factors that intervened between the norms and social structure of a society and its level of fertility (hence the term proximate variables), Davis and Blake (1956) identify three groups of factors: those related to exposure to the risk of pregnancy, to conception and to gestation. Later developments included post-partum infecundity and focused only on those factors which were both major determinants of the level of fertility and, at the same time, varied across population groups: marriage, contraception, abortion and post-partum infecundity (Moreno and Singh, 1996). Although the last two are important variables, they are not considered here because of the lack of information. As in the case of teenage fertility, we look at level and pattern of change of the two proximate determinants: marriage and contraception.

### 5.1. *Marriage and pre-marital sexual activity*

The exposure to the risk of pregnancy (exposure to intercourse) is determined by marriage<sup>3</sup> patterns as well as by sexual activity among those not married. We will look first at marriage patterns and then at sexual activity.

Early marriage is one factor contributing to high levels of teenage fertility. The proportion of ever married adolescents varies across countries in the same direction as adolescent fertility does: it ranges from a low of 12% in Peru and Bolivia to a high 29% in Dominican Republic and 23% in Guatemala (Figure 7). As well as early childbearing, marriage is more common in rural than in urban areas (Table 3). The timing of a first union or marriage is strongly associated with a woman's educational attainment: women who have reached secondary education marry later than women without a basic education (Figure 8). The lowest proportion of urban ever married adolescents is observed in Peru (8.4%) where the lowest urban teenage fertility was observed. Dominican Republic, the country with the highest teenage fertility, also shows the highest proportion of ever married adolescents in urban (24%) as well as in rural areas (38%). It seems then that the exposure effect on teenage fertility is not negligible as one would expect in very advanced stages of the fertility transition when fertility control is widespread.

Figure 7 about here

Table 3 about here

Figure 8 about here

In most of the selected countries, as in other Latin American countries, adolescents do not legalize the first union. The importance of consensual unions among couples ranges from a high of 87% in Dominican Republic and 81% in Peru and Colombia to a low of 50% in Brazil (Figure 7). Goldman and Pebley (1981) has shown that almost half of couples in consensual unions in several Latin American countries eventually legalize their union, suggesting that de facto unions might be serving a function as trial marriages. This behavior is also suggested in all the selected countries: consensual unions are more common among the youngest than among the older adolescents (Figures 9a-b). The high instability in many consensual unions, specially in early months of the union (Rosero-Bixby, 1996; Guzmán, Hakkert and Contreras, 2000) results in a higher proportion of divorced/separated adolescents in Dominican Republic than in the other countries (Figure 7).

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<sup>3</sup> The term "marriage" here includes legal (legally or religiously sanctioned), consensual and cohabiting unions.

Contrary to teenage fertility or to marriage patterns, the importance of consensual unions do not show a consistent urban/rural differential across countries. In Bolivia, Guatemala and Dominican Republic, consensual unions are more common in rural than in urban areas, while in Peru consensual unions are more common in urban than in rural areas (Figures 9a-b). In Brazil and Colombia, rural and urban are equally important. It does not seem to exist a relation between the legality of the union and teenage fertility: urban Peru and Dominican Republic show similar proportion of couples in consensual unions but urban Dominican Republic teenage childbearing is 1.8 times the one observed in Peru. Even more, although consensual unions are more common in urban (82%) than in rural (78%) Peru, rural teenage fertility is 2.5 times the urban one.

Figures 9 a-b about here

Looking at marriage experience by age up to age 20 by 5-years age groups we can identify marriage trends across countries by area of residence (Figures 10a-b). Marriage trends are in agreement with early childbearing trends. They show the same three patterns of change. First, Brazil and Colombia, where the proportion of ever married rural adolescents has increased by age it shows however little and erratic trend in urban areas. Second, Bolivia and Peru, where the proportion of ever married by age has declined in urban areas but has increased in rural areas. In urban areas, in both countries, the proportion ever married by age 20 declines from 40% to 30-33%. In rural Bolivia, this proportion increases from 39% to 53% (Figure 11). Third, Guatemala and Dominican Republic, where the proportion ever married by age changes widely but in erratic way, both in urban and rural areas. The three different patterns of change have a common characteristic: the proportion ever married by age 20 has increased or remained constant in rural areas but has declined or remained constant in urban areas, leading, in almost all countries, to an increase in rural/urban differences.

Figure 10 a-b about here

Figure 11 about here

While most sexual activity among adolescents women occurs within marriage, sexual experimentation before marriage is tolerated in some countries. However, although never married women may be exposed to the risk of pregnancy as soon as they enter sexual relations, the risk depends on the intercourse frequency. Figures 12a-b show that in Brazil and Colombia, both in urban and rural areas, there is a significant proportion of never married women with a regular sex partner. In Dominican Republic and Guatemala, on the contrary, premarital sexual activity is insignificant. In Peru, only urban adolescents show a low percentage of regular premarital sexual activity whereas it is negligible in rural areas. The higher acceptance of premarital coital relationship among adolescents in Brazil and Colombia may be linked to their advanced stage in the fertility transition, specifically to the widespread availability of contraceptives in these two countries, as we will see later in this paper.

Figures 12 a-b about here

Given the higher premarital sexual activity in Brazil and Colombia, these two countries are the ones with the higher proportion of adolescents who have had first intercourse (Figure 13a-b) while they are not the ones with the higher proportion of ever married adolescents. Exposure to pregnancy is affected not only by marriage but also by premarital intercourse. Sexual behavior is more common in rural than in urban areas in all countries. Differences across countries in sexual activities are more pronounced in urban than in rural areas. Thus, the proportion of rural adolescents who have had first intercourse ranges from 26% in Bolivia to 33% in Colombia, but in urban areas it goes from

16% in Bolivia to 31% in Brazil. This important differences across countries led us to analyze not only first marriage but first intercourse patterns as a fertility determinant.

Figure 13a-b about here

The age pattern of entry into sexual activities has changed, both in urban and rural areas, in the same direction as marriage patterns. However, in Brazil and Colombia, the changes in sexual activity have been more pronounced (Figures 14a-b) than the ones observed in marriage, particularly in urban areas. For example, the proportion of women who have had first intercourse by age 20 increased from 26% to 55% in urban Brazil and from 36% to 55% in urban Colombia (Figure 15). This may be highly related with the higher pre-marital sexual activity among never married adolescents observed in these two countries.

Figure 14 a-b about here

Figure 15 about here

Figure 16 show the entry into sexual activity, marriage and childbearing among adolescents. Although women aged 15-19 is a censored cohort, it is still important to analyze the early entry into these three activities since they may produce differences in cumulated fertility at older ages. Two facts emerge. First, there is a relationship between early marriage and early childbearing: the higher the proportion of adolescent married by age 15, the higher the proportion of adolescents who bear their first child by the same age. However, there is not a clear relationship between early sexual activity and early childbearing: early intercourse is not associated with a higher proportion of teenage mothers. This would imply that most of early adolescent childbearing occurs within marriage. Second, the difference between the entry into sexual activity and into marriage is lower in the countries where fertility is higher: Dominican Republic and Guatemala. Two things may be happening. One, in those two countries sexual activity occurs mostly within marriage. That is, the effect of exposure to pregnancy (sexual activity) acts mainly through marriage. This make sense since Dominican Republic and Guatemala are in an intermediate stage of the fertility transition where contraception is not widespread and then sexual activity is restricted to occurs within the marital union. Second, pregnancy and marriage are closely related but the timing of these two events are not clear: it may be that marriage occurs because of pregnancy or that pregnancy occurs just after marriage. We will see later in this paper that the first explanation applies for both Guatemala and Dominican Republic.

Figure 16 about here

## **5.2. Knowledge and use of family planning**

Many factors influence whether an adolescent women uses birth control. Her marital status and her desire to have a child are important determinants, although in some settings, the norm in he community may have an important influence. Whether or not a young women hoping to avoid pregnancy practices birth control will depend upon both her awareness that contraceptive methods exist and the degree to which these methods are available to her. Access to birth control methods and to health care are critical; a young women may wish to practice contraception, yet not be able to obtain information, supplies and services she needs (The Alan Guttmacher Institute, 1998).

In general, knowledge of family planning methods is almost universal among adolescents, with the exception of Guatemala, a country with a high teenage fertility, where almost one third did not know

any method (Figure 17). In the other countries, at least 85% of adolescent know a modern method. The knowledge is practically universal (above 98%) in Dominican Republic, Colombia and Brazil. By educational level, however, the knowledge of family planning methods differs, especially in Bolivia and Guatemala, where almost 2/3 of not educated adolescents do not know any method. In contrast, in Brazil, Colombia and Dominican Republic, knowledge of family planning is almost universal independently of the level of education (Figure 18). However, knowing that a particular method exists does not mean that a young person knows how to use the method properly. Lack of knowledge or skill in using contraceptives is a prime cause of method failure among young people. Consequently, adolescents are more likely than adults to experience accidental pregnancies during their first year of contraceptive use (The Alan Guttmacher Institute, 1998).

Figure 17 about here

Figure 18 about here

Use of birth control among adolescents differs widely across countries. Among currently married, the proportion currently using a family planning method ranges from a low of 12% in Guatemala to a high of 55% in Brazil (Figure 19). In Dominican Republic and Bolivia about one third of married adolescents use contraceptives, while that percentage is as high as 46-49% in Peru and Colombia. Contraception is linked to premarital sexual activity. Indicating their desire to avoid pregnancy, sexually active unmarried adolescents are more likely than married adolescents to practice birth control throughout all countries: use of family planning methods is higher among not married but sexually active than among currently married adolescents (Figure 19). The differences are lower in those countries where contraceptives are widespread, as Brazil, Peru and Colombia. In contrast, they are specially high in Dominican Republic, Bolivia and Guatemala where contraception is less common. For example, in Dominican Republic 65% of currently married do not use any method but only 28% of those not married but sexually active are in such situation.

Figure 19 about here

The type of method used also varies across countries. In most of the countries, with the exception of Bolivia, modern methods are more used than traditional methods. The increasing use of modern methods of birth control among adolescent women results in part from strong nationwide efforts to increase access to family planning services carried out in most LA countries since the end of the 60's. The level of contraceptive use and the type of method used are related not only to the existence and strength of public and private programme supplies but also to the existence of other actors in the supply-side of contraception such as pharmacies. Bolivia and Guatemala are countries with "very weak family planning programme effort" and with pharmacies playing a lesser role than organized programmes (Mundigo, 1996). Colombia has not only a strong programme effort but pharmacies also appear as strong providers of modern methods. Although in Brazil and Peru the programme effort has been weak, the pharmacies have play an important role in supplying over-the-counter methods (Mundigo, 1996).

With the exception of Guatemala, family planning need<sup>4</sup> among currently married adolescents is similar across countries: it is around 65%-75%. Although Bolivia is in an intermediate stage of the fertility transition, the family planning demand among married adolescents is as high as the one observed in Dominican Republic or Colombia, countries in a more advanced stage of the fertility

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<sup>4</sup> Total family planning demand includes: 1) women with unmet need for family planning, 2) women currently using any family planning method, 3) pregnant women while using a method. The last two constitute the satisfied demand. Unmet family planning includes: 1) pregnant women whose pregnancy is unwanted because they did not want more children or because they wanted the child later, 2) fecund women not using any method and who do not want more children or want more children but at least two years ahead (Profamilia, 1995).

transition (Figure 20). In contrast, in Guatemala only two out of every five married adolescents want to use contraceptive methods (40%). The low level of family planning demand and contraceptive use in Guatemala may be associated with its stage of the demographic transition, an intermediate stage in which contraception is less accepted and less practiced by couples. It seems that in this country fertility among adolescent women is highly valued and sexual activity among unmarried is strongly discouraged, such that young women seeking to obtain birth control may be denied access to available methods.

Figure 20 about here

The proportion of unmet need<sup>5</sup> varies across countries: it ranges from a high 70% in Guatemala to a low 22% in Colombia, 25% in Brazil and 28% in Peru. In Bolivia and Dominican Republic unmet need is in between: 52% and 41%, respectively (Figure 21). Guatemala, one of the countries with the highest teenage fertility is the country with the lowest family planning demand and highest unmet need. The high level of unmet need is related to a low supply of contraception (a weak family planning programme effort and a low supply over-the counter methods). The moderate levels of unmet need of family planning in Bolivia and Dominican Republic may be related to different factors on the supply side. In Bolivia, very weak family planning programme efforts may explain the short of supply. In Dominican Republic, where programme effort has been moderate, the short of supply may come out from the lesser role played by pharmacies.

Figure 21 about here

With the exception of Dominican Republic, family planning demand is higher in urban than in rural areas among both currently married and unmarried adolescents (Figure 22a-b). Among unmarried adolescents, family planning demand as well as contraception use is higher in Brazil and Colombia, the two countries that showed the highest proportion of premarital sexual activities. On the contrary, Guatemala, a country where sexual activity is mostly restricted to occur within the marital union, shows a negligible demand of family planning among unmarried adolescents. Thus, the higher occurrence and acceptability of premarital sexuality during adolescence seems to be linked to the widespread availability of contraceptives.

Figure 22a-b about here

Contraceptive use is higher in urban than in rural areas but unmet need is similar, leading to a higher percentage of satisfied demand in urban than in rural areas both among currently married and unmarried adolescents (Figure 23). The urban rural differences in the percentage of satisfied demand are striking in Guatemala which again can be explained by the weak family planning programme effort (family planning programmes usually reach first urban than rural areas).

Figure 23 about here

Family planning use, and in particular the use of modern methods, is higher at higher levels of education (Figure 24), which can be related to a greater knowledge and acceptability among high educated adolescents.

Figure 24 about here

### **5.3. Early motherhood: the issue**

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<sup>5</sup> (Unmet need)/(total demand).

The data presented thus far suggest that both marriage/intercourse and contraceptive use play an important role in teenage fertility level and trends. The scatterplots in Figure 25 show a positive correlation among exposure-time and teenage fertility level, stronger with marriage than with intercourse which can be explained by the higher proportion of satisfied demand of family planning among not-married than among currently married adolescents. One would expect that the effect of exposure-time becomes less important as fertility control is widely accepted and used. One way of fertility control is abortion. However, as Guzmán, Hakkert and Contreras (2000) state, in most LAC countries, a premarital pregnancy is more likely to end into a marriage than into an abortion, leading to an increase in adolescent fertility<sup>6</sup>.

Figure 25 about here

In most of the countries, teenage fertility has increased in rural areas but has declined or remain almost constant in urban areas. In order to estimate the impact of exposure-time on teenage fertility, we use the method of decomposition of fertility changes into marriage pattern and marital fertility components (Rosero-Bixby, 1996). The following equation was used then to estimate the amount of the change in the proportion of adolescent mothers by age 20, between women aged 40-44 and women aged 20-24, attributable to changes in the proportion of women ever married by age 20,  $C_m$ :

$$C_m = \frac{[(f_0 / m_0) + (f_1 / m_1)] * (m_1 - m_0)}{2 (f_1 - f_0)}$$

where the subscripts (0,1) refer to the age groups (0=20-24, 1=40-44),  $f$  is the proportion of adolescent mothers and  $m$  is the proportion ever married. The relation between marriage and fertility assumes that births occur within the marriage exclusively. Since we have seen that premarital sexual activity is also important in some countries, the same equation was used to estimate the impact of the proportion of women who have had first intercourse by age 20,  $C_i$ , on teenage fertility. Table 4 show the results. In urban areas, marriage has made meaningful contributions to somewhat important teenage fertility reductions in Peru and Dominican Republic, and the impact of intercourse patterns is particular important in Brazil. In Peru, in particular, the proportion of adolescent mothers declined from 32% to 25% and marriage patterns contributed to this decline by an estimated 43% whereas intercourse patterns contributed in 30%. Thus, both marriage and intercourse patterns contributed in the same direction to teenage fertility decline in Peru. The proportion of urban adolescent mothers increased in Brazil from 27% to 30% and intercourse patterns contributed to this increase by an estimated 36% whereas marriage did not contributed. It seems then that the increase in teenage fertility in Brazil occurred mainly out of unions. In Dominican Republic on the contrary, marriage patterns contributed to adolescent fertility decline by 25% whereas intercourse patterns counterbalanced larger changes in fertility among sexually active adolescents (note the negative sign in  $C_i$ ). In the other countries, marriage and intercourse contributions to early childbearing change have been modest (less than 10%).

Table 4 about here

In rural areas, neither marriage nor intercourse contributed to the small changes in adolescent fertility observed in Guatemala and Dominican Republic. In Bolivia and Colombia, intercourse patterns as well as marriage made meaningful contributions to the increase in rural teenage fertility.

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<sup>6</sup> In general, abortion has a higher incidence among adults than among adolescents in LAC countries. Colombia and Cuba are the only two LAC countries where the incidence of abortion is higher among adolescents than among adults women (Guzmán, Hekker and Contreras, 2000).

The important increase in rural teenage fertility observed in Bolivia appear to have been caused mainly by a marriage and a sexual activity boom among adolescents. The similar levels of  $C_m$  and  $C_i$  suggests that marriage and sexual activity are closely tied but it does not say anything about the timing of those two events: it may be that marriage occurred soon after pregnancy, or pregnancy occurred soon after marriage. The first situation seems to be the case in Bolivia as we will see later in this paper. In contrast, one third of the increase in teenage fertility in rural Colombia is explained by marriage but almost all is explained by change in intercourse patterns. It seems then that part of the increase in rural adolescent fertility in Colombia has occurred outside marriage with its negative consequences.

The role of marriage and intercourse patterns in teenage fertility change shows that both of them have been important factors, especially in rural areas. However, not always they contributed in the same direction or with the same intensity in fertility change. In some countries, both marriage and intercourse contributed to teenage fertility reductions, as in the case of urban Peru. In others, they both contributed to teenage fertility increases, such as rural Bolivia. There are also countries, where the contribution to teenage fertility change mainly came from intercourse patterns whereas marriage patterns made modest, if any, contributions, such as in Brazil and in Colombia. The differential contributions of marriage and intercourse patterns to teenage fertility change in each country led us to expect changes in unmarried parenthood. Figures 26a-b show the distribution of mothers by the interval between marriage to first birth by 5-year age group<sup>7</sup>, in urban and rural areas. Although the proportion of never married mothers declines with age, it is important to see the trend in the proportion of mothers with their first child born out of wedlock (never married plus negative interval<sup>8</sup>). Clearly, urban and rural Brazil and Colombia show a steadily increase in this proportion, meaning that unmarried motherhood among teenagers has increased, which is in agreement with the important role played by intercourse in fertility increase. In urban and rural areas of Guatemala and Dominican Republic, this proportion is small and has almost remained unchanged, implying that non-marital childbearing has never been common. In Bolivia and Peru, premarital fertility has increased only in recent cohorts and only in urban areas but it has always been at relative high levels both in urban and rural areas (where around 20%-30% of mothers had their first child out of wedlock).

Figure 26 a-b about here

Data thus far suggest that levels and trends of teenage premarital fertility vary widely among countries, ranging from low and constant levels in Guatemala and Dominican Republic to high and increasing levels in Brazil and Colombia. However, how does it vary within the adolescent group? Is premarital fertility as important among the 18-19 years old than among the youngest 15-17 years of age? The consequences of early childbearing are more negative the early the age of childbearing. Figure 27 show the distribution of adolescent mothers by first marriage to first birth interval by age. Once again, Brazil and Colombia show an increasing importance of premarital fertility among teenagers: about 25%-35% of 15-17 years old and 20% of 19 years old had their first child out of wedlock. Guatemala and Dominican Republic have the lowest and almost constant levels of premarital fertility: less than 10% of adolescents had their first child out of wedlock, implying that in these two countries most of teenage fertility occurs within marriage.

Figure 27 about here

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<sup>7</sup> Since, as we have seen, first marriage and first birth mainly occur at early ages, first marriage to first birth interval are concentrated in adolescent period.

<sup>8</sup> First marriage to first birth interval is negative if birth occurs before marriage.

Illegitimate births are determined by the differential pattern between first marriage and first live birth conception<sup>9</sup>. Figure 28 shows those patterns for adolescents aged 18-19 years, and they indicate that in only two out of the six considered countries – Guatemala and Dominican Republic, there is a positive interval between first marriage and conception of first birth, higher in Dominican Republic than in Guatemala. This implies that in these two countries, with the highest teenage fertility, births occur within marriage. In Colombia, Brazil and Peru, countries with lower teenage fertility, first marriage and first birth conception occur almost at the same time which implies that adolescents formalize the union as soon as they know they are pregnant or they get pregnant as soon as they get married. In Bolivia, one of the countries with moderate teenage fertility, there is a negative interval between first marriage and first birth conception, evidencing a high incidence of illegitimate births.

Figure 28 about here

Single adolescent mothers may formalize an union once the first child is born. Figure 29 shows the distribution of adolescent mothers by current marital status. Guatemala and Dominican Republic, where the common pattern is that births occur within marriage, show the lowest proportion of single adolescent mothers: 4%-8% of adolescent mothers are never married, both in urban and rural areas. In Brazil and Peru, the proportion of never married adolescent mothers is higher in urban than in rural areas: 20% of urban and 13% of rural adolescent mothers are never married. In Bolivia and Colombia, the proportion of single mothers is somewhat higher among rural than urban adolescent mothers: 18% in urban and 20-24% in rural areas.

There is empirical evidence on the negative relationship between age at first marriage and marital disruption, being intensified when first unions are consensual (Singh and Wulf, 1990). There is also evidence on the negative relationship between marital separation or divorce and either a premarital birth or premarital pregnancy (Gage, 1995). Dominican Republic, where consensual union are more common, shows the higher incidence of marital disruption among adolescent mothers, both in urban and rural areas: almost 30% of urban adolescent mothers were formerly married (Figure 29). Peru, on the contrary, presents the lower incidence of marital disruption among adolescent mothers: less than 5% of mothers were formerly married.

Figure 29 about here

Thus, although Dominican Republic show the lowest proportion of never married adolescent mothers, the common norm of consensual unions leads to have a high proportion of formerly married adolescent mothers, resulting in a high incidence of adolescent mothers rearing alone their children.

## **6. THE SOCIOECONOMIC DETERMINANTS OF TEENAGE FERTILITY**

Data thus far evidenced a variation of teenage fertility levels across countries and different patterns of teenage fertility change. Adolescent fertility levels do not show a consistent relationship with the socioeconomic conditions of the countries. Exposure-time to pregnancy (marriage and sexual activity) and contraceptive use, two proximate determinants, have had important, but not equal, effects in teenage fertility levels and trends by country. Although there are common patterns across countries in youth fertility differentials, and its proximate determinants, by urban / rural area, region

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<sup>9</sup> First live birth conception pattern by age was estimated by subtracting 9 months from the age at first birth.

and by level of education, teenage fertility varies across countries even when these factors are controlled for. Thus, in this section we will analyze the socioeconomic and demographic factors that determines teenage fertility behavior.

### **6.1. A conceptual framework**

Most theoretical models of adolescent behavior relate individual variables, family statuses and other factors to the likelihood of pregnancy or to the likelihood of a live birth, based on theories of social behavior such as socialization theory, social control theory, problem behavior theory and rational choice/opportunity cost theory. Gage (1995, pp. 7-8) summarizes these perspectives as follows:

- Models that derive from problem behavior theory state that adolescent behaviors, including premarital childbearing, are a function of individuals personality system and their perceived environment. Thus, sexual activity, childbearing and unmarried motherhood among adolescents are perceived to be a reflection of low self-esteem and internal locus of control, and low aspirations and expectations regarding the attainment of salient goals.
- The socialization and social control perspectives view adolescence as a trouble-prone period during which children need to be constrained by parents. These perspectives relate adolescent behavior to family statuses and events. The socialization perspective hypothesizes that women who grow up in a mother-only family during childhood are socialized in ways that produce a high risk premarital birth while the social control perspective hypothesizes that the number and types of adults present during adolescent years are important predictors of the likelihood of premarital birth.
- Rational choice/opportunity cost theory maintain that teenage childbearing may not be deviant or mistimed in certain populations, but is rather a response to underlying socio-structural constraints and opportunities. Early childbearing is viewed as a strategically planned life-cycle event that enables socially-disadvantaged women to take care of their infants under the protection of their families of origin. Thus, in some communities, those teenagers who are believed to have the academic potential to overcome the social and economic barriers to upward mobility are actively discouraged from bearing children during their teenage years.

According to this theoretical models, youths decide whether to have a childbirth or not, depending upon their family status (economic condition), the environment they were brought up, economic and school opportunities, personal characteristics, and supply of family planning methods.

### **4.2 Empirical Model**

Women decide whether to have a baby or not. As we just mentioned, such decision depends upon the woman's characteristics, her household's and the region she lives -or has lived-in. Variables that influence the decision are her age, schooling level, marital status, social-economic and household conditions. Women also interact within a social context, influencing and being influenced by other people. Each variable affecting the decision either increase or decrease the probability of having a baby; the probability is a function of such independent variables. Econometric models which explain this type of problems belong to a family in which the dependent variable is either qualitative or has a limited range. For example, one could think of a model where the dependent variable can

take two different values, which differentiate the option of having a baby or not. This binomial answer can be expressed as follows:

$$p_i = f(bX_i)$$

where  $p_i$  is the expected value of agent  $i$ 's response and  $f$  is a non-linear function of the linear predictors  $bX_i$ . The  $b$  coefficients capture the response or change in probability to changes in independent variables –contained in vector  $X_i$ –.

The non-linear function chosen is an exponential function known as logit:

$$p_i = \frac{e^{bX_i}}{1 + e^{bX_i}}$$

The observed response  $y_i$  are proportions binomially distributed:

$$y_i \sim \text{Bin}(p_i, n_i)$$

where  $n_i$  are all equal to 1.

### 4.3 Empirical Results

After selecting among variables which theoretically determine teenage childbearing, we incorporated into the empirical model the variables that are included in Table 5. Education and age are independent variables of the women. Controlled by income, it is expected that education has a negative effect on the probability of having a child, while age has a positive effect. Although economic status of the household has an impact on adolescent's choices, the effect is not clear. Higher income allows the adolescent to raise the child (income effect), but part of the time spent to obtain this income is employed on raising and educating the newborn (substitution effect). The empirical experience show that the income effect is smaller than the substitution effect, so that the net income effect is negative. Unfortunately, the DHS surveys have not included information about the income of all the other members from the household, so that total income has been measured through proxy variables as household appliance possession and access to public services. Other variables included in the model concern regional variables: the region level of teenage fertility (percent of women having a child in the same age ranges), percent of women that uses birth control methods and percent of women who have had an unsatisfied demand of birth control methods. The independent variable takes the value of one if the women have at least one child and zero if she has not.

Table 5 about here

The first approximation include all adolescent woman and estimate the  $b$  parameters for each country. In addition, two models were estimated grouping women per age groups: 15 to 17 years old and 18 to 19 years old. Those groups were made because of their different childbearing behaviors: bearing a child at 18 or 19 years of age is a common experience whereas childbearing before age 18 is uncommon.

On one hand, there is a different effect of the variables between the countries, and in some cases the effects are not significant (Table 5). On the other, we are assuming that the effect of a variable is the same between regions (and also between countries in the first column). The usual solution to this kind of problem is to aggregate, as independent variables, a set of dummy variables for each region and/or country. If we expect the  $\mathbf{b}$  coefficients to vary between regions, such dummies should interact with each independent variable. A great advantage of the DHS surveys is that, because of their size, samples are representative at the level of small regions. Therefore, among the six countries we can find significance levels in 92 regions. It would be inefficient to use 92 regional dummy variables in our model and multiply them with the ten independent variables.

However, if we chose to ignore such regional structure, we would be assuming that the individual observations are completely independent. Data suggest that women with identical characteristics, living in different regions, have different behaviors (fertility rates) due to regional effects. There can even be a higher correlation between women with different characteristics living in the same region, than the existing correlation between women with similar characteristics living in different regions. If regional effects were ignored, the estimations of standard errors would be biased.

The use of multilevel or hierarchical models, which include group or regional effects solve the problems mentioned earlier. The following section briefly explains the assumptions behind multilevel models.

#### **4.4 Multilevel Analysis (MA)**

Because individuals interact with the social context to which they belong, and that the individuals, who make up the **group**, in turn influence the properties of those **groups**, we need to take into account those effects, in the econometric analysis. If we think that some regional (country, group, etc.) variables affect teenage fertility behavior we have to use MA. For instance, we expect that a woman who lives in a region with a high fertility rate has a higher probability of childbearing than a woman who lives in a region with a low fertility rate. We also have to use MA when we think any variables have different effects on fertility. In MA, the data structure in the population is hierarchical, and the sample data are viewed as a multistage sample from this hierarchical population. Samples selected in two stages, such as the DHS, tends to generate some correlation between observations related with regions: individuals from the same region are expected to be more alike in terms of characteristics and behaviors than those selected from different regions.

##### **4.4.1 Description of Multilevel Modeling (Two level)**

The full multilevel regression model assumes that there is a hierarchical data set, with one single dependent variable (fertility) that is measured at the lowest level and explanatory variables at all existing levels. Assume that we have collected data in  $J$  regions, with data from a different number of women  $N_j$  in each region. On the women level we have the dependent variable  $Y$  (fertility) and the explanatory variable  $X$ , and on the region level we have the explanatory variable  $Z$ .

We can set up a separate regression equation in each separate region to predict the dependent variable  $Y$  by the explanatory variable  $X$  as follows:

$$Y_{ij} = \mathbf{b}_{oj} + \mathbf{b}_{1j}X_{ij} + e_{ij} \quad (1)$$

The difference with the usual regression model is that we assume that each region is characterized by a different intercept coefficient  $\mathbf{b}_{oj}$  and also a different slope coefficient  $\mathbf{b}_{1j}$ .

The next step in the hierarchical regression model is to predict the variation of the regression coefficients  $\mathbf{b}_j$  by introducing explanatory variables at the region level, as follows:

$$\mathbf{b}_{oj} = \mathbf{g}_{00} + \mathbf{g}_{01}Z_j + \mathbf{m}_{oj} \quad (2)$$

and

$$\mathbf{b}_{1j} = \mathbf{g}_{10} + \mathbf{g}_{11}Z_j + \mathbf{m}_{1j} \quad (3)$$

The model can be written as one single complex regression equation by substituting equations (2) y (3) into equation (1). Rearranging terms gives:

$$Y_{ij} = \mathbf{g}_{00} + \mathbf{g}_{10}X_{ij} + \mathbf{g}_{01}Z_j + \mathbf{g}_{11}Z_jX_{ij} + \mathbf{m}_{oj}X_{ij} + \mathbf{m}_{1j} + e_{ij} \quad (4)$$

The first part in equation (4) contains all the fixed (or deterministic) coefficients and the second part contains all the random (or stochastic) error terms of the model. The term  $Z_jX_{ij}$  is an interaction term that appears in the model as a consequence of modeling the varying regression slope  $\mathbf{b}_{1j}$  of woman level variable  $X_{ij}$  with the region level variable  $Z_j$ . Thus, the moderator effect of  $Z$  on the relationship between the dependent  $Y$  and  $X$  is expressed as a **cross-level interaction**.

Multilevel models are needed because with grouped data the observations in the same group are generally more similar than the observations from different groups, which violates the assumption of independence of all observations. This lack of independence can be expressed as a correlation coefficient: the intra class correlation  $\mathbf{r}$  that we can estimate by the equation:

$$\mathbf{r} = \frac{\mathbf{S}_{00}}{(\mathbf{S}_{00} + \mathbf{S}^2)} \quad (5)$$

this is the variance explained by the grouping structure.

The estimators currently used in multilevel regression are Maximum Likelihood.

Putting in a binary way we have:

$$\left. \begin{aligned}
y_{ij} &\sim \text{Binomial}(n_{ij}, \pi_{ij}) \\
y_{ij} &= \pi_{ij} + e_{0ij} x_0^*
\end{aligned} \right\}$$

$$\text{logit}(\pi_{ij}) = \beta_{1j} x_{1j} + \beta_{2j} x_{2j} + \beta_3 x_{3j} + \beta_4 x_{4j}$$

$$\beta_{1j} = \beta_1 + u_{1j}$$

$$\beta_{2j} = \beta_2 + u_{2j}$$

$$\begin{bmatrix} u_{1j} \\ u_{2j} \end{bmatrix} \sim N(0, \Omega_u) : \Omega_u = \begin{bmatrix} \sigma_{u1}^2 & \\ \sigma_{u21} & \sigma_{u2}^2 \end{bmatrix}$$

$$x_0^* = x_0 [\pi_{ij}(1 - \pi_{ij})/n_{ij}]^{0.5}$$

$$\begin{bmatrix} e_{0ij} \end{bmatrix} \sim (0, \Omega_e) : \Omega_e = \begin{bmatrix} 1 \end{bmatrix}$$

The subscript  $i$  and  $j$  represent the first (women) and second (region) level of the multilevel regression. On the other hand,  $x_1$  represents the constant and takes the value of one for all the women while  $x_2$  are all the variables which coefficients vary between regions. This would imply the existence of a random variation represented by  $\mathbf{m}_{1j}$  and  $\mathbf{m}_{2j}$ . The coefficient of the variable  $x_3$  is constant between regions and  $x_4$  represents variables related with the regional level (regional average). The parameters  $\mathbf{b}$  and the variance and covariance matrix  $\Omega$  are assumed to be unknown and are to be estimated. Results are shown in Table 6. The Hausman test was used to detect random deviations in the variables as the ones represented by  $x_2$ .

Table 6 about here

#### 4.4.2 Results from MA

The results show that for women 15 and 17 years old, the age variable has different impact between regions. This would imply that women, of the same age, in two different regions have different probabilities of having a child ceteris paribus. On the other hand, the education variable has different effect between regions among women 18 and 19 years old. For this group it is necessary to

consider the use of a Poisson function since they have more than one child. Nevertheless the predicted values using the Logit function are more robust.

It must be noted that the intercept estimation is random at the regional level, producing variation on the unconditional probability. This suggests that women with the same characteristics in two different regions have different teenage fertility, as it was mentioned before.

What is probably most relevant of these results is that the negative correlation between  $m_{1j}$  and  $m_{2j}$  can explain the regional differences in teenage fertility (Figure 30). Figure 31 indicates that a woman that lives in region A has a high unconditional probability and a very large negative effect of education, while a woman living in region B presents a very small autonomous probability and a positive effect of education. However, the positive effect of education on teenage childbearing was observed only in few regions.

Figure 30 about here

Figure 31 about here

## 5 SUMMARY AND CONCLUSIONS

In the late 90's, *teenage fertility levels* varies across LAC countries: the proportion of adolescent mothers ranges from a high level of 18% in Guatemala and Dominican Republic to a low level of 10% in Peru. Teenage fertility differentials by area of residence (rural/urban), by region and by level of education are important but especially striking by education and region. Early childbearing is the norm in rural areas and among not educated adolescents. Initial sexual activity and marriage are not so closely related in all countries, as in Colombia and Brazil, and in these, young women may have sexual relationships that do not lead to formal unions. Early marriage and premarital sexual activity are important factors contributing to high levels of teenage fertility. In Guatemala and Dominican Republic, births occur mainly within marriage and the exposure-time effect on fertility acts mainly through marriage whereas in the other countries, especially in Brazil and Colombia, premarital sexual activity is an important component of the exposure-time effect. Most adolescents do not legalize their first union: at least 50% of couples are in consensual unions. Although there are differences across countries, it does not seem to exist a relationship between the legality of the union and teenage fertility.

Family planning use is one factor that inhibits fertility to be high. Guatemala has the higher teenage fertility and the lower proportion of adolescents using a family planning method. Peru is in the opposite situation. Contraceptive practice depends upon supporting attitudes, policy, and service provision. Guatemala has adverse conditions on these three factors: family planning is less accepted and used among adolescent couples -and then it has the lowest demand for family planning methods-, family planning programme efforts have been weak, and it has a low supply over-the-counter methods. It seems that in this country fertility among adolescent women is highly valued and sexual activity among unmarried is strongly discouraged, such that young women seeking to obtain birth control may be denied access to available methods.

*Teenage fertility trends* indicate different patterns of change across countries by area of residence. However, in most countries teenage fertility has increased in rural areas but has declined or remained

constant in urban areas leading to an increase in rural/urban differentials. Guatemala and Dominican Republic show little change in both urban and rural areas, remaining as the two countries with the highest teenage fertility levels. In those two countries, most of teenage births occurs within marriage, and the high and constant adolescent fertility is associated with high and constant marriage patterns and high unmet need of family planning. In urban Peru, teenage fertility has declined as a result of decreases in both marriage and intercourse patterns and a high acceptability and use of family planning methods. In Brazil and Colombia, although contraception has high acceptability and use among adolescents, teenage fertility has increased as a consequence of increasing intercourse patterns whereas marriage has have modest, if any, effects.

The different contributions of marriage, proper use of family planning methods, and premarital births to teenage fertility behavior are reflected in *unmarried motherhood*. The disadvantages inherent in early childbearing are compounded for young unmarried mothers and their children by a lack of economic and social support. In Guatemala and Dominican Republic, unmarried motherhood is low and has remained unchanged since the norm is that teenage fertility occurs within marriage. In Bolivia and Peru, although premarital fertility has increased only in recent cohorts it has always been at relative high levels evidencing a high incidence of illegitimate births on teenage fertility. In spite of high levels of satisfied demand of family planning among adolescents in Brazil and Colombia, sexual activity before marriage has increased with serious consequences on unmarried motherhood among teenagers. It seems that young unmarried, as well married, women are likely to lack accurate knowledge about the different contraceptive methods and about their proper use.

Urban / rural area of residence, region of residence and level of education are variables that differentiate teenage fertility as well as its determinants, marriage and contraceptive use. Early childbearing, early marriage, and low contraceptive use is particularly common among young women who live in rural areas and who have comparatively little education.

The *econometric analysis* show that education and income have negative effects on teenage fertility, while age and the time of exposure have a positive impact on the probability of having a child. The results are encouraging because a high level of unsatisfied demand of family planning has a positive effect on teenage childbearing that can be eliminated throughout policies envisage to reduce teenage fertility: increasing adequate knowledge and facilitating access to family planning methods. The results also show that the probability of having a child diminishes in the regions where there is a higher use of birth control methods; which imply that campaigns related with birth control will reduce teenage fertility. What has been mentioned above has a direct relation with policy issues: low levels of teenage fertility in these countries can be assured through policies of the supply and demand of family planning methods.

Finally, the impact of education on teenage fertility of adolescent women between 18 and 19 years old vary depending on the region. In a region where teenage fertility is high, education can reduce the probability of childbearing. On the contrary, if teenage fertility is low, education will raise the probability of having a child. However, the positive effect of education was found only in very few regions.

## **BIBLIOGRAPHICAL REFERENCES**

Alan Guttmacher Institute. 1998. *Into a New World: Young Women's Sexual and Reproductive Lives*. New York: The Alan Guttmacher Institute.

---, 1999. "Risks and Realities of Early Childbearing Worldwide". *Issues in Brief*:1-14.

Buvinic, Mayra. 1998. "Costos de la Maternidad Adolescente en Barbados, Chile, Guatemala and México". Reprint from *Studies in Family Planning*, 29 (2): 201-209.

Burt, Marta. 1998. "Porqué debemos invertir en el Adolescente". Paper presented at the Conferencia Salud Integral de los Adolescentes y Jóvenes de América Latina y el Caribe. OPS. Washington: USA.

Chackiel Juan and Susana Schkolnik. 1996. "Latin America: Overview of the Fertility Transition, 1950-1990". In Guzmán, Singh, Rodríguez and Pantelides, editors. *The Fertility Transition in Latin America*. New York: Claredon Press – Oxford.

Crockett, Lisa and Anne Petersen. 1994. "Adolescent Development: Health Risks and Opportunities for Health Promotion". In Susan Millstein and Anne Petersen, editors. *Promoting the Health of Adolescents: New Directions for the 21st Century*.

Elliott, Glen and S. Shirley Feldman. 1990. "Capturing the Adolescent Experience". In S. Shirley Feldman and Glen Elliott, editors. *At the Threshold: The Developing Adolescent*. Cambridge, MA: Harvard U. Press.

Gage, Anastacia. 1995. "The Social Implications of Adolescent Fertility". Paper presented at the Seminar on Demography and Poverty. IUSSP-UNICEF-University of Florence: Italy.

Goldmand, Noreen and Pebley, Anne. 1981. "Legalization of Consensual Unions in Latin America". *Social Biology*. 28: 49-61.

Gupta Neeru and Iúri da Costa Leite. 1999. "Adolescent Fertility Behavior: Trends and Determinants in Northeastern Brazil". *International Family Planning Perspectives*. 25 (3): 125-130.

Guzmán Jose Miguel, Hakkert Ralph and Contreras Juan Manuel. 2000. "Diagnóstico sobre Salud Reproductiva de Jóvenes y Adolescentes en América Latina y el Caribe". Paper presented at the Reunión de Planeación Regional en Población. UNFPA: México.

Hayes, Cheryl. 1987. *Risking the Future: Adolescent Sexuality, Pregnancy and Childbearing*. Washington: National Academic Press. Cited in Gage Anastacia (1995).

Monroy de Velasco, Anameli. 1985. "Pubertad, adolescencia y cultura". In OPS-OMS. *La salud del adolescente y del joven*. Washington D.C.: Organización Panamericana de la Salud y Organización Mundial de la Salud. Publicación Científica 489.

Moreno Lorenzo and Singh Susheela. 1996. "Fertility Decline and Changes in Proximate Determinants in the Latin American and the Caribbean Region". In Guzmán, Singh, Rodríguez and Pantelides, editors. *The Fertility Transition in Latin America*. New York: Claredon Press – Oxford.

Mundigo, Axel. 1996. "The Role of Family Planning Programmes in the Fertility Transition in Latin America". In Guzmán, Singh, Rodríguez and Pantelides, editors. *The Fertility Transition in Latin America*. New York: Claredon Press – Oxford.

Rosero-Bixby, Luis. 1996. "Nuptiality Trends and Fertility Transition in Latin America". In Guzmán, Singh, Rodríguez and Pantelides, editors. *The Fertility Transition in Latin America*. New York: Claredon Press – Oxford.

Singh Susheela and Deirdre Wulf. 1990. *Adolescentes de Hoy, Padres del Mañana: Un Perfil de las Américas*. New York: The Alan Guttmacher Institute.

Suarez Ojeda, Elbio et al. 1985. "Adolescencia y juventud: Aspectos demográficos y epidemiológicos". In OPS-OMS. *La salud del adolescente y del joven*. Washington D.C.: Organización Panamericana de la Salud y Organización Mundial de la Salud. Publicación Científica 489.

Torres-Rivas, Edelberto. 1988. "Introducción al análisis comparativo de la juventud". In Edelberto Torres-Rivas et al editors. *Escépticos, narcisos, rebeldes: 6 estudios sobre la juventud*. San José: FLACSO.

Wartenberg Lucy, 1999. *Embarazo Precoz y Aborto Adolescente en Colombia*. Bogotá: Centro de Investigaciones sobre Dinámica Social-CIDS-Universidad Externado de Colombia and Fondo de Población de Naciones Unidas-UNFPA.

**Table 7**  
**Razón de Predominio (OR) : EXP(B)**  
**Teenage Fertility**

	<b>Logit 15-17</b>	<b>Logit 18-19</b>	<b>Logit <sup>a</sup> 18-19</b>
Constant	0,01%	0,06%	0,06%
Education	94,46%	94,74%	94,93%
Age	134,85%	122,02%	122,75%
Married <sup>b</sup>	0,18%	0,92%	0,82%
Exposure Time	341,44%	235,61%	239,65%
Unmet Need of family planning <sup>b</sup>	0,01%	0,08%	0,07%
Water Availability	82,70%	109,86%	111,29%
Household Appliances ( R )	70,68%	56,44%	55,32%
Regional Fertility Rate	106,16%	104,06%	103,89%
Regional Use of any Method of F.P.	99,00%	98,95%	99,02%
Regional Unmeet Need of F.P.	107,72%	104,34%	104,21%
Observations	11.386	6.642	6.642

Source: DHS. Author's Calculation

<sup>a</sup> Using 32 regions

<sup>b</sup> Dummy variable:  $\exp(\text{constant}+B)$

**Table 5. Estimated coefficients from a Logit Model****Women between 15-17 years old**

Variable	Total	Bolivia	Brasil	Colombia	Domin.Rep	Guatemala	Perú
Age	0,3102 ***	0,2819	0,2356	0,1593	0,6357 ***	0,4491 **	0,3580 **
Education	-0,0615 ***	-0,0118	-0,1548 **	-0,0008	-0,0395	0,0731 ***	-0,2340 ***
Married	2,6178 ***	2,2330 ***	2,5733 ***	2,6364 ***	2,1861 ***	2,1928 ***	3,2001 ***
Exposure time	1,2374 ***	1,6455 ***	1,0005 ***	0,9235 ***	1,2643 ***	2,1643 ***	1,2394 ***
Unmet Need of F.P.	0,0243	0,2958 ***	-0,0193	0,3432 ***	0,5229 ***	-0,0429	-0,5164 *
Water Availability	-0,1951 **	-0,2051 ***	-0,5792 **	-0,6148 ***	-0,0428	0,6260 **	-0,0746
Household Appliances (R)	-0,3245 **	-0,7049 ***	0,1489	-0,8031 **	-0,7197 *	-0,6569 ***	0,3252
Regional Fertility Rate	0,0520 **	0,1738 ***	0,2449 **	-0,0018	0,2226 ***	0,0177	0,0791 *
Regional Use of any Method	-0,0039 ***	-0,0595 **	0,0105	0,0160	-0,0300 ***	-0,0867 ***	-0,0293 ***
Regional Unmet Need F.P.	-0,0739 ***	-0,1447 ***	-0,1351 ***	-0,0097	-0,1144 ***	-0,0590 **	-0,1021 ***
Constant	-9,1208 ***	-9,4415 **	-8,6572 **	-6,1695 **	-16,1065 ***	-12,7682 ***	-9,0242 ***

**Women between 18-19 years old**

Variable	Total	Bolivia	Brasil	Colombia	Domin.Rep	Guatemala	Perú
Age	0,2180 **	-0,1053	-0,1031	-0,1737	0,7533 **	0,3159 ***	0,3904 **
Education	-0,0288 *	-0,0801 *	-0,1483 ***	-0,0653 ***	0,0047	0,0507	-0,0328 ***
Married	2,6884 ***	2,7378 ***	2,5606 ***	2,1835 ***	2,6685 ***	2,6042 ***	3,1859 ***
Exposure time	0,8697 ***	0,9079 ***	0,7346 ***	0,9530 ***	0,7224 ***	1,4928 ***	0,8040 ***
Unmet Need of F.P.	0,2153 *	0,6791 **	0,1086 *	0,4125 ***	0,2762 **	0,4345 ***	-0,3551
Water Availability	0,0529	0,0728	0,5128 *	-0,4040 ***	0,1618	-0,0837 *	0,1075
Household Appliances (R)	-0,5366 ***	0,1265	-0,6898 **	-0,6254 **	-0,7418 **	-0,3537 ***	-0,3958 *
Regional Fertility Rate	0,0279 ***	0,0662 ***	0,0858	0,0496 **	-0,0032	-0,0419	0,0576 ***
Regional Use of any Method	-0,0041 *	-0,0321 ***	-0,0028 *	-0,0079 *	0,0651	0,0748	-0,0265 **
Regional Unmet Need F.P.	-0,0332 **	-0,0672 **	-0,1082 ***	-0,0917 *	0,0271	0,1387 **	-0,0626 *
Constant	-7,8218 ***	-1,5572	-2,2274	0,1333	-19,7249 ***	-11,0593 **	-11,1065 ***

Source: DHS, Author's Calculation

**Table 6. Estimated coefficients from multilevel models  
Teenage Fertility**

	<b>Logit 15-17</b>	<b>Logit 18-19</b>	<b>Logit<sup>a</sup> 18-19</b>	<b>Poisson 18-19</b>
Constant	<b>-8,967</b> +u <sub>1j</sub> -7,59	<b>-7,359</b> +u <sub>1j</sub> -4,14	<b>-7,504</b> +u <sub>1j</sub> -4,18	<b>-4,218</b> +u <sub>1j</sub> -7,40
Education	<b>-0,057</b> -2,71	<b>-0,054</b> +u <sub>2j</sub> -2,70	<b>-0,052</b> +u <sub>2j</sub> -2,74	<b>-0,024</b> +u <sub>2j</sub> -4,00
Age	<b>0,299</b> +u <sub>3j</sub> 4,10	<b>0,199</b> 2,07	<b>0,205</b> 2,11	<b>0,067</b> 2,16
Married	<b>2,646</b> 21,17	<b>2,672</b> 25,69	<b>2,702</b> 25,25	<b>2,080</b> 36,49
Exposure Time	<b>1,228</b> 22,33	<b>0,857</b> 23,81	<b>0,874</b> 24,28	<b>0,272</b> 30,22
Unmet Need of Family planning	<b>0,057</b> 3,75	<b>0,196</b> 4,56	<b>0,207</b> 1,45	<b>0,074</b> 2,00
Water Availability	<b>-0,190</b> -1,64	<b>0,094</b> 0,90	<b>0,107</b> 1,03	<b>0,026</b> 0,81
Household Appliances	<b>-0,347</b> -2,53	<b>-0,572</b> -5,15	<b>-0,592</b> -5,29	<b>-0,189</b> -4,73
Regional Fertility Rate	<b>0,060</b> 2,67	<b>0,040</b> 6,29	<b>0,038</b> 5,52	<b>0,010</b> 4,11
Regional Use of any Method of F.P.	<b>-0,010</b> -1,82	<b>-0,011</b> -2,47	<b>-0,010</b> -2,33	<b>-0,002</b> -4,74
Regional Unmeet Need of F.P.	<b>0,074</b> 2,74	<b>0,042</b> 2,82	<b>0,041</b> 2,69	<b>0,007</b> 1,89
Observations	11.386	6.642	6.642	6.642

Source: DHS. Author's Calculation

<sup>a</sup> Using 32 regions

# Graph 30. Residuals

