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Maternal health care in south India: Do adolescents seek more care than older women?

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Abstract

Introduction

Adolescent reproductive health is a major area of focus by donor agencies worldwide. While it is generally believed that younger women experience lower autonomy compared to older women, little information is available regarding the care seeking behaviour of pregnant adolescents. In rural India, early onset of sexual activity and the pressure on young married women to prove their fertility as soon after marriage as possible results in high rates of adolescent fertility. Also, as family size preferences have fallen and contraception is more frequently adopted by older women, fertility is increasingly concentrated in the adolescent ages in India (Jejeebhoy, 1998).

The 1998-99 Indian National Family Health Survey (NFHS-2) for observed that a higher percentage of women aged 20-34 and primiparas received antenatal care from a skilled provider compared to younger groups. To determine the extent of care-seeking by pregnant adolescents, we analyse data from an in-depth, prospective study of maternal morbidity and care in rural Karnataka.

Data and Methods

This paper discusses the results of an analysis of a prospective, community-based study of maternal morbidity and care in rural south India, funded by the WHO, for which data collection was completed in 1998. The entire population of pregnant women in eleven villages in rural Karnataka was enrolled in the study (n=500). Nearly half of the study population was 19 years of age or less at the time of enrollment. Due to the widely prevalent practice of returning to the natal home for delivery, women whose natal homes were outside of the study villages were lost to follow-up. This resulted in a sample size of 388 women. Differences in background characteristics between dropouts and those who completed the study were non-significant.

Using bivariate analysis and logistic regression, we examine the extent of care sought, by age group, during the antenatal, labour and delivery and postnatal periods. The outcomes of interest are related to maternal care-seeking behaviour. To measure this, timing in weeks of the first antenatal visit to a trained health care provider, as well as the number of antenatal care visits are explored. A small qualitative component of the study was also carried out to aid interpretation of the quantitative results. This work is also reported in the paper.

Findings

Considering the expected lower autonomy that younger women experience, the results are surprising. Very few significant differences are found by age among the key health seeking indicators. Looking at bivariate tables alone, younger women even have a slight advantage in terms of timing and number of contacts with health services, and report more contacts with private services rather than government providers. However, when gravida is taken into account, the effect of age disappears altogether. There is a divide in terms of care-seeking between primigravidas and multigravidas, regardless of age.

No differences in measures of care such as prescription of iron supplements and receipt of tetanus toxoid injections were observed by age, although a significantly lower percentage of women aged 19 and under received advice on contraception. Furthermore, their reported awareness of public programmes such food supplementation under the national programme is significantly lower. Interestingly, there were no significant differences between age groups in the number of self-reported pregnancy-related problems. Given the international focus on adolescence as an important dimension of public health, this study gives a valuable insight into health care patterns the married adolescents who predominate in Indian villages. An understanding of health seeking behaviour among pregnant youth will also be useful to better inform local education efforts.

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Introduction

Adolescent reproductive health has become a focus of research and intervention globally, perhaps due to the recognition that the ages between 10-19 represent a window of opportunity to positively change the course of people's lives, including their present and future health status. Although many studies and programmes are underway, there is relatively little research that describes the reproductive health status of adolescents and their behaviour, especially with regard to childbearing and care received during the obstetric period. It is generally accepted that adolescents face increased obstetric morbidity and mortality risks, due to a combination of factors, and experience a relative disadvantage in terms of access to heath services. In this paper, we discuss results from a prospective study of obstetric morbidity and care, in which 42% of the sample were 19 years of age or less. The focus of the analysis is on health care during the obstetric period, to examine whether and how adolescents are disadvantaged in aspects of maternal care. The paper concludes with results from focus group discussions.

Previous work

Much of the literature on adolescent childbearing focuses on young unmarried women. These studies explore the risk associated with pregnancy and childbirth among young women and girls who are in a context of traditional values which strongly censure sexual relationships among the unmarried (Singh 1998). However, the vast majority of adolescent childbearing in India is found among married girls and women, who face different social conditions during pregnancy and beyond.

Adolescent pregnancy and childbearing is now viewed as a greater social problem than it was in the past. The International Conference on Population and Development affirmed the importance of reducing the level of childbearing among adolescents (UN 1994). However, worldwide, there are few countries in which adolescent childbearing is increasing, in many it is decreasing, and in some substantially so. Adolescent childbearing in India is at a fairly high level. The age-specific fertility rate is 121 per 1000 for the 15-19 age group for all India and 135 for rural Karnataka (NFHS-2, IIPS 2000). Fertility among rural adolescents ages 15-19 in India accounts for 20% of total fertility in rural areas and 19% overall. While adolescent fertility rates are high in India, they are dropping, and they rank below other regions such as sub-Saharan Africa and other south Asian nations (e.g., Bangladesh). The percentage of women who give birth by age 20 is also declining in India, although not substantially so (Singh, 1998).

Medical indications for adolescent pregnant girls as compared with older women are well documented. Treffers (2001) gives a review of the main differences in outcome by age. This review of adolescent childbearing starts by documenting the declining age at menarche from 15 years to 12.5 years worldwide. The trend for more schooling for girls combines with this to increase the length of time that unmarried adolescents are exposed to sexual activity and pregnancy.

Some studies have shown that maternal deaths are concentrated in the youngest ages, and children born to younger mothers are more likely to be pre-term or low birth weight, (Aras et al.,1989, Jejeebhoy and RamaRao, 1995, Bhatia 1993). However, studies that have controlled for other factors such as socio-economic status and antenatal care show that the young age of the pregnant woman need not be a risk factor for increased mortality (Kwast and Liff 1988). Zabin and Kiragu (1998) question the biological role of age as a causal factor of the health situation of young mothers. Using the case of cephalopelvic disproportion (a rare disease in the west regardless of age) as an example, they claim that "age is not the basic problem, although physical development is implicated". Instead, lack of access to health care and malnutrition are cited as the root cause. They conclude that both age-related customs (e.g. early marriage) and/or age-related vulnerability (social economic position) interact with biological factors and account for the differences recorded in prevalence and incidences of pregnancy related problems in adolescents when compared with older women.

They therefore conclude that these differences are "essentially differences of degree" that have been exacerbated by intervening social factors.

In terms of the complications of pregnancy, there is mixed evidence for adolescent childbearing. The effect of adolescence often disappears if the study has compared teenage primagravidae with older primagravidae, rather than comparing teenage pregnancies with all others (eg Mukasa, 1992). Some evidence shows that the incidence of pregnancy induced hypertension is higher in adolescents. There is no evidence that haemorrhage or infection is age-related, in fact, complications that occur during labour are less common among the younger women (Treffers, 2001). However, anaemia is a common problem among adolescents, especially in India, and this is a risk factor for postpartum haemorrhage. For teenage girls, the extra nutritional demands of pregnancy are additional to the nutritional demand to fuel the adolescent growth spurt, both of can which combine to culminate in the poor nutritional status of the pregnant adolescent (Jejeebhoy, 1998, Ramachandran, 1989). Among adolescents there is also a higher risk of pre-term delivery than for older women, although much of the evidence for this is from the United States where social conditions are very different to developing countries. Young gynaecological age (GA: the time lapse between the onset of menarche and first delivery) is a strong factor predicting pre-term delivery, but this is not a significant problem after a GA of two years (Treffers 2001).

According to the few papers on healthcare utilisation, adolescents are less likely to seek or receive maternal care (McDonald and Coburn, 1988, Singh et al, 1985). However, these studies have been carried out in very different cultural context from rural India, usually in developed countries with socio-economically marginalized, unmarried adolescents. While this situation might also exist in India, particularly in urban areas, most adolescent childbearing takes place within the context of marriage and within what is socially viewed as a normative period for marriage and childbirth. Also, in many of the studies it is not clear whether gravida has been controlled.

Setting and study design

The study described in this paper was funded by the World Health Organisation and the primary aim was to identify the sociocultural determinants of obstetric morbidity. The setting is in rural south Karnataka, in southern India. The research objectives were to establish the type and extent of obstetric morbidities and explore health promoting behaviours and factors affecting service uptake during the obstetric period. A related objective was to gather information on traditional beliefs and practices and to explore the nature of health services provided in the rural context. Both quantitative and qualitative methods were used, and a prospective research design was employed in order to overcome the recall biases inherent in retrospective studies.

Karnataka has a rural profile typical of south India, where early marriage for women and consanguineous marriages are common. Recent rapid fertility declines at all ages have brought the Total Fertility Rate in Karnataka to 2.24 for rural women aged 15-49, with about 21% of rural women experiencing birth intervals of less than 24 months (IIPS 2000). Use of contraception is high within the state with female sterilisation being the preferred method, as in most other Indian states (IIPS 2000). Literacy levels in the state are just a little higher than the national average of 52%, with male rates exceeding female rates by over 30% (Bhatia and Cleland 1995).

The study area itself is 50 kilometers south of the Karnataka capital Bangalore, including 11 villages surrounding the main town Kanakpura. The total population of the selected villages was approximately 25,000 people and 6,000 households at the time of the study, and distance from the taluk main township of Kanakapura ranges from 8km to 25km. Nine villages were randomly selected but two additional villages, a large village with access to mixed services and a small tribal village were purposively selected to capture health behaviour in a range of settings.

The data analysed for this paper was collected from August 1996 to September 1998. Information such as health seeking behaviour, nutritional intake, delivery practices and extent and type of self-reported morbidities was collected to provide a comprehensive record of the relevant characteristics of the pregnant women. The study used a prospective design with visits in the antenatal, intrapartum and postpartum periods. Insight gained from this prospective design, such as respondents intentions and reasoning, and timing of

events are of particular interest to this specific research area. These invaluable data could not have been obtained with a retrospective design and its inherent recall error.

All women who were pregnant at the onset of the study were recruited into the study. Enrollment continued until approximately 500 cases were collected. Collaboration with local staff from the government health system (anganwadi and ANM ancillary nurse midwife) ensured complete coverage. Participants were administered five interviews. Firstly the initial questionnaire was carried out soon after identification, usually between two and four months of pregnancy. Two antenatal questionnaires were conducted later during the pregnancy, usually during the second and third trimesters, with similar questions. The post delivery questionnaire was administered within one week after delivery, and a postpartum questionnaire at three months concluded the study. Qualitative interviews were done with some women throughout the course of the study.

Of the 535 women initially enrolled in the study, 388 completed the antenatal questionnaires, and 366 completed the postnatal questionnaire. The loss to follow-up was due to women returning to their natal home for delivery outside the study villages. This is a common practice in south India, especially for the first and second births. Other than a slightly higher percentage of first births to the dropouts, there are no other statistically significant differences between the dropouts and the final analytical sample. This analysis is reported in more detail in Matthews et al (2001).

The antenatal data used in this analysis draws from two sub-samples of the data:

1. All women who completed antenatal questionnaires (n=388) and
2. All women who completed both antenatal questionnaires *and* were interviewed sufficiently late in the pregnancy (8^{th} or 9^{th} month, n=282) to provide satisfactory coverage of the antenatal period and maintain consistency between cases of exposure time. From this sub-sample, outcomes such as total number of antenatal care visits are analysed. For the other parts of the analyses the data from the 388 respondents have been used.

Methods of analysis

After an initial exploration of basic characteristics of the women by age group (see Table 1), bivariate tabulations were used to look at the relationship between age and health-care seeking variables (see Table 2). Age has been grouped to less than or equal to 19 years (42% of the sample, of which about half are 17 or younger) and greater than or equal to 20 (58%). Variables from the antenatal, intrapartum and postpartum periods were analysed to observe where unadjusted differences lie, if at all, between age groups. The health care related variables include both care-seeking and care provision through, for example, home visits by an outreach health worker. Following this, all bivariate crosstabulations were stratified by whether the pregnancy was first gravida or higher, as this is significantly associated with maternal care in other studies and differed between the two age groups of women in the study. (see Table 3). Finally, logistic regression was used to model the main outcomes of interest (see Tables 4,5,6).

To provide more insight on health care and social support intentions for pregnant women of different age groups, three focus group discussions with a total of 24 women of different ages and different castes, all with either young children (recent births) or with adolescent children were conducted. Discussions were semi-structured and the interviewers took care not to ask leading questions. The discussions first centered around marriage and the women's opinions of early marriage, followed by childbearing (early vs. later) and the medical care and social support associated with maternal health generally and then with specific regard to maternal age.

Results

The background characteristics of the two age groups are remarkably similar (Table 1). None of the socio-economic variables are statistically different. The percent of adolescents who are of a socially low caste and low education categories vary little with that of women 20 and older. The distribution of education of the head-of-household comes closer to significance than any of the other variables. A higher proportion of the head-of-households of the pregnant adolescents have no education (70.2%) and a lower proportion have studied to class 9 or beyond (14.9%) compared to the 20 and older group (58.6% and 22% respectively). The households of the pregnant adolescents also score lower in terms of household possession value, but these

proportions also are not statistically significant. Gravida, however, is strikingly different. About 65% of the pregnant adolescents are primigravida, compared to about 35% of the 20 years and older group. Selecting only those women who had a previous pregnancy, there are no significant differences between age groups for problems reported in previous pregnancy. Finally, a higher proportion of adolescents remained in their natal homes for the postpartum period, probably a reflection of more of them experiencing first births.

For many of the care variables, a higher proportion of adolescents' report a higher level of health care either accessed or received (Table 2). A higher percentage of adolescents report an earlier antenatal visit, and more saw a higher skilled provider in the first visit. An examination of routine visits also showed a similar pattern, with a higher percentage adolescents having more routine visits, although this result is non-significant. Few differences emerge in either delivery plans or actual place and attendant at delivery. Although a higher proportion of women 20 and older had a postnatal contact with a health care provider, the 19 and younger group had more contacts and earlier first contact. This difference is observed although the proportions reporting a postnatal problem between the groups are similar.

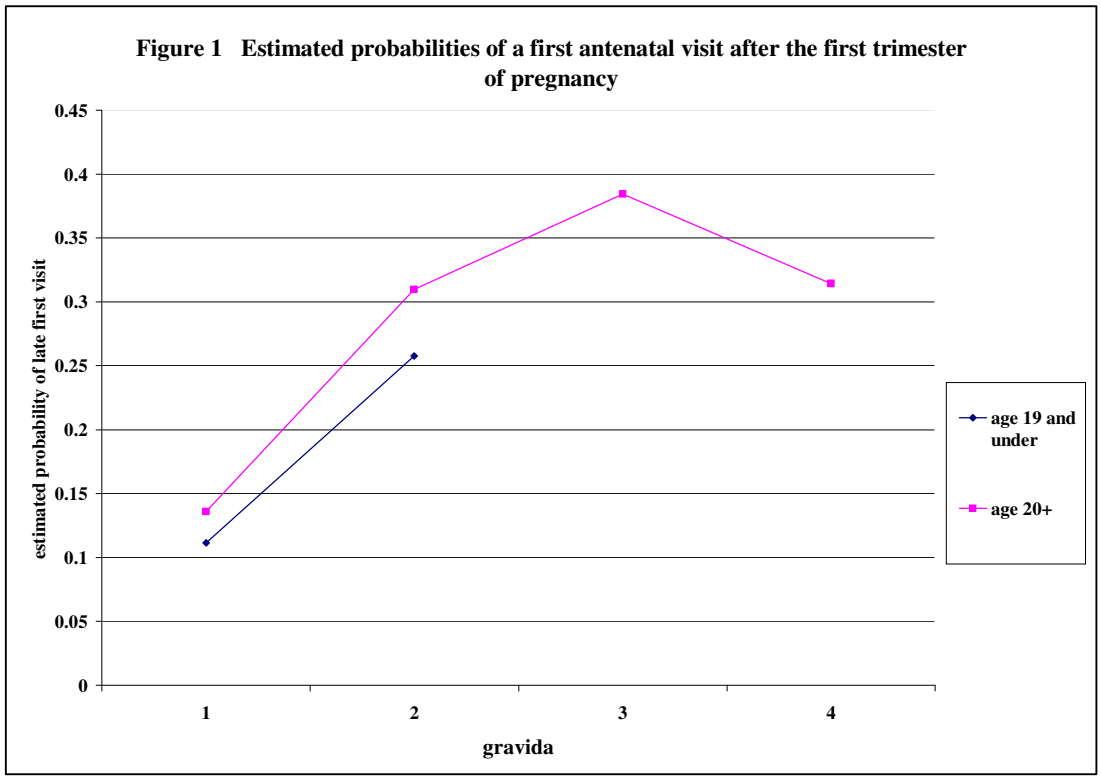
Given that gravida significantly differed between the two age groups and that gravida is a significant variable in some literature for health care seeking, all crosstabulations were performed again stratifying by gravida status (Table 3). A dichotomous variable of whether the woman was primigravida or not was used. These results clearly show an association between the care variables and gravida status. In some cases, the significant bivariate associations seen with age are not observed. The earlier findings appear to be associated with gravida status, with primigravidas having a higher level of care. This is masked in the simple bivariate tables, since a higher proportion of the primigravida group consists of adolescents. In fact, many of the stratified crosstabs show no significant differences in the care variables between the adolescents and the older group of women. Some significant differences emerge among those with gravida more than one, with a higher percentage of younger women having a higher total number of antenatal visits.

In terms of postnatal care, although a significantly higher proportion of older women have a postnatal visit, in both the simple bivariate and stratified crosstabulations, adolescents with some postnatal contact have more and earlier contact. This result bears out even when stratified by gravida. Interestingly, a lower proportion of adolescents have postnatal problems among the primigravidas, and a slightly higher proportion for those with gravida greater than one.

Tables 4, 5 and 6 show the results of logistic regressions, which were carried out to model the following three dichotomous outcomes:

- late first antenatal care visit (after the first trimester of pregnancy)
- private provider at first routine antenatal care visit
- less than three antenatal care visits in total.

In all three analyses, there is no significant effect of age, as gravida predominates. An interaction term between age and gravida has been fitted to show the nature of the relationships between careseeking and adolescent status, but in all three regressions, it is difficult to detect differences between the young and older primigravidas, or between the young and older multigravidas. To illustrate this, estimated probabilities have been calculated for the first model which focuses on late first antenatal care visits. In this analysis, women's education and caste are seen to have the expected effect on timing of first visit. Setting education and caste at their average levels, estimated probabilities are shown for separate gravidas and for the two age groups separately in Figure 1 below.



Note: education and caste are controlled for in the estimation of the probabilities shown above.

In the final model for which the results are shown in Table 4, there is no significant effect above gravida 2. Although the estimated probabilites show a rise in the proportion of women with a late first visit for higher parities, the predominant effect is between the first and second pregnancy. However, the diagram illustrates the doubling of the probability of late visits between the first two pregnancies, and also illustrates the slightly lower chance for teenagers as compared with older women of contacting antenatal care late in pregnancy. The effect of age is, however, not significant.

For accessing private providers, more factors are significant. As well as the education and caste factors seen in the associations with late first antenatal care visits, wealth and location variables are also important for routine visits to private providers. Older multigravidas have a lower odds of accessing private care compared with other pregnant girls and women (see Table 5). A similar effect is seen in Table 6, which shows correlates of 0-2 antenatal care visits only. Although only education shows a significant association, the group with fewer visits is older multigravidae. Again, adolescents are not shown to be suffering a care-seeking disadvantage.

Qualitative results

Early marriage

The group discussion first explored women's opinions of early marriage, what they consider to be early, and why early marriages are commonly performed for adolescent girls. Almost all of the women said that early marriage was not directly linked to low economic status. Many families who could afford to wait opted for early marriage mostly for convenience, and especially if there was an interested party. Almost all of the women said that 18 was a good age for marriage, perhaps because it is the legal age, but almost all admitted that it is difficult to wait so long, unless a girl is studying and the family can afford to continue to educate her.

> *In the cities, you can wait, girls study and work, here in the villages it is different. Why wait if a girl is sitting at home?*

In all three focus groups, women said that in their villages almost all families marry their daughters by 16 or 17 years of age. They considered marriage before the age of 16 to be early. Two members of the group who

had recently arranged the marriage of their 16-year-old daughters said, "we got them married young because they married relatives. If marrying relatives, then girls are married younger. Why wait, there is a boy ready, especially if the girl is not studying".

Almost all the women said early marriage was not related to the economic status of the family and that is was more dependent on convenience. However, with regard to dowry specifically, some said that it is less for early marriage while others said that early marriage makes no difference to the amount of dowry paid.

> *Sambandhadalli maduve aadare, karchigenu kadime illa, aadare huduga iddane antha bega maduve mardthevai.*
> *If marriage occurs with a relative there is no reduction in expenses. Because there is a boy ready, we marry the girl soon (young age)*

Early pregnancy
Many of the women said that while it would be ideal to delay childbearing for 1-2 years, this often was not possible due to social pressure to prove one's fertility. Others felt that early childbearing was better because the pregnant woman's mother would be young enough to care for her, otherwise she might have to fend for herself. However, many felt that early childbearing, before the ages of 16 or 17, was detrimental to the health of the mother.

> *Chikkavaysinalli maduve aagi mogu aadare, kelasa madalu nishakti aguthade* -in younger age, marriage and having a baby will make a girl weak and reduce her ability to work.

> *Basri, herigenalli chikkavaysina hudigiruge shakti salala; thondare agabohodu* - during pregnancy and delivery younger women can face problems as younger women may not have enough strength [in her body]

The general view was that for all women, pregnancy weakens the body. When asked if it is better to have children soon after marriage or to delay childbearing, many women surprisingly expressed the latter, citing time to let the couple "settle" and the girl to mature as reasons. However, they felt that due to social pressure, it usually was not possible to delay pregnancy, and that by delaying one might actually have less social support available.

> *Avalu chikkavaysinalli navu ellaru irthivi. Amele nangunu vice agathe.*
> When she [daughter] is young, we will all be there [to help]. Later, I will be older.

Care for the pregnant mother
Although some women said that the risk of problems is greater for early childbearing, this does not mean that they seek more medical care for their adolescent daughters or relatives. Care is based on the pregnant woman's condition – if she has a problem than care will be sought. No specific intention of seeking routine or preventive care was articulated. However, women said that social support at home might be a little greater, in terms of diet and paying attention to any problems that arise, for younger pregnant women. The majority of the women said that the first pregnancy is always given extra attention, and if the girl is young, then she might be sent to her natal house earlier.

> *Modala herige, bananthana ke navu hechu bele koduthevai*- we give more importance for delivery and bananthana (postpartum period) for first pregnancy

Also, speaking of their own daughters, they said that they were able to give their second daughter more attention and care because of experience.

> *Modalasala anubhava dinda, yeradaneyedakka swalpa hechina gomana, araikke marduthevai* -from experience from first time, we give little extra attention and care to the second [daughter]

With regard to antenatal care, they said the first contact is usually at 3 months or later, unless there is a problem. Most women said this is the same for all pregnant women, regardless of age.

If they have more awareness, than they will see someone [health care provider] before 3 months.

Regarding delivery, the participants said that regardless of age, they tend to go to a hospital or primary health centre (PHC) for the first delivery. If the first delivery was without complications, then the second delivery is planned at home. As for postpartum care, contact with a health care provider is sought only if there is a problem. Unlike in the antenatal period when most women have at least one contact with a health care provider (over 95% in our sample), cultural norms encourage care-seeking only if there is a perceived problem (Kilaru, et al, 2002). Furthermore, the many postpartum beliefs and practices are adhered to by women of all ages, castes and communities. They are strictly enforced by older women in the household, especially in the case of first births, and relaxed only if the household cannot afford to observe the practices or if there is little or no social support available.

Pregnancy generally is viewed as a process that reduces a woman's strength and resilience. Many women expressed the feeling that pregnant adolescents are more vulnerable to health risks, mostly citing "less strength" and "less matured body" as reasons for this vulnerability. However, they did not express a significant difference in care seeking for young. Many women did say that the social support might be greater for young pregnant women. Birth spacing was also mentioned as important; some women said there are more health risks to the mother with closely spaced children.

In an interview with an ANM who has been practising in some of villages for 14 years, she said that her instructions are not to attempt home deliveries for women under 18 years of age, and to advise very young mothers to see a doctor at least once during the antenatal period. Her impressions were that pregnant adolescents might not necessarily seek more medical treatment but might receive a little extra support at home and that people seek care in their second pregnancy only if they had a problem in their first pregnancy or delivery.

If a woman has more awareness of risks then she might take more care during 1st pregnancy
If there were complications, for the 2nd pregnancy, more than the 1st, they ask for my advice.

Regarding early marriage and early childbearing, she felt that the former is not directly linked with poverty, and that even households who were not extremely poor engaged in early marriage to prevent premarital sexual exposure and also because it is easier to find a prospective spouse. Although she counsels young married couples to delay childbearing and use contraception (usually copper-T), the stigma of not having children soon and the fear of infertility prevents most from waiting to have children. Finally, she said the reproductive and child health programmes (RCH) conducted locally do not specifically emphasis adolescents, but all women of reproductive age.

Discussion

From this data we observe that married, pregnant adolescents age 19 and younger are not necessarily disadvantaged when it comes to the level of maternal care obtained. It is not possible to tease apart care-seeking from care received, so both contribute to the health care contacts described. Contrary to the widespread belief that adolescents receive less care, this analysis shows that gravida is a more significant marker than age in determining the level of care a woman may have during the obstetric period. There are no significant differences in any of the care outcomes by age. In fact, adolescents may have a slight advantage in terms of routine care.

The qualitative data largely confirms what is observed in the quantitative results. Women, of different ages and castes, were almost unanimous in their opinions that younger women do not get extra or less medical care during pregnancy; many suggested, however, that they might get a little more social support. It is difficult to predict whether the adolescents who were pregnant at the time of this study would have had better outcomes, both maternal and infant, if they had delayed their childbearing. To what extent are much of the poorer outcomes reported in the literature due more to biological and social characteristics of younger women bearing children (poverty, low autonomy, lower education, poor nutritional status, gravida) than to their age per se? Studies have shown that when socioeconomic status is adequately controlled in analyses, maternal age is not a significant predictor for child development outcomes. (Treffers 2001, Geronimous 1991). Early

childbearing in a context where there is prevailing social and economic disadvantage might reflect the shaping of fertility timing around a period in a young woman's life when there is maximum social support available (Geronimous 1991). Many of the poor outcomes observed in pregnant adolescents and adolescent mothers might be a result of socio-economic conditions that existed prior to childbearing.

In this particular context of rural south India, adolescent childbearing has little effect on health care sought or received during the obstetric period. In earlier analyses, no significant differences in the prevalence of maternal morbidity was noted between the two age groups (Ganapathy et al, 2000). In an analysis of infant weight outcomes that is in progress for the same villages and including some of the same mothers who participated in this study, preliminary results show mixed findings of maternal age. Weight gain for the entire sample is poor, as the majority of children experience growth faltering and underweight by 12 months of age. Children of older mothers have higher weight gain velocities in the first year of life, followed by children of very young mothers and lastly those mothers in the older adolescent, young adulthood group.

Maternal health in general is severely constrained by women's lack of authority to make health care decisions for themselves, and the first delay in making motherhood safe, deciding to seek care, is significantly affected by women's powerlessness (Jejeebhoy 2000, Thaddeus and Maine 1994). Adolescents are usually seen as vulnerable in this respect, and recent commentators have noted the need for research that addresses young women's powerlessness and vulnerability in terms of timely health care seeking during pregnancy and childbirth (Jejeebhoy 2000). However, the results of this study cast an interesting light on current perceptions of youthful childbearing. Despite their evident lack of autonomy, adolescent girls in the study villages enjoy a certain degree of social support, particularly from their natal family, which might compensate for their compromised position within their new marital home.

In the context of this study, interventions for adolescents should be multi-faceted. The evidence for the high proportion of anaemic adolescent girls in overwhelming, and this is the main maternal health-related factor that needs to be addressed in rural areas where adolescent childbearing is common and slow to change. Focusing on sexual activity, delaying marriage or delaying childbirth alone probably will not be as promising as interventions that seek to address gender equity, such as more education and employment for women along with improved reproductive health services for all women.

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Table 1 Bivariate tables showing percentage respondents by selected background variables and adolescent status

Variable	Category	Adolescents less than 20 years	Women 20+ years
Caste	Other backward castes	70.8%	66.5%
	Scheduled caste/Scheduled tribe	29.2%	32.2%
	Other	0	1.3%
Education	None	44.1%	44.9%
	Grades 1-5	12.4%	21.1%
	Grades 6-8	21.1%	17.2%
	Grade 9+	22.4%	25.1%
	mean years of schooling	7.36 years	7.6 years
	median years of schooling	7.50 years	8.0 years
Occupation	Agricultural wage labour	6.8%	9.3%
	Housework, own livestock, sericulture	91.3%	88.5%
	Small business, salaried	1.8%	2.2%
Husband's education	None	49.1%	44.9%
	Grades 1-5	9.3%	11.0%
	Grades 6-8	9.3%	12.3%
	Grade 9+	32.3%	31.7%
Head of household's education	None	70.2%	58.6%
	Grades 1-5	8.1%	10.1%
	Grades 6-8	6.8%	9.3%
	Grade 9+	14.9%	22.0%
Household possessions	<= Rs.1000	43.5%	49.3%
	Rs 1001-Rs 5000	36.6%	32.2%
	Rs 5001 – Rs 15000	13.0%	10.1%
	above Rs 15001	6.8%	8.4%
****Gravida**	1st	65.2%	34.8%
	2nd or higher	18.5%	81.5%
Problems in previous pregnancy (for multigravidae only)	yes	60.7%	60.9%
	no	39.3%	39.1%
	Total sample size	**161**	**227**

Table 2 Percentage of respondents by care contact variables and adolescent status

Variable	Category	Adolescents less than 20yr	Sample size for adolescents	Women 20+ years	Sample size for older women
First antenatal care contact N=388	**1st trimester after 1st trimester	82.6 % 17.4 %	161	68.7% 31.3%	227
	**mean	13.6 weeks		15.2 weeks	
First antenatal care contact For those whose first was routine N=251	* P 16 weeks > 16 weeks	64.0 % 36.0 %	100	52.9 % 47.1%	151
	**mean	13.8 weeks		15.7 weeks	
Total antenatal care visits † N=282	* 0-2 visits 3-4 visits 5+ visits	15.0% 36.3% 48.7 %	113	23.2 % 41.7 % 35.1 %	168
	** mean	3.4 visits	47	3.0 visits	59
Total routine antenatal care visits † N=201	1-2 visits 3-4 visits 5+ visits	42.7 % 40.0 % 17.3 %	75	47.6 % 46.0 % 6.3 %	126
First care provider seen N=388	**ANM/Nurse Doctor	34.2 % 65.8 %	161	44.3 % 55.7 %	227
Antenatal visit to private prov? † N=282	Yes No	55.8% 44.2%	113	56.5 % 43.5%	168
Problems in antenatal period † N=282	Self-report **Self report, diagnosed, & probed	55.8% 87.6 %	113	47.6 % 79.2 %	168
Content of first antenatal visit N=388	Blood pressure checked **Urine tested **Blood tested	43.3 % 40.8 % 40.4 %	158	38.6% 25.5 % 31.4 %	220
Planned delivery location N=366	Home Institution	91.1% 8.9 %	158	87.9% 12.1%	223
Planned delivery attndnt N=366	Dai/ layperson ANM/ Nurse Institution	39.0% 52.2 % 8.8 %	159	38.7% 49.1% 12.2%	222
Actual delivery location N=366	Home Institution	62.1 % 37.9%	161	66.2 33.8	227
Actual delivery attendant N=366	Dai/ layperson ANM/nurse Institution	36.9% 25.0 % 38.1 %	161	41.5 % 24.2 % 34.2%	227
Postnatal care N=366	Yes No	62.0 % 38.0%	150	81.9% 18.1%	216
First postnatal visit N=269	**P 2 weeks > 2 weeks	42.4% 57.6 %	85	28.0% 72.0%	161

Key: ANM = Auxiliary Nurse Midwife, * significant at the 10% level, ** significant at the 5% level, † reduced data set

Table 3 Care variables by adolescent status, stratified by gravida

Variable	Category	Percentage of *primagravidas* in each category (no. of cases in brackets)		Percentage of *multigravidas* in each category (no. of cases in brackets)	
		<20 years	**20+ years**	**<20 years**	**20+ years**
Timing of first antenatal contact	<= 16 weeks > 16 weeks	88.6% (93) 11.4% (12)	88.1% (37) 11.9% (5)	71.4% (40) 28.6% (16)	64.3%(119) 35.7% (66)
Total number of antenatal care visits	0-2 visits 3-4 visits 5+ visits	11.8% (9) 42.1% (32) 46.1% (35)	6.5% (2) 35.5% (11) 58.1% (18)	**21.6% (8) 24.3% (9) 54.1% (20)	27% (37) 43.1% (59) 29.9% (41)
First provider seen	ANM/Nurse Doctor	30.5% (32) 69.5% (73)	29.3% (12) 70.7% (29)	41.5% (22) 58.5% (31)	47.8% (86) 52.2% (94)
Antenatal visit to private provider ?	Yes No	**60.5 %(46)	83.9% (26)	45.9% (17)	50.4% (69)
Problems in antenatal period	Self-report	53.9% (41)	58.1% (18)	*59.5 % (22)	45.3% (62)
	Self report &diagnosed &probed	90.8% (69)	87.1% (27)	81.1% (30)	77.4% (106)
Content of first antenatal visit	BP checked	**44.2%(46)	65.9% (27)	41.5% (22)	32.4% (58)
	Urine checked	45.2% (47)	46.3% (19)	*32.1% (17)	20.7% (37)
	Blood tested	40.4% (42)	53.7% (22)	*40.4% (21)	26.3% (47)
Actual delivery location	Home Institution	52.4% (55) 47.6% (50)	47.6% (20) 52.4% (22)	80.4%(45) 19.6% (11)	70.6% (127) 29.4% (53)
Actual delivery attendant	Dai/laypersn ANM/nurse Institution	26.7% (28) 25.7% (27) 47.6% (50)	21.4% (9) 26.2% (11) 52.4% (22)	56.4% (31) 23.6% (13) 20.0% (11)	46.3% (82) 23.7% (42) 29.9% (53)
Received postnatal care	Yes	57.0% (57)	65.9% (27)	**72.0 %(36)	85.6 %(149)
First postnatal visit	P 2 weeks > 2 weeks	57.7% (30) 42.3%(22)	52.4% (11) 47.6% (10)	18.2%(6) 81.8% (27)	24.3% (34) 75.7% (106)

Key:

* significant at the 10% level

** significant at the 5% level

Table 4 Results of a logistic regression to find significant correlates of first antenatal visit after 16 weeks of pregnancy

Factor	Level	Parameter estimate (SE)	Odds ratio	n
REGRESSION TO MODEL LATE FIRST ANTENATAL VISIT				
Age/gravida	Primigravida aged 19 and less		1.00	
	Multigravida aged 19 and less**	1.020 (0.437)	2.80	
	Primigravida aged 20+	0.228 (0.579)	1.30	
	Multigravida aged 20+**	1.377 (0.349)	4.00	
Caste	Other backward classes		1.00	
	Scheduled caste/tribe**	0.514 (0.259)	1.67	
Education	None		1.00	
	Grade 1-5	-0.187 (0.378)	0.83	
	Grade 6-8*	-0.769 (0.357)	0.46	
	Grade 9+**	-0.906 (0.357)	0.40	

Parsimonious models are shown above, all likely correlates were tried in the models, and eliminated by a mixture of backward and forward substitution

Table 5 Results of a logistic regression to find significant correlates of private Provider at first routine visit

Factor	Level	Parameter estimate (SE)	Odds ratio	n
REGRESSION TO MODEL PRIVATE ROUTINE CARE SEEKING				
Age/gravida	Primigravida aged 19 and less		1.00	
	Multigravida aged 19 and less	-0.321 (0.440)	0.73	
	Primigravida aged 20+	0.061 (0.487)	1.06	
	Multigravida aged 20+*	-0.584 (0.318)	0.56	
Caste	Other backward classes		1.00	
	Scheduled caste/tribe**	-1.044 (0.360)	0.352	
Education	None		1.00	
	Grade 1-5	0.298 (0.458)	1.35	
	Grade 6-8	0.520 (0.361)	1.68	
	Grade 9+**	0.880 (0.350)	2.41	
Possessions score	Low score		1.00	
	Medium low score	0.571 (0.312)	1.77	
	Medium high score	0.770 (0.413)	2.16	
	High score**	1.606 (0.514)	4.98	
Location	Large village/Township		1.00	
	Tribal village	1.332 (0.810)	3.79	
	Village group 1*	0.926 (0.374)	2.53	
	Village group 2	0.209 (0.404)	1.23	
	Remote village	0.258 (0.625)	1.29	

Parsimonious models are shown above, all likely correlates were tried in the models, and eliminated by a mixture of backward and forward substitution

Table 6 Results of a logistic regression to identify significant correlates of 0-2 antenatal visits only

Factor	Level	Parameter estimate (SE)	Odds ratio	n
REGRESSION TO MODEL FEW ANTENATAL VISITS				
Age/gravida	Primigravida aged 19 and less		1.00	
	Multigravida aged 19 and less	0.571 (0.562)	1.77	
	Primigravida aged 20+	-0.562 (0.842)	0.57	
	Multigravida aged 20+*	0.903 (0.423)	2.47	
Education	None		1.00	
	Grade 1-5	-0.497 (0.520)	0.61	
	Grade 6-8*	-1.095 (0.491)	0.33	
	Grade 9+(*)	-0.824 (0.476)	0.44	

Parsimonious models are shown above, all likely correlates were tried in the models, and eliminated by a mixture of backward and forward substitution.