Reproductive behavior of newly married women in rural Punjab, India: A longitudinal study

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\section*{ABSTRACT}

\textbf{Introduction:} In India, little is known about the reproductive behavior during earlier years of married life of women, when they are more vulnerable to reproductive ill health and early child bearing with very few interventions available. \textbf{Objective:} The objective of this study is to follow a cohort of newly married women immediately after marriage until their first pregnancy outcome to gain an insight into their reproductive behavior so that important opportunities could be identified for intervention. 

\textbf{Subjects and Methods:} A community-based longitudinal study was carried out in 15 villages of Ludhiana District under the Rural Health Training Centre of Department of Community Medicine, Dayanand Medical College and Hospital, Ludhiana, Punjab. All marriages of the male residents that took place in these villages from January 1, 2013, to December 31, 2013 were enrolled. Thus, a cohort of 195 newly married women was identified over a period of 1 year and followed every month till first pregnancy outcome. The analysis was performed using SPSS version 20 statistical software. \textbf{Results:} Mean age at marriage for newly married women was 22.9 ± 3.0 years. Majority of them conceived within 1\textsuperscript{st} year of marriage (79.5%) while 10.8% of women did not conceive till the end of follow-up period. Mean age at first pregnancy was 23.4 ± 3.1 years with mean interval between marriage and first pregnancy of 5.4 ± 6.1 months. Nearly, three-fourth of pregnancies resulted in live births while adverse pregnancy outcome including still births and abortions was seen in 15.9% of the study cohort. \textbf{Conclusions:} Overall findings indicate optimistic picture for married young women, but critical opportunities should be utilized to promote health of these women in a journey toward safe motherhood.

\textbf{Keywords:} Age at marriage, newly married women, reproductive behavior

\section*{Introduction}

Health of mother and child is a priority for ensuring healthy populations. Indicators related to maternal and child health (MCH) are encouraging and promising with respect to current maternal mortality ratio and infant mortality rate of India. Historically national programs for MCH have been focusing on the three main areas related to fertility, morbidity, and mortality affecting this population as these areas are closely interwoven, and they need equal attention simultaneously. With changing scenario, the strategies in these programs are also changing accordingly with more focus on reproductive health of young population. This population (15–24 years) has increased steadily from 16.5% in 1971 to 19.2% as per 2011 census.\textsuperscript{8} Young married women are important stakeholders in pursuit of the provision of good health to mother and children. Therefore, it is very important to understand the reproductive behavior of young married females with respect to social factors likely to affect their choices regarding contraception and reproduction.

The state of Punjab is known for prosperity and better health indices. Mother and child health indicators such as total fertility rate, maternal mortality ratio, and infant mortality rate are clearly far ahead in comparison to other states in India.\textsuperscript{2,3} However, for further improvement in the health status of this vulnerable population, more focus on understanding the reproductive behavior of young married women is required.
section of population, these indices need to be observed with a fresh perspective. It is also required to know the crucial stages in the process of motherhood, where possible interventions could be done for improvement. Immediately after getting married, a woman undergoes many changes. She experiences tremendous family and social pressures to prove her fertility. Newly married women on starting their new phase of life may suffer from reproductive ill health and become vulnerable to quick pregnancies and childbirth.

Therefore, this study was planned to observe a cohort of newly married women for the period immediately after marriage till their first pregnancy outcome to gain an insight into their reproductive behavior so that important opportunities could be identified for intervention in the rural area.

**Subjects and Methods**

**Study design**
A community-based longitudinal study was carried out in 15 villages comprising a population of 31,756 under the Rural Health Training Centre of Department of Community Medicine, Dayanand Medical College and Hospital, Ludhiana, Punjab, India. Married women in the age group 15–45 years receive continuous home-based reproductive care and health education regarding nutrition, contraception, pregnancy, etc., by the health workers of the training center. Registration of pregnancies is almost 100% in these villages, and the outcome of pregnancies is known and recorded with regular follow-up during antenatal and postnatal period.

**Methodology**
All those women who got married to male residents residing in these 15 villages from January 1, 2013, to December 31, 2013 were eligible for entering into the cohort of newly married women. A total of 233 marriages of male residents took place during this period. Marriages that ended up in divorces (9), newly married couples living separately (4), where couples shifted to another area (14), and husbands of newly married women working abroad or serving in army (11) during the study period were excluded from the study. Only those newly married couples who were available throughout the study period were included in the study, and thus, a cohort of 195 newly married women was identified [Flow Chart 1]. All the newly married women were visited within 2 weeks of their marriage, and information such as age at marriage, education, occupation, and various health parameters were recorded and regular follow-up of the study subjects was done by health workers every month under the supervision of faculty of the department till first pregnancy outcome for these women became available. The information was collected on a pretested semi-structured questionnaire after taking written consent in local language. Ethics clearance for the study was duly obtained from the Institutional Ethics Committee.

**Flow Chart 1:** Sequence of the events observed in the study. *3 twin births
Statistical analysis

Analysis was performed using SPSS version 20 (IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp.). Descriptive statistics are presented in percentages and mean ± standard deviation. Student’s t-test and one-way ANOVA test were used to determine the difference between the means of two and more than two independent groups, respectively. All tests were two-tailed, and $P < 0.05$ was considered to be statistically significant.

Results

A total of 195 newly married women were followed. The baseline characteristics show that more than half of the newly married females (56.4%) belonged to the age group of 20–24 years and one-third (31.3%) were 25 years and above. About 12% respondents were adolescents in the age group of 15–19 years. Husbands were relatively older with over 70% of them aged 25 years and above [Table 1]. Majority of the couples followed Sikh religion (95.4%) and were living in joint families (89.7%). Predominantly, these newly married women were homemakers (94.9%).

Mean age at marriage for newly married women was 22.9 ± 3.0 years with a range between 17 and 33 years, and only one subject got married before 18 years. However, mean age at marriage of their spouses was 26.2 ± 2.9 years with a range between 19 and 36 years. The observed difference was found to be statistically significant [Table 2]. Majority of the respondents belonged to lower middle and high-middle socioeconomic status (92.3%) as per Modified Udai Pareek Scale[10] for rural area. Table 3 reveals that mean age at marriage significantly increased from low (22.0 ± 1.8 years) and lower middle (22.5 ± 2.7 years) to the upper middle (23.6 ± 3.4 years) and high-socioeconomic status (24.7 ± 3.9 years) ($P = 0.033$).

Almost all the respondents had completed some years of schooling. Over half of them had more than 10 years of schooling and 3 (1.5%) of them had no formal education at all. Mean years of schooling of newly married women were 10.8 ± 3.3 years. However, adolescent subjects had lesser years of schooling (9.2 ± 3.2 years) as compared to their counterparts in the age groups 20–24 years (10.5 ± 3.2 years) and 25 years and above (12.2 ± 2.9 years). The observed difference was found to be statistically highly significant ($P < 0.001$). Contraceptive usage was reported by only three study subjects before their first conception. Mean interval between marriage and first pregnancy was 5.4 ± 6.1 months. On further analysis, it was observed that adolescent women conceived earlier than those in higher age group. However, this observed difference came out to be statistically nonsignificant [Table 4].

Nearly, 10.0% newly married women had symptoms of reproductive tract infections (RTIs) such as vaginal discharge, lower abdominal pain, and low backache while 17.4% of newly married women reported menstrual complaints such as irregular menstruation and pain during menstruation at some point of time during the study. Nearly, 46.0% of respondents who conceived were anemic (Hb <10 mg/dl) with mean Hb of 9.94 ± 1.2 mg/dl. It was also observed that about 41.0% newly married women were overweight whereas 8.7% of women were overweight or obese as per Asian adaptations of the World Health Organization (WHO) criteria for categorization of body mass index (BMI).[13]

Majority of the newly married women conceived within 1st year of marriage (79.5%), another 9.7% of women conceived within the following year while 10.8% of women did not conceive during 2 years of observation despite cohabiting with their husbands, not using any contraceptives, and maintaining a desire to conceive were diagnosed with primary infertility closely following WHO definition of infertility.[16,17] Mean age at first pregnancy was 23.1 ± 2.8 years. There were 146 (74.9%) live births including three twin births while 15.9% of the study cohort had adverse pregnancy outcome which included 9 still births (4.6%) and 22

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### Table 1: Sociodemographic profile of respondents

| Characteristics                        | n (%)          |
|---------------------------------------|----------------|
| Current marital status (n=233)        |                |
| Married                               | 195 (91.9)     |
| Divorced                              | 9 (3.0)        |
| Separated                             | 1 (0.4)        |
| Others*                               | 29 (4.7)       |
| Respondent's age in years (n=195†)    |                |
| 15-19                                 | 24 (12.5)      |
| 20-24                                 | 120 (65.4)     |
| 25 and above                          | 61 (31.3)      |
| Husband's age (years)                 |                |
| 15-19                                 | 1 (0.5)        |
| 20-24                                 | 51 (26.2)      |
| 25 and above                          | 143 (73.3)     |
| Years of schooling completed          |                |
| No education                          | 3 (1.5)        |
| Up to 5                               | 11 (5.6)       |
| 6-10                                  | 82 (42.1)      |
| 11-12                                 | 59 (30.3)      |
| >12                                   | 40 (20.5)      |
| Type of family                        |                |
| Nuclear                               | 20 (10.3)      |
| Joint                                 | 175 (89.7)     |

†Where husband working abroad, in army and loss to follow-up  Analysis was performed for 195 newly married women, who were followed during the study period

### Table 2: Age at marriage and first pregnancy of the study subjects

| Characteristics                        | Mean±SD (years) | Range (years) |
|---------------------------------------|-----------------|---------------|
| Mean age at marriage in years (women)* | 22.9±3.0        | 17-33         |
| Mean age at marriage in years (men)*   | 26.2±2.9        | 19-36         |
| Mean age at first pregnancy in years   | 23.4±3.1        | 17-31         |
| Mean age at first child birth in years  | 24.1±2.9        | 18-34.8       |

*P=0.001, SD: Standard deviation

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### Table 3: Association of socioeconomic status with age at marriage of study subjects

| Socioeconomic status | Number of newly married women (%) | Mean age at marriage±SD (years) | ANOVA (P) |
|----------------------|-----------------------------------|-------------------------------|-----------|
| Low                  | 8 (4.1)                           | 22.0±1.8                      | ANOVA F (3,191)=2.96, (P=0.033) |
| Lower middle         | 109 (55.9)                       | 22.5±2.7                     |           |
| Upper middle         | 71 (36.4)                        | 23.6±3.4                     |           |
| High                 | 7 (3.6)                           | 24.7±3.9                     |           |
| Total                | 195 (100.0)                       | 23.1±3.0                     |           |

SD: Standard deviation

### Table 4: Age at marriage, education, and interval between marriage and first pregnancy of newly married women

| Age at marriage (years) | Number of newly married women (%) | Mean age at marriage±SD (years) | Mean year of schooling of newly married women±SD | Mean interval in months between marriage and first pregnancy±SD (n=174) |
|-------------------------|-----------------------------------|-------------------------------|-----------------------------------------------|--------------------------------------------------|
| 15-19                   | 24 (12.3)                         | 18.5±0.6                     | 9.2±3.2                                       | 3.1±2.4                                          |
| 20-24                   | 110 (56.4)                       | 21.9±1.3                     | 10.5±3.2                                      | 5.5±5.9                                          |
| 25 and above            | 61 (31.3)                        | 26.5±1.8                     | 12.2±2.9                                      | 5.9±7.0                                          |
| Total                   | 195 (100.0)                       | 22.9±3.0                     | 10.8±3.3                                      | 5.4±6.1                                          |

ANOVA (F (2,192)=9.53, P=0.001) ANOVA (F (2,171)=1.43, P=0.242) SD: Standard deviation

abortions (11.3%). There were 70 (47.9%) male live births and 76 (52.1%) female live births. Sex ratio at birth was 108 females per 100 males. Mean birth weight of newborns was observed to be 2.76 ± 0.5 kg. Among all live births, 20.5% occurred before 37 weeks gestation (preterm). There was no maternal death observed in the duration of the study [Table 5]. The mean age of mothers at first child birth was 24.1 ± 2.9 years. Out of these, 174 1st time pregnant women, 34 (19.5%) became pregnant 2nd time, and 4 (2.3%) became pregnant 3rd time within the study period. About 39% of pregnant women underwent cesarean section. Majority of the deliveries were conducted by doctors (98.0%). Out of which nearly 37% delivered at government centers/hospitals. There was one home delivery conducted by traditional birth attendant. About 37% women availed benefits of Janani Suraksha Yojana.

### Discussion

This longitudinal observational study offers insights into earlier part of lives of newly married women in the rural Punjab and explores the reproductive behavior of young newly married females in their natural environment. It also gives an opportunity to find out the possible areas for interventions in a women’s journey toward motherhood.

Age at marriage is a very important demographic indicator as it relates to number of years a female is exposed to pregnancy and hence to family size, thus determining the health of mother. Mean age at marriage, as well as mean year of schooling, is a positive finding in this study ensuring safe motherhood. The mean age at marriage for newly married women was 22.9 ± 3.0 years. Sample Registration System statistics for the year 2013 observed that mean age at marriage for women was 21.0 and 22.5 years for all ages in rural India and Punjab, respectively. The present study also revealed that the higher percentage of female marriages occurred in the age 20 years and above, whereas only 12.3% of respondents were adolescents. Only one respondent got married before 18 years of age. Health and Family Welfare statistics in 2015 also observed that the percentage of females who had their effective marriage before 18 years has come down over the years, and Punjab had the lowest percentage of these females (0.2%). Singh et al., in a longitudinal study carried out in a resettlement colony of New Delhi, observed that mean age at marriage for newly married women was 20.2 ± 0.5 years with lesser percentage of women marrying before the age of 18 years. Other studies conducted by Pandya and Bhanderi, and Haloi and Limbu in India, and by Islam et al., in a rural community of Bangladesh observed lower mean age at marriage than the present study. This may be because of higher proportion of adolescent marriages in these studies.

The study also revealed that males tend to marry later than females in rural settings as husbands were typically older than their better halves. It is in concordance with District Level Household and Facility Survey-4 (DLHS) statistics for rural Punjab and rural Ludhiana. Other studies by Ram et al.[9] and Pandya and Bhanderi also observed similar relationship. As seen in other studies conducted by Pandya and Bhanderi and Haloi and Limbu in India, and by Islam et al., in Bangladesh, on the undeniable influence of years of schooling on delaying marriage, we also observed that adolescent respondents had significantly less education as compared to higher age groups.

Conception immediately after marriage is a norm in a typical rural setting in India, and the newly married female might not be prepared mentally or physically for it. In the present study, 79.5% of the newly married women conceived within 1 year of marriage with mean age at first pregnancy of 23.1 ± 2.9 years, and mean interval between marriage and first pregnancy (3.7 ± 3.5 months) shows eagerness toward pregnancy having nil contraceptive usage during this period. Two-third of adolescents conceived with mean age at pregnancy of 18.7 ± 0.8 years. These findings reflect the extreme pressures faced by these young women to prove their fertility soon after marriage and bear the first child, a practice...
also prevalent in this study area of rural Punjab. A similar finding was observed by Santhya et al.\textsuperscript{14} This is also corroborated by the results of Singh et al.\textsuperscript{15} wherein 79\% of women conceived within 9 months of marriage and 43\% of females were below 20 years of age. Similar findings were reported by Nair and Devi.\textsuperscript{31}

About 17\% of respondents reported menstrual complaints and nearly 10\% of the respondents had symptoms of RTIs with abnormal vaginal discharge as the most common symptom during some part of the study. Similar results were observed by Singh et al.\textsuperscript{32} in which irregular cycle and dysmenorrhea were the chief menstrual problems, and all the RTI cases reported abnormal vaginal discharge. This is also in agreement with reports of DLHS-4 for rural Ludhiana.\textsuperscript{14}

Contraceptive usage was low after delivery as evident from the fact that 19.5\% of subjects became pregnant 2\textsuperscript{nd} time and 2.3\% became pregnant 3\textsuperscript{rd} time during the study period. On the other extreme, primary infertility was reported in 10.8\% of the females, similar to the estimates from Southern India by Adamson et al.,\textsuperscript{13} wherein the prevalence of primary infertility was 12.6\% among 15–30 years aged young women. Infertility rates appear to vary substantially across various regions as reported by the WHO\textsuperscript{18} and Mascarenhas et al.\textsuperscript{19} Some of the variation is due to difference in definition of primary infertility being used. Nevertheless, high rate of primary infertility among women having nil contraceptive usage underscores the requirement of further research on infertility. Therefore, provision of health services for infertile couples is also need of the hour to prevent stress and mental trauma in them.

In the present study, it was observed that mean weight of newly married women was 49.4 ± 8.2 kg and 41.0\% of them were underweight. This finding is in contrast to rising trend of obesity in Punjabi population pointing toward the need of improving nutrition of young girls. Singh et al.\textsuperscript{30} reported that mean weight of respondents was 44.01 ± 0.926 kg and three-fourth had less weight than expected for their age. Mean BMI for newly married women was 19.3 ± 2.9 kg/m\textsuperscript{2} and it was significantly lower (2.8 kg/m\textsuperscript{2}) than male counterparts (t = 8.6, P < 0.001). This is in agreement with the study by Shankar et al.,\textsuperscript{19} in rural community of Uttar Pradesh, which revealed that about 44\% of newly married women were underweight with mean BMI of 19.27 ± 2.37 kg/m\textsuperscript{2}.

Age of mothers at first childbirth was 24.1 ± 2.9 years. Majority of the deliveries were conducted at government and private institutions by skilled health attendants. This is consistent with DLHS-4 statistics for rural Ludhiana.\textsuperscript{14} Adverse pregnancy outcome included abortions (11.3\%) and still births (4.6\%). Stillbirth rate was observed to be 58/1000 total births indicating the need of improving quality of existing MCH services. DLHS-4 reports\textsuperscript{14} revealed that 96\% of pregnancies resulted in live births. Higher percentage of pregnancies resulting in adverse pregnancy outcome in the present study could be due to fact that our study was restricted to the first pregnancy outcome (Primigravida) only. More than one-fifth of live births were preterm, and risk of preterm birth was higher among women who were underweight. However, more research is required to understand this relationship. This finding was also corroborated by Shah et al. in a study conducted in a rural Bangladeshi cohort of married women of reproductive age.\textsuperscript{31} Only one home delivery and nil maternal death were reported during the study period, which shows favorable result. Secondary sex ratio was also found to be favorable toward female sex while DLHS-4 statistics for rural Ludhiana\textsuperscript{14} reported that it was in favor of males. This could be attributed to the fact that appeared with the female being pregnant for the 1\textsuperscript{st} time; couples are unlikely to indulge in sex selection practices.

### Conclusions

The present study highlights an optimistic, but typical picture that appears when fertility and mortality indicators start declining and other indicators such as age at marriage and pregnancy outcome starts improving. This study offers valuable insights into the earlier part of married lives of young females in rural settings in India. However, it also reveals many areas where further work is required. It shows that women’s year of schooling had significant role in increasing age at marriage for them. The study also revealed that majority of women conceived within 1 year of marriage, and practices of contraceptives were absent. Nutritional aspect requires a special attention once a female gets married and also these young newly married women with mounting pressure to conceive immediately after the marriage are vulnerable to adverse pregnancy outcomes. This necessitates actions such as motivating them for contraceptive usage; therefore, increasing interval between marriage and first pregnancy and utilizing this opportunity to educate these young women on nutrition,

| Observations | n (%) |
|--------------|-------|
| Pregnancy outcome (n=195) |     |
| Live births | 146\* (74.9) |
| Stillbirths | 9 (4.6) |
| Abortions | 22 (11.3) |
| Primary infertility | 21 (10.8) |
| Place of delivery (n=152) |     |
| Government hospital | 54 (35.5) |
| Private hospital | 96 (63.2) |
| Home | 2 (1.3) |
| Type of delivery (n=152) |     |
| Normal vaginal delivery | 93 (61.2) |
| Cesarean section | 59 (38.8) |
| Birth attendance (n=152) |     |
| Doctor | 149 (98.0) |
| Staff nurse | 2 (1.3) |
| Trained Dai | 1 (0.7) |
| Gender status of live births (n=146) |     |
| Female | 76 (52.1) |
| Male | 70 (47.9) |

\*3 twin births, †includes live births and stillbirths

Table 5: Observations regarding first pregnancy of newly married women
contraception, reproduction, reproductive choices, and safe motherhood practices before parenthood. However, it is now pertinent to study the role of social factors responsible for early conception among this vulnerable population through qualitative studies.

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Conflicts of interest

There are no conflicts of interest.

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