Adolescents' reproductive health in rural Bangladesh
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8 Conclusions and discussion
8.1 Introduction
We have endeavoured to study the reproductive health status of adolescents in Matlab, rural Bangladesh, and to assess the relative contribution of its contemporary and early childhood nutritional determinants. The main research question that we aimed to answer in this study was formulated as follows:

*What is the reproductive health status of adolescent girls and boys in Matlab, Bangladesh, and to what extent is this status associated with contemporary and early childhood nutritional anthropometry?*

Despite being generally delimited by age, *adolescence* is primarily a social classification based on physical, mental and social markers of development, of which the origins are partly founded earlier in life, embedded within for instance the processes of physical maturation and socialisation. We considered adolescents’ reproductive health status to be made up of a *physical* and a *mental* component. The main research question was split up into five specific research questions (see section 1.3), in this way accounting for the physical and mental well-being of adolescents’ reproductive health. Below we answer the five research questions on the basis of the corresponding hypotheses (see section 3.2). However, we first briefly reflect on some theoretical considerations, the study design and the particularities of the study population (section 8.2). Conclusions based on analyses that shed light on the adolescents’ physical well-being in terms of reproductive health are then drawn (section 8.3), followed by conclusions about the adolescents’ reproductive well-being from a mental-emotional perspective (section 8.4). Finally, we formulate some recommendations for further research and intervention aimed at improving adolescents’ contemporary and future reproductive health status (section 8.4).

8.2 Theoretical considerations, study design and population
We studied adolescents’ reproductive health from a *lifecourse* perspective, which is one of the angles that can be taken within the *process-context* approach. Taking this approach to adolescents’ reproductive health is rather new within the discipline of demography. The universal character of the lifecourse refers to the occurrence of stages, separated by transitions. Major reproductive transitions in early adolescence indicative for the *physical well-being* of adolescents’ reproductive health are menarche and spermarche. The combined effect of inherited traits and environmental inputs mean that individuals can go through the respective stages at a different pace, and hence, that the timing of transitions differs. We analysed in particular the *timing of menarche* in relation to the *nutritional status career*, which is closely intertwined with the *reproductive health career*. Within the nutritional status career, the effects of early life growth failure may be passed on from one stage in life to the next, via the mechanisms of ‘programming’ as proposed by Barker (1992) and ‘cumulative causation’ (Kuh and Ben-Shlomo 1997), the accumulation of factors leading to nutritional deprivation. Moreover, the effects may be passed on to the next generation, so that an *intergenerational cycle* of growth failure results. In addition, a career of *knowledge and perceptions* may be distinguished. Adolescents’ reproductive knowledge and perceptions reflect the *mental-emotional well-being* of adolescents’ reproductive health.
Central to the discussion of physical and mental development was the notion of ‘developmental readiness’, meaning that one develops in stages whereby progress through each stage is in part determined by success or lack of success in acquiring certain developmental tasks or traits in previous stages. Developmental readiness was addressed from two angles. First, we studied empirically the influence of early childhood nutritional status on age at menarche and, on the basis of secondary literature, the importance of age at menarche and contemporary nutritional status for reproductive health in early adulthood. Secondly, we studied empirically adolescents’ knowledge and perceptions about reproductive transitions pertaining to the current stage in life (attainment of menarche and spermarche) and transitions pertaining to future reproductive health (marriage, childbirth).

By following the lifecourse approach we circumvented one of the main disadvantages present in most studies on (reproductive) health, i.e. a cross-sectional focus (comparing groups in terms of their current health and exposure status). A disadvantage of such an approach is that the health and exposure status are assessed simultaneously, while the origins of diseases and impaired (reproductive) health often go back to months or even years before. Studies on the long-term consequences of impaired nutritional status in the early stages of life have mainly been the domain of epidemiologists (for instance, Elo and Preston 1992; Kuh and Ben-Shlomo 1997; Kuh and Hardy 2002). Although the timeframe of our study is considerably shorter (up to early adolescence), here too we found (some) common ground with research conducted by, for instance, Barker who investigated the foetal and infant origins of several adult diseases. Our study follows directly from recommendations on research to be conducted in Matlab aimed at the association between nutritional status in early childhood and reproductive outcomes or anthropometric status in adolescence and early adulthood (for instance, Ross 1996, pp. 13-16).

Studying adolescents’ reproductive health from a lifecourse perspective requires an analysis of longitudinal data. Our study involved the follow-up of 707 under-five children who were enrolled in a study on persistent diarrhoea conducted in Matlab in 1988-1989 by Baqui, a paediatrician affiliated with ICDDR,B. At the start of Baqui’s study, April 1988, the youngest child enrolled was less than one month old, whereas the oldest child was almost four years old. His study served as a baseline for a follow-up survey in 2001. By that year (most of) the under-fives had grown up to be adolescents, aged 12 to 16 years. We succeeded in surveying the majority of the adolescents (569). In order to learn more about perceptions about reproductive health, additional information was collected among 18 adolescents, 8 parents and 3 local key persons by means of in-depth interviews. Almost all adolescents who were interviewed at follow-up were unmarried. Unmarried adolescents in Bangladesh are a marginalised group both in research and policy (Ross 1996, p. 8). However, unmarried adolescent girls merit attention as they are on the threshold of getting married and starting childbearing, and hence, passing on life to the next generation (currently 48 per cent of the 15 to 19-year-old girls in Bangladesh are married and the proportion of girls who gave birth by the age of 20 years is 63 per cent; Population Reference Bureau 2000, p. 21). That unmarried adolescent boys should also be informed is not only relevant for their own sake, but also important because of their role as husbands and fathers-to-be. If a man is sensitised from an early age onwards about reproductive issues, he may better be able to address the reproductive health related needs and aspirations of his wife later in life. Also in proportional as well as
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numerical terms adolescents are of the utmost importance (ICDDR,B 2002a, ICDDR,B 2002b).

As already noted in Chapter 1, conducting a longitudinal study in a developing country is rare. That we were able to link the data collected at baseline and at follow-up was feasible only because of the Registration IDentification (RID) number which is the key in the ICDDR,B’s Health and Demographic Surveillance System (HDSS). It was also only because of the HDSS that we were able to analyse the records of the children who were lost for follow-up due to death or migration. Information on cause of death or migration was available for 106 individuals. The number of children who passed away before the onset of the follow-up study was small (n=11), which may be related to the fact that the majority (64 per cent) of the baseline population was already older than one year at the beginning of the (baseline) survey, and hence had passed the critical first 12 months of life. Far more under-fives (n=90) were lost for follow-up because of migration. At baseline, no differences in importance were observed in terms of demographics or socio-economic status between the ‘survivors and stayers’ and the children who would later die or migrate. At baseline, the proportions of children severely underweight and severely stunted appeared to be higher among the (few) children who passed away before the onset of the follow-up study than among the children who later enrolled in the follow-up study.

ICDDR,B does not systematically collect data on anthropometry (including birth weight) and menarche attainment. As in other studies (see, for instance, DHS 1997), we had to collect data on menarche (including maternal age at menarche) and birth weight retrospectively. Although the recall method of reported age at menarche may not be optimal, it is often the only way to collect this kind of information (see also Graham et al. 1999, p. 259). Due to the long period of recall the quality of this data may have suffered from a lack of objectivity and accuracy. Because of this some highly relevant hypotheses, including those that stem from an intergenerational perspective, could not be tested adequately.

Since the results presented in our study underscore the relevance of early childhood nutritional status for menarche attainment - and hint at the importance of birth weight for menarche - we highly recommend expanding the HDSS with a routine collection of data on anthropometry, from birth onwards, and menarche. Given the strong correlation with early childhood nutritional status, the average age at menarche of a population could also be considered as an indicator of the overall nutritional status and, possibly, the population’s level of development (comparable to, for instance, indexes such as life expectancy or under-five mortality). In addition, age at menarche may gain in importance as a determinant in studies on maternal (obstetric) health and reproductive health in later life, for example regarding breast cancer (see, for instance, Dos Santos Silva and De Stavola 2002).

The aforementioned appeal should also be seen in view of the fact that more and more valuable input from other disciplines such as epidemiology, nutrition, sociology, anthropology and psychology is being successfully integrated into demographic studies. The present study can also be seen as a contribution to a further integration of some of these sciences into demography. The research design, described in Chapter 3, as well as the analyses of data presented in Chapters 5 and 6, relate for instance to epidemiology and nutrition. In Chapters 2 and 7 the meaning of adolescence was
explored, as a consequence of which the study yields a more holistic view of the period of adolescent life in rural Bangladesh. The research was based on data derived from different sources whereby ample time was allotted to fieldwork, as described in Chapter 3. We not only built a database with data collected by means of primary methods of data collection (the follow-up survey), which we linked to secondary data (the baseline survey), but we also combined the quantitative (survey data) to qualitative information which we collected by means of in-depth interviewing (extracted phrases in which the real ‘voices’ of the respondents were heard). We believe that grounding the study in a variety of information sources may have contributed to the validity of the data.

8.3 Physical well-being of adolescents’ reproductive health

8.3.1 Timing of reproductive transitions (question 1)

Research question 1 addressed the timing of the core transition in adolescence:

What is the reproductive health status of adolescent girls and boys as indicated by the timing of menarche and spermarche respectively?

Age at menarche

From the results presented in Chapter 6, we learned that among the 12 to 16-year-old girls in our sample (n=255) many had not yet reached menarche: the proportion of postmenarcheal girls increased from 7 per cent among 12-year-old girls to 81 per cent among 16-year-old girls. Over half, 52 per cent, of the postmenarcheal girls reached menarche at an age of 14 years or older, the cut-off point of what could be defined as a ‘late’ menarche when compared with contemporary Western countries. In addition, also 52 per cent of the premenarcheal girls was 14 years or older and therefore, according to this definition, ‘late’ with the reaching of menarche. This latter figure can be regarded as a lower limit as it may increase if premenarcheal girls who are currently 12 or 13 years old do not reach menarche before their 14th birthday. Lifetable analyses, which allow for censoring, revealed that the (expected) median age at menarche among the girls in our sample is 15.1 years.

Age at menarche in view of future reproductive health

Reaching menarche at the age of 14 years or older may be detrimental for reproductive health if, as outlined in Chapter 2, such a relatively ‘late’ menarche is followed shortly by the birth of the first child and the girl’s height is low. This notion is grounded in the recognition that a) height and pelvic size are correlated; and b) at the time of reaching menarche girls have approximately 4 per cent more height and 12 to 18 per cent more pelvic growth ahead of them (WHO 1991, p. 6). From Chapter 5 we learned that 31 and 46 per cent of the adolescent girls in our sample are moderately (between -3 and -2 SD) and severely (<-3 SD) underweight in comparison to a well-nourished reference population of the same age and sex (CDC 2000). The corresponding proportions of stunting are 40 per cent (moderate) and 28 per cent (severe) respectively. In absolute terms, some of the girls in our sample are at risk because their weight and height fall below the cut-off points below which obstetric risks increase (for a height less than 145 cm and a weight lower than 45 kg there may be an obstetric risk; WHO 2003, pp. 22-23). The adolescent girls in our sample are
likely not to have completed growth but their height and weight seem also to be subnormal because of malnutrition. If the 16-year-old girls in our sample married and became pregnant soon afterwards, 83 and 23 per cent respectively would be at risk in terms of obstetric cut-off points for weight and height.

**Age at spermarche**

Collecting data on spermarche turned out to be highly sensitive, something which was already expected given earlier studies on this topic, particularly in developing countries (WHO 1995; Hirsch et al. 1979). Nevertheless, among our sample of adolescent boys 40 out of 260 affirmed having experienced this event. Comparison of the age-specific distributions of adolescent girls and boys who had experienced menarche and spermarche respectively showed that girls are more advanced in terms of reproductive development than boys at every age between 12 and 16 years. A case in point is that among 14-year-olds, 40 per cent of the adolescent girls is postmenarcheal, against 4 per cent of the boys being postspermarcheal.

### 8.3.2 Menarche and nutritional anthropometry (question 4)

Research question 4 stemmed from the assumption that timing of menarche is predisposed by contemporary and early childhood nutritional anthropometry and possibly even set in utero:

*Is timing of menarche predisposed by contemporary and early childhood nutritional anthropometry, birth weight, as well as height and age at menarche of the adolescent girl’s mother?*

**Influence of maternal age at menarche**

A late menarche may ‘run in the family’. The review of studies (Chapter 2) showed that there is some evidence of a genetic predisposition on the timing of menarche, which is based on studies on twins and on a positive correlation between age at menarche of mothers and daughters. In Chapter 6 we analysed data on (recalled) age at menarche of adolescent girls and their mothers. We found neither a significant correlation between a mother’s age at menarche and menarche status of her adolescent daughter (all girls included), nor a significant correlation between a mother’s age at menarche and the age at menarche of her postmenarcheal daughter. This brought us to reject hypothesis 1, which stated that timing of menarche of mothers and daughters is positively, though weakly, correlated. It needs to be recalled, however, that prudence is required here because of the long period of recall (see also section 8.2).

**Menarche and contemporary and early childhood anthropometry**

The assumed influence of contemporary and early childhood nutritional status on age at menarche was confirmed in our descriptive analyses presented in Chapter 6. By means of descriptive analyses, lifetables and Cox regression models, we reviewed a) the stage in life (adolescence, early childhood or birth) that is most important with respect to the influence of nutritional status on menarche attainment; and b) within this stage, the type of nutritional status indicator (underweight, stunting or BMI) that has the strongest effect. It appeared that every contemporary and early childhood nutritional indicator that we included in the analyses had a significant effect on the rate of menarche when considered separately. As noted in Chapter 5, this also reflects
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the extent of collinearity between the independent variables. Illustrating the effect of contemporary stunting on menarche attainment yielded the followed results: severely (\(<-3\) SD) and moderately (between -3 and -2 SD) stunted adolescent girls have a rate of menarche that is respectively 16 and 42 per cent of the rate for girls who are not stunted (\(\geq-2\) SD) in adolescence (the reference group). This means that girls who are severely stunted in adolescence have the highest age at menarche. Significant effects on the rate of menarche were also found for severely underweight and stunting in early childhood. After controlling for the respective early childhood predictors (i.e. childhood underweight, childhood stunting and recalled birth weight), it appeared that adolescent stunting stood out as the most important (significant) determinant of age at menarche.

However, we believe that we cannot conclude that only adolescent stunting impacts on menarche attainment and that adolescent weight (or weight-for-age) and nutritional status in childhood are not factors of importance. Given that in extreme situations (famine, diet, physical exercise) menstruation (temporarily) stops (Napieralski and Devine 1998, p. 3) there seems to be a minimum of nutritional intake for reproductive functioning. Such a minimum - or to use Frisch and Revelle’s term (1971), “critical weight” - is also likely to be present for the first menstruation, menarche. Given the strong correlation between stunting in early childhood and adolescence, which we found in Chapter 5 (see also subsection 8.3.4), adolescent stunting still resonates from the effect of stunting in early childhood. Following this line of thinking, the effects of nutritional status of the previous generation (the adolescent girls’ mothers) should also not be ruled out as a factor possibly (indirectly) influencing age at menarche. Maternal height did not have a significant effect on the rate of menarche, but it appeared to be an important determinant of adolescent stunting. The results verified hypothesis 2 that stated that adolescent girls who were malnourished according to anthropometry as an under-five child are more likely to reach menarche ‘late’ (i.e. 14 years or older when this event occurs) as compared to their well-nourished counterparts. Hypothesis 3 stated that adolescent girls who were born with a low birth weight reach menarche earlier than girls with a higher weight at birth. The univariate Cox regression showed a significant effect of birth weight on the rate of menarche, but it lost its effect when other nutritional predictors, notably adolescent stunting, were taken into consideration. Since the data on birth weight are likely to suffer from a lack of validity (see also section 8.2), we do not find it feasible to draw a conclusion with respect to hypothesis 3.

8.3.3 Adolescent nutritional anthropometry and gender (question 2)

In research question 2 we addressed the contemporary nutritional status of adolescents, accounting for possible differences by sex:

What is the contemporary nutritional status, as indicated by anthropometry, of adolescent girls and boys, and does this differ by sex?

In hypothesis 4 it was stated that adolescents’ nutritional status, as indicated by anthropometry, is poor. In confirmation of this hypothesis it appeared that irrespective of the nutritional indicator used, the adolescent population in our sample can be considered largely malnourished. For instance, 66 per cent of the adolescent boys and 46 per cent of the adolescent girls are severely (\(<-3\) SD) underweight, whereas 36 and
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28 per cent of the adolescent boys and girls respectively are severely ($<-3$ SD) stunted. Particularly the high percentage of severely underweight boys calls for further (cross-country) comparison of nutritional data. However, information on adolescent nutritional anthropometry is scarce (United Nations 2000, p. 2), particularly within the Southeast region including Bangladesh (WHO 2003, p. 6; p. 14). Our study population has a slightly lower height and weight than their Indian peers (NNMB 2002): 15-year-old adolescent boys from Bangladesh are 149 cm tall and weigh 35 kg, whereas similarly aged boys from India are 152 cm tall and weigh on average 37 kg. Both our Bangladeshi and the Indian population are considerably smaller and lighter than their counterparts in the US: the US NCHS figures for height and weight for 15-year-old American boys are respectively 168 cm and 55 kg.

8.3.4 Early childhood and adolescent nutritional anthropometry (question 3)

The central contention in research question 3 is the notion that early childhood may be considered sensitive or critical for the adolescent stage in life:

*Is nutritional anthropometry in adolescence predisposed by nutritional anthropometry in early childhood, birth weight, and height of the adolescent’s mother? And, related to this, is there any potential to catch up early childhood growth faltering in adolescence?*

We hypothesised that malnutrition, as indicated by the level of stunting, is more prevalent among adolescents who were stunted in early childhood than among adolescents who were not stunted as an under-five (*hypothesis 5*). Both from the descriptive as well as the univariate and multivariate binary logistic regression analyses, we learned that stunted under-fives are indeed highly likely to become stunted adolescents. For example, among boys who were severely ($<-3$ SD) stunted as an under-five$^{62}$, 71 percent remain severely ($<-3$ SD) stunted in adolescence. Also 48 and 17 per cent respectively of the not stunted under-five boys become moderately and severely stunted in adolescence. Compared to boys, a relatively high proportion of girls maintain an adequate nutritional status between early childhood and adolescence: 54 per cent of the girls remain not stunted ($>-2$ SD). The regression analyses revealed that, irrespective of sex, the odds of being stunted in adolescence for children who were moderately stunted in childhood is 1.64 times the odds for children who were not stunted in childhood, whereas the odds of being stunted in adolescence for children who were severely stunted in childhood is even 7.40 times the odds for children who were not stunted in childhood (reference category).

Moreover - as based on the findings of, for instance, Gillespie and Flores (2000) - we hypothesised that adolescents who were already stunted at the age of two years are more likely to remain stunted as compared to their not stunted same-aged counterparts in early childhood (*hypothesis 6*), and that girls are more likely to catch up early childhood growth faltering in adolescence than boys (*hypothesis 9*). Such a difference by sex could be biological in nature, related to differences in growth velocity (height), whereby boys generally peak later than girls. Results presented in Chapter 5 showed that for both boys and girls there is indeed some potential to catch up early childhood

$^{62}$ Nutritional status in childhood was assessed on the basis of comparison with the CDC/WHO reference population of 1978.
growth faltering (indicated by the level of stunting), but girls display a greater potential to improve their nutritional status, i.e. they are more likely to either consolidate a not stunted status or to turn from a moderately or severely stunted under-five into a not stunted adolescent. However, we also found that girls who were stunted around the age of two years do not have a greater potential to catch up faltering growth than their male counterparts in adolescence. Among children who did not suffer faltering growth around the age of two years girls are less likely than boys to become stunted in adolescence.

Given the prevailing low status of girls and women in many domains of life, we hypothesised that both in early childhood and adolescence girls are more likely to be malnourished as compared to their male counterparts (hypothesis 8). We observed that whereas on average adolescent girls are heavier compared to boys throughout the early and middle adolescent period, boys ultimately grow taller than girls, assuming that the nutritional status pattern (indicated by weight and height) pertaining to the ages 12 to 16 years prevails throughout the later stages of adolescence (ages 17 to 19 years). The turning point in height, i.e. when adolescent boys in our sample catch up with their female counterparts, is right after the age of 14 years. Contrary to what was hypothesised, we found that adolescent girls are less likely to be malnourished than boys. The binary logistic regression analyses revealed, for instance, that the odds of being stunted in adolescence for girls are about 0.4 times the odds for boys (reference category), meaning that girls are less likely to be stunted in adolescence as compared to boys. In early childhood however, girls are indeed relatively more often severely (<-3 SD) underweight and severely stunted than boys. However, if we consider two categories together - moderately and severely underweight and stunting - this difference is almost counterbalanced.

Finally, we hypothesised that the likelihood of being stunted in adolescence is greater for adolescents whose mothers are stunted than for adolescents whose mothers are not stunted (hypothesis 7). The descriptive analyses showed that 49 per cent of the adolescents whose mothers are less than 145 tall, is severely (<-3 SD) stunted. By comparison, it is 29 per cent for adolescents with taller mothers. Small mothers are more likely to have a child who is severely stunted in early childhood as compared to mothers who are not small. This apparent effect of maternal height on the stunting status of an (adolescent) child diminished completely, however, in the multivariate regression analyses and may thus only have an indirect influence (for instance, via childhood stunting). When we took all potential nutritional indicators together into consideration by means of binary logistic regression models, the variation in stunting in adolescence can be explained by the combined effect of the predictors, notably sex of the adolescent, childhood stunting, and possibly - see our reservations on the quality of the data in subsection 8.2.2 - birth weight.

8.4 Mental well-being of adolescents’ reproductive health (question 5)
Research question 5 addressed the adolescents’ reproductive knowledge and perceptions, both pertaining to current and future life:

Are adolescent girls and boys informed about and prepared for menarche and spermarche respectively, and reproductive development in general?
In Bangladesh, throughout the respective sub-stages of childhood and adolescence, girls are expected to learn their gender role at an earlier age than boys. Moreover, the period for adolescence in this country also seems to last longer for boys as they generally marry later. In adolescence, the world of girls and boys becomes increasingly segregated. The different approaches to the respective rites of passage which adolescent boys and girls in Bangladesh undergo illustrate the chasm between them. Although circumcision, which precedes spermarche, is of a different order from the onset of menarche, a common denominator shared with menarche is that it marks the entrance into the next stage of life, including the internalisation of the corresponding modes of conduct. In our study the average age at circumcision was 7.1 years (Chapter 7). With circumcision, the new status of an adolescent boy is celebrated with fanfare and in public, whereas the onset of menarche is kept silent and generally looked upon negatively because of the polluting nature of menstrual blood and the new ‘dangerous state’ of being sexually mature. The public acknowledgement of the transition from childhood to adulthood associated with circumcision contrasts sharply with the silence surrounding menarche. Given the gender-specific differences in adolescent socialisation, which we described in detail in Chapter 2, we hypothesised that adolescent girls and boys are not or insufficiently informed or prepared about menarche and spermarche respectively and reproductive development in general, and that girls are less informed than boys (*hypothesis 10*). This was subsequently studied in Chapter 7 on the basis of a combination of information collected by means of the (follow-up) survey and in-depth interviewing. The latter was held with selected (unmarried and a few married) adolescents, several mothers and fathers of adolescents, ghatoks (matchmakers) and a local youth counsellor. Coherence to the quantitative (survey) and qualitative (the ‘voices’) data was achieved by analysing both types of data jointly.

The social significance of menarche and spermarche was addressed first by analysing how adolescent girls and boys perceived the transition of menarche and spermarche respectively. A relatively high proportion of the postmenarcheal adolescent girls, 64 per cent, reached menarche in fear (‘I felt mainly scared’), indicating low reproductive well-being from a mental-emotional perspective. Underlying this fear may be a lack of preparedness. The girls (and boys) whom we interviewed in-depth did not have any or had only a little knowledge about the physical origin of menarche (and spermarche respectively). The link with reproduction and the will of Allah, as indicated by some mothers, seemed to bestow menarche with ‘religious preordainment’. For 44 per cent of the postmenarcheal girls, menstruation was accompanied by feelings of weakness. A smaller proportion (14 per cent) mentioned that they experienced headaches and moodiness on these days of the month. Nevertheless, in spite of this, menstruation is in general perceived positively because it is considered as a means to restore ‘good health’ by purging or washing away the ‘bad blood’. Moreover, as was the case with menarche, menstruation is welcomed as an identification of womanhood.

Boys and girls differ when it comes to whether they talked to someone after the onset of spermarche and menarche respectively. Having someone to talk to may be especially important in view of the previous observations about the feelings of fear and anxiety that accompany reproductive transitions and the high number of premenarcheal girls not informed about their approaching menarche (65 per cent). The majority of the postspermarcheal boys (65 per cent) kept the reaching of
spermarche silent, whereas the rest turned to friends. Postmenarcheal girls were not only much more likely to talk to someone after they experienced menarche (85 per cent talked to someone), but their social circle in this respect also seems much broader, ranging from friends to female family members. The role of mothers in this is slightly smaller than that of friends, sisters and aunts or cousins of adolescent girls. This has also been observed in other studies (see subsection 2.4.3).

Although adolescents said that they were informed about human procreation (84 per cent of the boys; 71 per cent of the girls) their factual knowledge seemed to be less substantial. About 70 per cent of the postmenarcheal girls confirmed the statement that a girl can indeed get pregnant the first time she has sexual intercourse, but only 6 per cent of them actually knew that a girl or woman is most likely to conceive approximately two weeks before or after the menstrual period. The proportion of adolescents who had ‘ever heard’ about contraceptives was relatively low: 34 per cent among the adolescent boys and - twice as high - 68 per cent among the adolescent girls. In this group, the majority (89 per cent) considered themselves to be ‘informed’. However, detailed analyses of questions about how different methods of contraception worked showed that their factual knowledge was patchy. A similar finding was observed with regard to HIV/AIDS. A way needs to be found which does justice to the need for clarity on these topics and to ensure that the cultural norms about sexual propriety are not contravened.

The mean age at which a girl and a boy in Bangladesh should marry according to the adolescents in our sample is respectively 19 and 25 years. In Matlab, it is the parents who generally decide on the timing of the marriage. In the in-depth interviews some parents revealed that they base their decision on the timing of (the future) marriage of their daughter on their own experiences with (early) marriage and childbirth. Negative experiences with early childbearing of the parents may result in a later timing of marriage of their daughter.

Finally, the questions that some adolescents posed in the in-depth interviews were revealing. These questions display a great eagerness among both adolescent girls and boys to learn more about the basic facts relating to pregnancy and childbearing. Such eagerness for learning may serve as a catalyst in adolescent educational campaigns. From Chapter 4 we also learned that among the adolescents, school enrolment is high: 98 per cent has been to school (slightly more girls than boys) and 85 per cent was still school-going at the moment of interview at follow-up. The adolescents in our sample were much better educated than their parents. For instance, at baseline, the proportion of fathers and mothers who had not completed a single year of education amounted to 53 and 75 per cent respectively. That more and more girls, also in rural areas, are enrolled in schools nowadays was also observed by Blanchet (1996, p. 57). She points out that this increase in female education may indicate more room for childhood and adolescence. As a consequence, the meaning attributed to the adolescent stage in life may change as well as reproductive health needs. Important factors to keep in mind, when setting up reproductive education and counselling programmes, are not only the differences in knowledge between boys and girls but also the different sources of information (persons) about reproductive matters, as has become apparent in our study. In a study by the Population Council Dhaka, it was found that male adolescents preferred a mass media message, whereas female adolescents preferred a personal transfer of information regarding reproduction and sexuality (Haider et al. 1997).
8.5 Recommendations for further study and intervention: research for action

In this study we focussed on the three core elements of life history analysis, namely “describing, explaining and predicting” (Willekens 1999, p. 31). More specifically, our aims were to:

- describe contemporary (reproductive and nutritional) status within a broader timeframe (i.e. any period between conception to death);
- explain this contemporary status (menarche, adolescent nutritional anthropometry) by examining conditions or features in the past (early childhood nutritional anthropometry); and
- outline the possible consequences of contemporary status (age at menarche, nutritional anthropometry) for future events (childbearing).

The first two objectives were studied empirically, whereas the third, explored by means of literature review, relates particularly to the justification of the subject of study. Age at menarche, our main outcome indicator, is not only an indicator of reproductive health status per se, but it may also be crucial for the rest of the reproductive career. Age at menarche appeared to carry both physical (pertaining to the biological clock) and social significance (relating to the social clock). In order to turn the vicious circle of intergenerational growth failure and impaired reproductive knowledge into a virtuous one whereby adolescents are well prepared, both physically and mentally, for reproductive transitions pertaining to the current stage in life as well as to their future reproductive life, an undertaking could be made to have the research followed by action, an approach which is in line with the ICPD action programme as well as the programmes of HERA and ICDDR,B. Next, we will outline some recommendations for research or intervention aimed at improving the contemporary (subsection 8.5.1) and future reproductive health status of adolescents (subsection 8.5.2).

8.5.1 Contemporary reproductive health status

As stated by Napieralski and Devine (1998, p. 4), “age at menarche is beyond our control”. Given our results, however, this remains to be seen. In our study we concluded that menarche is indeed reached ‘late’ for a considerable proportion of the girls due to low contemporary nutritional status, particularly indicated by severely stunting, which was in turn associated with malnutrition in early childhood (see section 8.2). A girl who finds herself on the threshold of adolescence may indeed not be able to alter the timing of her coming menarche. However, for malnourished girls in early childhood (particularly in infancy), but possibly also in late childhood, i.e. between the ages of 6 to 12 years (a population under-addressed in contemporary research), it may still be feasible to improve nutritional status and catch up part of the deficit of early childhood growth. On the basis of stunting profiles in particular, monitoring systems should be formulated, aiming at singling out those pre-adolescent girls who run a risk of reaching their menarche ‘late’ so as to programme urgent nutritional aid for them. In addition, the results presented in Chapter 7 underscore the need to address the adolescents’ needs with regard to reproductive health education. It is worth noting that maintenance of proper nutritional status from birth onwards also adds to mental well-being in later life (see, for instance, Lachance 1995 pp. 9-12; Gillespie and Flores 2000, p. 2).
Chapter 8: Conclusions and discussion

In order to improve the reproductive health status of the adolescents involved (and the generations that follow), a proposal could be developed to translate results of the research into an educational or health campaign on nutrition and reproductive health. Since the development of Information Education and Communication (IEC) activities as such is beyond the scope of the work of researchers, co-operation with a local NGO (Non-Governmental Organisation) is required. For years, such a translation of research into action has formed an integrated part of general health research. In demographic research, however, the inclusion of an action component is rather new. With respect to programming nutritional intervention in developing countries, attention has traditionally not been paid to adolescents (WHO 2003, p. 5), though some successful programmes have been implemented in Bangladesh (for instance, by the Population Council 2003 and Marie Stopes International 2003b).

8.5.2 Future reproductive health status

A comparison of our data on age at menarche with data published in other sources on age at first birth in Bangladesh (see also section 8.4) yields a relatively small time gap between these two events. Also, apparently irrespective of their social and cultural diversity, adolescents start sexual activity at about the same age in both developed and developing countries (UNFPA 1997). It is as yet not known exactly how a pregnancy in an adolescent girl interferes with her own growth and reproductive maturation process (Riley et al. 1993, p. 56). There are indications that catch up early life growth faltering in adolescent girls is characterised by a growth that continues longer than usual, while growth velocity does not change (Riley 1994, p. 92; Silventoinen 2000, p. 23). This may have serious implications for adolescent girls’ reproductive health, because then reproductive organs (for example, the pelvis) take longer to reach maturity (height is correlated to pelvic size). Consequently, these girls would typically reach physical ‘readiness’ for childbirth also at a later stage. These observations have implications for gynaecological age, the time in years since menarche. Young gynaecological age (immaturity of the young mother-to-be) may not only jeopardise the course and outcome of the pregnancy, but it is likely to increase the risk of obstructive labour as well, endangering both the life of the adolescent mother and that of her baby. Gynaecological and biological age (indexed by nutritional status) rather than chronological age seem more important to an adolescent girl’s reproductive health status.

More research is required in order to verify the validity of such a hypothesis. For instance, as a sequel to the present study, future research could entail a third round of data collection (a second follow-up) among the female individuals of our study population at the time their marital lives begin. The focus in such a study would be on reproductive health, indicated particularly by the course and outcome of the first pregnancy, in relation to the young woman’s gynaecological age and her nutritional status career. Such research would also aim to throw more light on weight and height cut-off points that reflect a potential obstetric risk for the Bangladeshi population in particular.