

Teenage-pregnancies from a Human Life History Viewpoint – an Updated Review with Special Respect to Prevention Strategies

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Abstract: Adolescence is life stage typical of *Homo sapiens*. Reproduction during adolescence, i.e. teenage pregnancies is still listed among the most important public health problems of the 21st century, although low maternal age may be a marker for social rather than biological or medical disadvantage. Data from developed countries indicate that an optimal prenatal program eliminates obstetrical risks among adolescent mothers and adverse pregnancy outcome is mainly due to socioeconomic cofactors. Most teenage pregnancies are unplanned and result often in a social disaster. It is well documented that teenage mothers are more likely to drop out of school and have a low educational level. They are faced with unemployment and poverty. Consequently nearly all developed countries try to reduce teenage pregnancies and teenage motherhood effectively. The different countries however, use different strategies and these strategies differ regarding their effectiveness. In this review beside general aspects of pregnancies during adolescence, strategies to reduce teenage pregnancy rates are discussed. In particular the decline in teenage motherhood in Austria since the 1970s and is highlighted.

Keywords: Adolescence, decline in teenage pregnancy rates, pregnancy outcome, secular trends, sex education, social support, teenage mothers.

INTRODUCTION

Today nearly the half of the global population is less than 25 years old. Even the generation of adolescents, i.e. individuals between 10 and 19 years [1] is the largest in history. Adolescence is a particular phase of human life history characterized by somatic growth spurt, social development but first of all by the achievement of reproductive capability. During this phase of life adolescents tend to develop increased interest in sexual activities which often lead to an increased risk of sexually transmitted diseases including HIV/AIDS but also of unintended pregnancies and all associated social and medical risks of early child bearing. Consequently teenage pregnancies and teenage motherhood are debated as major public health issues and are considered as a societal problem in nearly all developed countries. The European Union (EU) listed in the REPROSTAT project teenage pregnancy rates as one of 18 core indicators for monitoring and describing reproductive health in the European Union [2, 3]. For that reason teenage pregnancy has become labeled alongside obesity, diabetes, cardiovascular disease and cancer rates, as a major public health problem [4-6]. This classification of teenage pregnancies as a high risk category and therefore a major public health concern however, is mainly based on results of quite old studies dated back to the 1950s, when teenage pregnancies were seen as obstetric problems per se and not as a multifactorially influenced event [5-13]. At this time studies were predominantly carried out among social

deprived subpopulations, which per se showed an increased risk of anemia, preterm labor, urinary tract infections, hypertension, preeclampsia, a high rate of caesarean sections but also preterm birth, low birth weight and intrauterine growth restriction. During this the 1970s this viewpoint of teenage pregnancies changed markedly. Some authors declared that adverse health consequences and poor pregnancy outcome among teenage mothers are not associated with low gynecological or chronological age of the mothers but with adverse life circumstances [14, 15] because the highest proportions of teenage pregnancies occur in most socioeconomically disadvantaged subpopulations or in areas with high social and material deprivation. Teenage pregnancies and teenage motherhood were no longer seen as medical risk but as a social problem which is the result of a lack of sufficient education and of poverty in general. Furthermore it was documented that teenage motherhood has numerous deleterious social consequences for mother and child. Consequently, governments of developed countries tried to develop strategies to reduce teenage pregnancy rates and to improve pregnancy outcome of teenage mothers effectively, although the adverse impact of teenage motherhood on maternal and child health is increasingly scrutinized. The aim of this review is to give a short overview of teenage pregnancies from a human life history perspective and in particular of different recent strategies to reduce teenage pregnancy rates or to improve the situation of pregnant adolescents, with special respect to the situation in Austria.

METHODOLOGY

This paper is based on a PubMed and Science direct search concerning teenage pregnancy prevention strategies

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including papers from 1970 to August 2012. Cross referencing and hand searching yielded additional papers.

TEENAGE PREGNANCIES IN A HUMAN LIFE HISTORY PERSPECTIVE

As pointed out in the introduction section, nowadays the prevention of teenage pregnancies and teenage motherhood is a priority for public health in nearly all developed and in some developing countries. But from a human life history view point we have to ask why should we prevent reproduction when reproduction is biologically possible? Teenage pregnancies occur during adolescence, i.e. the life span between 10 and 19 years according to the definitions of the World Health Organization [1]. The phase of adolescence can be divided into early and late adolescence. Early adolescence is defined as an age of 15 years and below, late adolescence means an age of 16 to 19 years. According to Bogin [16] adolescence as a stage of human life history is very young in an evolutionary sense. It is not found before *Homo sapiens* and may lead to a fitness advantage because it is a phase of sociosexual maturation and of acquisition of social and economic skills which may increase reproductive success during later life. In contrast to most mammals, reproduction shortly after sexual maturation i.e. during early adolescence was quite rare during the majority of our evolution and history. It is a special human trait that the appropriateness of mating and child bearing and the age of reproductive competence have become disconnected. This delay of reproduction among human females was mainly due to the fact that under stressful living conditions, such as high rates of infection or insecure food supply, not only puberty was delayed but also that it lasted some years after menarcheal onset that regular ovulatory cycles occur. The years following menarche were characterized by anovulation and a low frequency of ovulatory cycles and the likelihood of successful conception is quite low [17]. During late adolescence, however reproduction was a common phenomenon.

TEENAGE PREGNANCIES - A NEW PROBLEM?

From a historical point of view teenage pregnancies are nothing new. For much of human evolution and history, first births took place during late adolescence. It was absolutely common that girls married during their late adolescence and gave birth during their second decade of life. This kind of reproductive behavior was socially desired and considered as normal [18]. However, extremely early pregnancies during early adolescence (girls under the age of 15), which are associated with elevated risks, have always been rare. This was mainly due to the fact that menarche and reproductive maturity were experienced much later in historical times than today. Although the reliability of data concerning age at menarche in historical times has to be questioned, it can be assumed that over the past 180 years the age of menarche has fallen substantially across all developed countries [19]. In the 1840s the average age at menarche was 16.5 years in Europe, today menarcheal onset occur at the age of 12.5 on the average [20]. This decline of menarcheal age can be interpreted as typical example of the so called secular acceleration trend, which was induced by improved living

conditions, infection control and an improvement of nutrition [21]. In the 1990s the secular trend in menarcheal age had slowed down or ended in many European countries such as Denmark, Iceland, Norway, Great Britain, Belgium, Hungary and Poland. A similar trend was reported for the United States [22]. The improvement of living conditions and sufficient food supply resulted not only in an advanced sexual maturation it caused also an increase in the rate of ovulatory cycles soon after menarche. Furthermore during the late 19th and the whole 20th century peak height velocity took place much earlier and most adolescent girls often look like young adults, long before they reach mental maturity [13, 23]. Especially during later adolescence these girls may look like adult women and may feel that they are old enough to start with sexual activity. In historical times sexual activity of girls and young women was mainly related to marriage, but changes in social and sexual behavior during the second half of the 20th century have also contributed to the problem [19]. First sexual activity is initiated at a much younger age, the use rate of contraception among this age group however is rather low [24, 25]. Therefore the probability of pregnancies during teenage age increased in all developed countries.

PREVALENCE OF TEENAGE PREGNANCIES

The secular trend described above resulted in increased pregnancies rates even during early adolescence since the second half of the 20th century. Consequently teenage pregnancies are a worldwide phenomenon today, however the attitudes towards teenage motherhood differ markedly between developed and developing countries. While teenage motherhood is discouraged, debated as a public health problem and considered as a societal challenge in industrialized countries, childbearing among teenagers is widely socially desired in some traditional societies and in developing countries [26]. Therefore the majority of teenage pregnancies are found in Third world countries. This fact is really a paradoxon because complications from these early pregnancies and childbirths are the leading causes of death for girls of this age group in poorer countries. More than ten years ago Singh [27] reported adolescent childbearing rates in 43 developing countries. According to this review highest levels of adolescent childbearing (15-19 years) are found for the countries of sub-Saharan Africa, next highest levels are found for Latin America and the Caribbean region, ranging from 80 to 100 births per 1000 each year [28]. This picture has still not changed today [29]. The ten highest risk countries for teenage motherhood are still Niger, Liberia, Mali, Chad, Afghanistan, Uganda, Malawi, Guinea, Mozambique and the Central African Republic. In these countries teenage birth rate (births per 1000 women aged 15 to 19) ranges from 233 in Niger to 132 in the Central African Republic. In Niger more than 50% of teenage girls (15-19 years) are married. Approximately 25% of teenage girls gave birth between 15 and 19 years [30]. Quite different is the situation in Asia, where teenage birth rate is low to moderate with the exception of Bangladesh, India and Pakistan, with teenage births rates from 84 to 140 per 1000 births. However, of note, contained in all of these data sources is the fact that teenage birth rate focused on girls aged between 15 and 19 only. The extremely vulnerable group of teenage

mothers younger than 15 years is not accounted for in the majority of statistics quoted. Singh [27] reported that 8 to 15 % of girls in Cameroon, Liberia, Malawi, Niger and Nigeria and 11 % of the girls in Bangladesh had given birth before their 15th birthday. Pregnancy and birth among girls younger than 15 years are extremely risky. In Bangladesh the risk of maternal mortality may increase fivefold among mothers aging between 10 and 14 years in comparison to adult women [30]. Nevertheless in the majority of these countries it is quite common that girls marry in their teens and a successful reproduction early on in marriage is absolutely necessary to improve the girls' low status in 'their family' [31]. This social pressure to reproduce as early as possible is one factor which makes teenage pregnancies and childbirths extremely dangerous in many developing countries.

Compared with the situation in developing countries teenage birth rates in the first world are quite low, although considerable differences exist between the different developed nations. The majority of teenage mothers (60%) are accounted for by the United States. The teenage birth rate of the United States is 52.1 per 1000 births is not only the highest in the developed world it is also about four times that of the European Union average [32]. Within the European Union the highest teenage birth rates are found for UK with 27% and the new EU members Bulgaria (33%), Romania (34%) and the Baltic States (21-23%) [33]. Extraordinary high levels are also reported for Ukraine (38%), Macedonia (34%), Russia (31%) and Belarus (27%). In contrast, extremely low rates of teenage births are reported for Japan and Korea (less than 5%), for Switzerland (4%), Netherlands (5%) and Sweden (6%). Less than 15% were reported for Italy, Spain, Denmark, Finland, France, Luxembourg, Belgium, Greece, Norway, Germany and Austria [32]. Over the last 4 decades teenage pregnancy rates have declined in the majority of developed countries [33-35], mainly because of governmental efforts to prevent pregnancies during adolescence. In developing countries however such prevention programs are extremely rare, although teenage pregnancies represent a major risk factor for increased morbidity and mortality among adolescent girls.

WHY ARE TEENAGE PREGNANCIES CONSIDERED AS RISKY?

Female reproduction has always been risky and doubtless pregnancies and births are, independent of maternal age, critical phases in the life of mother and fetus or child. Until the 20th century childbirth was the leading cause of female mortality during reproductive phase. Teenage pregnancies were seen as a special problem because adverse health consequences of teenage pregnancies were solely attributed to the young maternal age for a long time. As pointed out above, it was alleged that the higher rates of pregnancy induced hypertension, anemia, prematurity and perinatal mortality in teenagers were documented in reports from urban clinic, whose patients had an extremely low socio economic status and in reports from developing countries. Reports from more economically advantaged clinics in First world countries yielded no increased obstetrical problems among teenage mothers compared with older mothers [9, 10, 36-39]. A recent study from Austria showed clearly, that the

obstetric outcome of adolescent pregnancies has remained favorable over the last 18 years. Cesarean section rate remained the same in the adolescents during the last 18 years, and the incidence of abnormally adherent or incomplete placentas decreased. The authors concluded that teenage motherhood is a social problem and not an obstetrical or clinical one [40]. Another cross-sectional Austrian study [41] found no adverse effects of young maternal age on pregnancy outcome. Although other recent studies from first world countries still insist on the obstetrical risks of adolescent pregnancies [10, 36, 42-46], in developed countries teenage pregnancies especially among teenagers older than 15 years are not considered as a general obstetrical problem [36]. In developing countries, however, the opposite is true. Complications from pregnancy and childbirth are still frequent [7, 47-55] and the leading cause of death for adolescent girls between 15 and 19 years [29]. This is especially true of mothers younger than 15 years. Young adolescent girls in developing countries suffer often from malnutrition and reduced linear growth [31, 50, 51]. Short stature is an independent risk factor for the need of caesarean sections [56], on the other hand pelvic breadth is often affected by malnutrition leading to a too narrow pelvic inlet. Because of that a vaginal delivery is often impossible, but a lack of medical facilities makes caesarean sections impossible. An improvement of medical facilities however reduces the risks of pregnancy and childbirth in general but especially among teenage girls even in developing countries dramatically [55, 57].

Gestational and obstetrical complications can be minimized by an improvement of medical facilities, pregnancies during adolescence however have various non obstetrical adverse consequences. Social factors represent a special problem for teenage pregnancy outcome. On the one hand socioeconomic deprivation and poverty are beside minority status, low educational level and a family history of teenage births main risk factors for teenage pregnancy [58-69]. On the other hand in developed countries teenage pregnancies lead to further social disadvantage. According to the results of the 2010 teenage pregnancy strategy report at the age 30, teenage mothers are 22% more likely to be living in poverty than mothers bearing their children aged 24 and over. Furthermore teenage mothers are less likely to be employed and are less likely to be living with a partner. They are 20% more likely to have no qualification at age 30 and are more likely to live with poorly qualified and unemployed partner [70]. Teenage mothers have high drop out rates at school and thus a low educational level, they have lower incomes, a worsened living situation and they are often single mums because partnerships at this age are unstable [59, 60, 71]. Today the majority of teenage pregnancies in developed countries ends with induced abortion. If induced abortion is not possible teenage motherhood increases the risk of postpartum depressions [71] with deleterious long term effects on mother child interaction [72-75]. Consequently, teenage pregnancies are to be seen as a social rather than a biomedical problem [13]. Therefore all developed countries but also some developing countries try to optimize strategies to prevent teenage pregnancies, especially during early adolescence.

STRATEGIES TO PREVENT TEENAGE PREGNANCIES

Although strategies to improve reproductive health among adolescents and to prevent teenage pregnancies differ between different countries they always have the same goal: the reduction of sexual risk behavior [76]. Adolescent reproductive health interventions (ARH) include a myriad of approaches including conventional sex education in schools, mass media programs, but also community based programs and workplace programs [77]. Two different types of interventions can be distinguished: On the one hand comprehensive risk reduction leading to a reduced number of sex partners, reduced unprotected sexual activity and an increased use in condom and hormonal contraceptives, on the other hand abstinence education leading to a general reduced sexual activity [76, 78]. Several studies have been carried out to evaluate the different programs in different countries [25, 77, 79-81]. It turned out that most successful interventions include multiple and varied approaches to the problem [25, 82].

A cornerstone in reducing adolescent sexual risk behaviors and promoting reproductive health are sex education programs. School based programs have the potential to reach the majority of adolescents in developed countries and large numbers of adolescents in countries where school enrollment rates are high [77]. European countries prefer school based sex education because schools in industrialized countries are the only institution in these societies regularly attended by nearly 95% of all youth aged between 6 and 16 years [83]. The positive effects of sufficient sex education in school are discussed since more than 40 years [84] and numerous studies have pointed out that sex education programs may increase knowledge of human reproduction and methods of contraception [85]. Developed countries with the lowest rates of teenage motherhood are characterized by well developed school based sex education but also, broad availability of contraceptives including post coital emergency contraception, and a liberal abortion law [86, 87]. Since not all adolescents are in school especially in developing countries, sex education programs have also to be implemented in clinics, community organizations and youth oriented community agencies. In a review of 83 evaluated sex education programs including 18 in developing countries Kirby *et al.* analyzed the impact of these programs on sexual initiation, frequency of sexual intercourse, number of sexual partners, condom use and general contraceptive use. According to this review, about two-thirds of the studies found a significant positive effect on one or more reproductive health outcomes. The effects of sex education programs were similar across developing and developed countries [80].

In England, the country with the highest teenage pregnancy rates in Western Europe, the 10 years teenage pregnancy strategy was embarked with the desire to halve the conception rate among girls under 18 years and increase the participation of teenage mothers in education [83]. For this purpose the teenage pregnancy unit (TPU) was established within the Department of Health to co-ordinate the activities in 1999. This British prevention strategy was mainly based on an improvement of sex and relationship education in and outside schools, a national information

campaign, and improved access to contraceptives for young people. An evaluation of this strategy showed some signs of improvement but no dramatic decline of teenage pregnancies. Especially in social deprived areas teenage pregnancy rates remained high [88]. An improvement however was found in knowledge and use of contraception [83].

The Netherlands in contrast belong to those countries with the lowest rates of teenage pregnancy in the world. This favorable situation is mainly due to a general openness about sexuality and contraception, an effective sex education in schools, the acceptance of teenage sexuality as a fact and easy access to contraceptives [89].

Completely different is the situation in the United States. The United States still has the highest ten birth rate in the developed world [90]. Adolescent pregnancy rates are disproportionately higher for Hispanic and African American youths. Different strategies are discussed to reduce teenage pregnancy rates, however there is still no consensus which strategy is the most effective one. Group based interventions to reduce sexual risk behavior by improved sex education and increased use of contraceptives were criticized because it was suspected that sex education in public schools may lead to inappropriate sexual behavior. Consequently abstinence education was discussed to be a promising strategy [91, 92]. This abstinence movement in the USA has received much publicity, although researchers from the Colombia University have pointed out that 86% of the decline in teenage pregnancy rate was due to improved use of contraceptives and only 14% of the decline was linked to reduced sexual activity [70]. In most European countries in contrast encouraging sexual abstinence is not applicable [70]. Therefore the most promising strategy in Europe is to improve sexual education especially in schools, providing sufficient information about efficient birth control methods, in particular about the correct use of contraceptives, but also teaching skills to cope with peer pressure [92, 93]. Furthermore the access to effective contraceptives is of special importance. As mentioned above, the Netherlands are a good example for the effectiveness of this strategy. Another example of the effectiveness of sex education programs in schools and the broad availability of contraceptives is Austria.

AUSTRIA IN BRIEF

Austria is a small country (83855 km²) in the center of Europe and since 1995 a member of the European Union (EU). According to the Forbes list 2012 Austria is the 12th richest country in the world in terms of GDP (Gross domestic product) per capita and the 3rd richest country in the European Union. Austria is characterized by a high standard of living and a well developed social system including public health service for all inhabitants on nearly equal conditions and health insurance coverage is universal. Attending school is the main occupation of all younger adolescents. Austria has a free and public school system, and nine years of education are mandatory. After compulsory basic school for 4 years pupils have the option to visit higher learning institutions that prepare one for university for 8 or 9 years, or to go on to vocational preparatory schools for 5

years. Sex education is mandatory in all schools since 1971. Sex education is provided at the age of ten years and 14 years and 16 years. Beside school based sex education programmes special out-patient departments for adolescents such as the so called First love out-patient department in Vienna were implemented. Adolescents have access to these institutions free of charge. They get sex education there but also access to contraceptives. Contraceptives and postcoital emergency contraceptives are available. 1974 the so called mother-child passport was introduced. The mother-child passport is a highly sophisticated system of care, which

includes seven check-ups during pregnancy starting at the 8th week of gestation and eight postnatal check-ups of the child between birth and the fourth year of life. All check-ups are free of charge and are performed in the gynecologists or paediatricians consulting rooms. Abortion has been fully legalized in 1974. Abortions can be performed on-demand in hospitals, out-patient departments and private practice for women whose pregnancies have not exceeded twelve weeks however abortions are not paid for by the government health system.

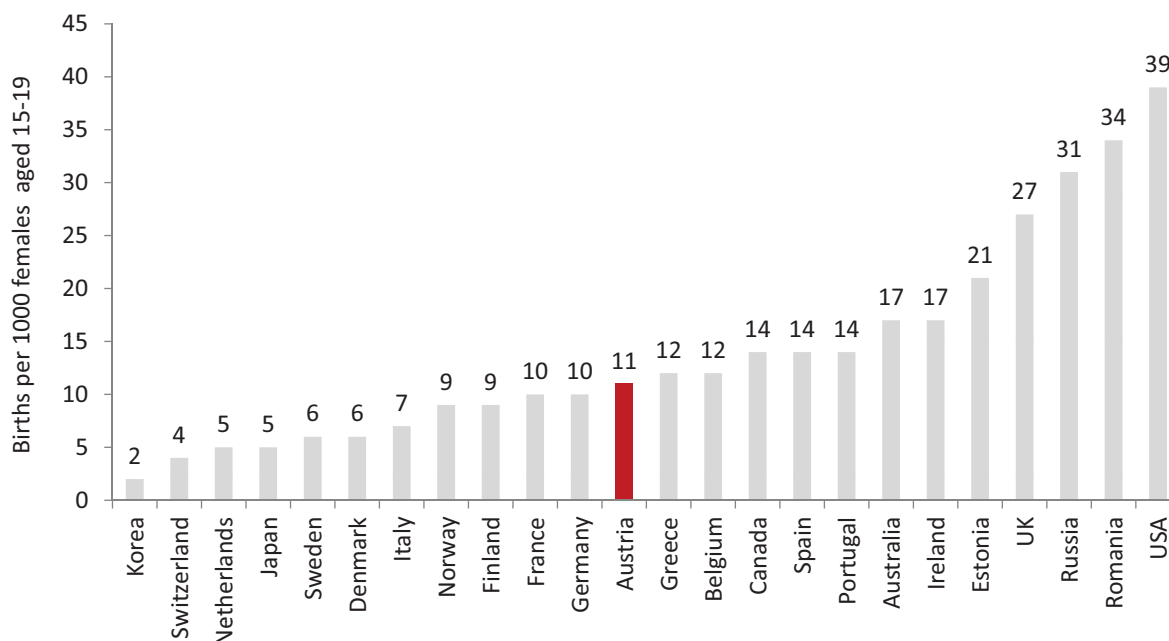


Fig. (1). Teenage birth rates. Births per 1000 females aged 15-19 selected countries (source: United Nations Demographic Yearbook 2008).

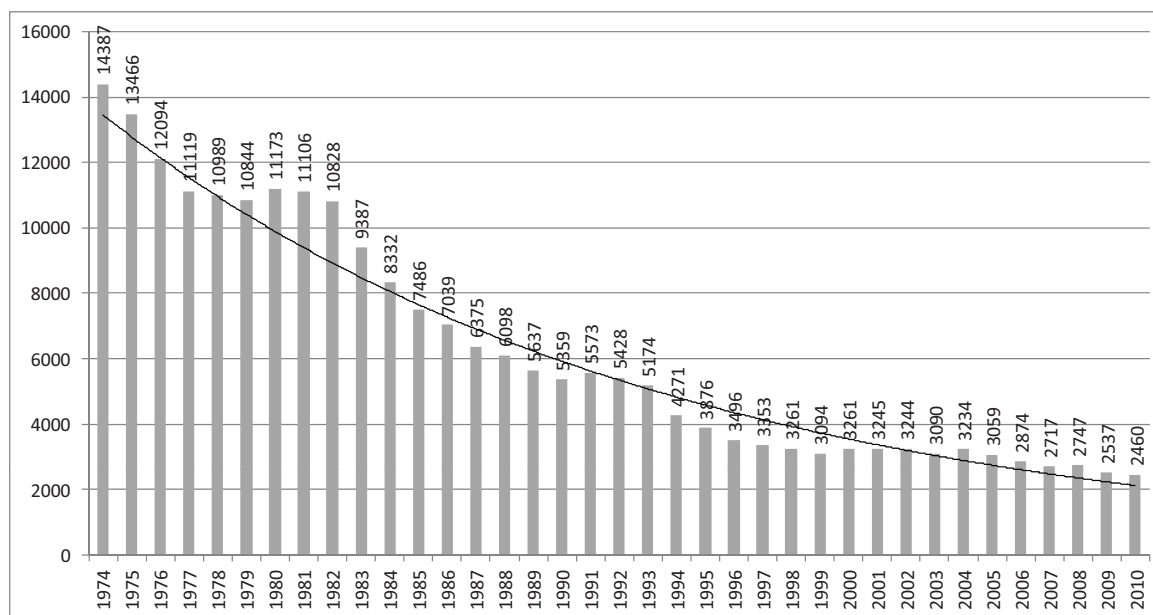


Fig. (2). Absolute amount of births given by late adolescent (girls 15 to 19 years) in Austria between 1974 and 2010 (source: Statistik Austria 2011).

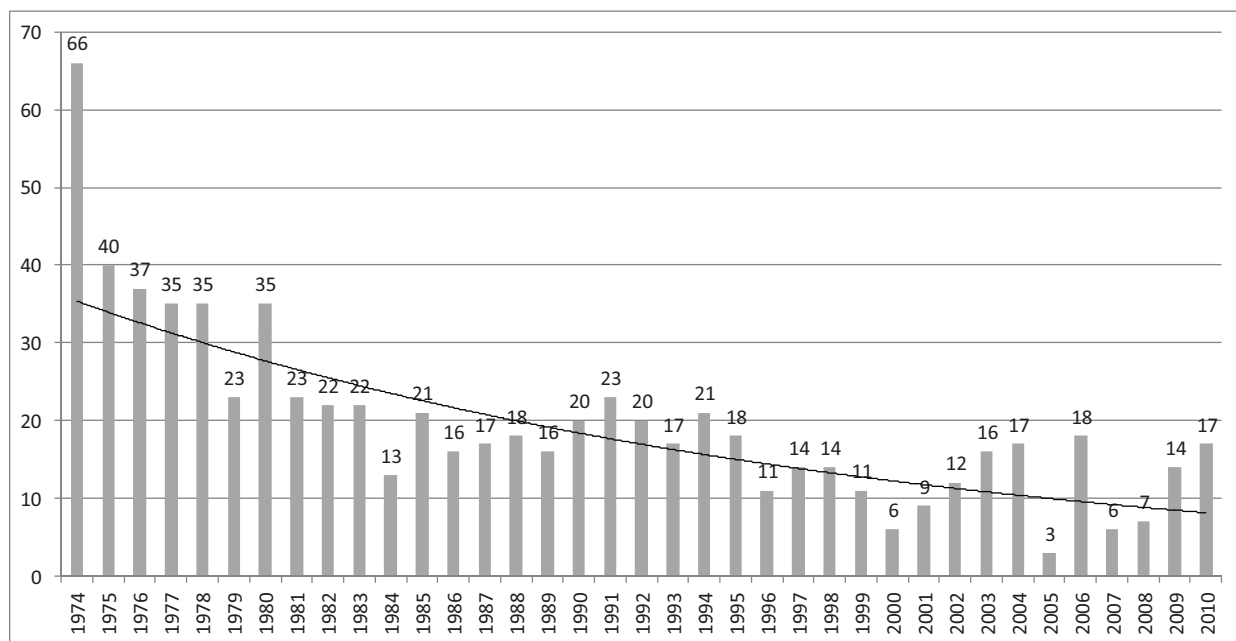


Fig. (3). Absolute amount of births given by early adolescent girls (< 15 years) in Austria between 1974 and 2010 (source: Statistik Austria 2011).

As highlighted in Fig. (1) teenage pregnancy rate in Austria is much lower than many other developed countries however, it is still higher than in Scandinavian countries or Japan [94].

DECLINE OF TEENAGE MOTHERHOOD IN AUSTRIA

As pointed out above during the early seventies marked changes in public advances to improve reproductive health took place. The mother child-passport was introduced, abortion became legal and sex educations in public schools became obligatory. At the same time teenage motherhood started to decrease markedly. Unfortunately only births and not pregnancies are recorded in Austria. Therefore we have no information how many adolescent girls became pregnant because no official abortion statistics exist in Austria. Nevertheless as to be seen in Fig. (2) from 1974 to 2010 the number of girls ageing between 15 and 19 years, i.e. older adolescents, who gave birth dropped down from 14387 to 2460 [95]. This reduction started with 1974 when abortions became fully legal. A marked decrease of motherhood was also observable for girls younger than 15 years (Fig. 3). Among this early adolescent group teenage motherhood dropped down from 66 birth in 1974 to 17 birth in 2010. The lowest value of motherhood among early adolescents was found 2005. In this year only 3 girls younger than 15 years gave birth. Although teenage motherhood in Austria is not among the lowest in developed countries the positive effects of mandatory sex education and legal abortions on teenage motherhood rates can be seen.

CONCLUSION

In developed countries most teenage pregnancies, especially those during early adolescence are unplanned and unintended. For a long time teenage pregnancies were

considered adverse, medically as well as socially. Nowadays obstetrical risks of teenage pregnancies are predominantly interpreted as results of adverse social and economic factors rather than chronological age. This however is no reason to deny that teenage pregnancies are currently still an important public health problem all over the world. There is no doubt that obstetrical problems can be managed by modern medicine and so the risk of teenage pregnancies can be diminished. Nevertheless the development of strategies to reduce teenage pregnancy rate and teenage motherhood, especially among young adolescents effectively is a goal of public health in the majority of developed countries. However, strategies to reduce teenage pregnancy and motherhood differ markedly between the individual countries and ranges from abstinence only education programs to the legal abortions and intensified sex education in schools.

CONFLICT OF INTEREST

The author(s) confirm that this article content has no conflict of interest.

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