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Are Teenagers at High Risk of Poor Birth Outcomes in India? A Comparison of Urban and Rural Areas

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Abstract

Young maternal age has far-reaching implications on women's as well as children's health. Therefore, the objective of this study is to examine the effect of young maternal age on size of the baby at birth and infant loss by place of residence. For this purpose, the National Family Health Survey (NFHS)-3, India data have been used. NFHS-3 collected detailed information on birth histories and socio-economic characteristics of women as well as households. This information has been used to fulfil the objectives of the study. In this study, adolescent women refer to women who had their birth at the age of 19 or below. Logistic regression analysis is used to see the net effect of young maternal age on the size of the baby at birth and infant loss. The bi-variate analysis showed that the percent of births with small size babies and infant loss was higher among adolescent mothers as compared with adult mothers. The logistic regression analysis showed that the likelihood of having small size babies and infant loss was higher among births to adolescent women than adult women in urban areas.

Key words: Teenagers, High Risk, Birth Outcomes, India

I. Introduction

Millions of young people in the developing world are married when they are very young. Early marriage in different cultures means early initiation of sexual activity and childbearing. This can have far reaching and life-threatening complications on women's reproductive health as well as child health. The programme of action adopted at the International Conference on Population and Development (ICPD) held at Cairo in 1994, stresses the importance of addressing adolescent sexual and reproductive health issues (United Nations, 1994). In developing country settings, particularly in South Asian countries, though age at marriage is on the raise, still a major proportion of girls get married and give birth at early ages (WHO, 2004).

Moreover, teenage women have no control over their fertility and are exposed to repeat pregnancies at short intervals. Repeated adolescent pregnancies during short intervals make women more vulnerable to negative outcomes of pregnancy. Pregnancy during adolescence exposes mothers at high risk to many pregnancy-related complications and new born infants to poor birth outcomes (Isaranurag, Mo-suwan & Choprapawon, 2006). Some of these conditions include higher infant morbidity and mortality, low birth weight, premature babies and various complications during pregnancy which are leading causes for maternal and infant mortality. It is also known from the earlier studies that utilization of maternal health care services is found to be low among adolescent women (Le Grand, Thomas & Cheikh, 1993; Heidi, Emelita, & Tucker. 2006, Thato, Rachukul & Sopajaree, 2007). In addition to the physiological immaturity, the low tendency to utilize maternal health care services make adolescent women more vulnerable to maternal morbidity and mortality, and the new born to the risk of infant morbidity and mortality.

In India, although the legal minimum age at marriage is 18 years, a major proportion of girls get married before it (Ambadekar, Devendra, Sanjay, Kersturwar & Vasudeo, 1999). Despite the serious consequences of adolescent pregnancy, national level studies on the effect of age of women at birth on negative outcomes of pregnancy found to be scarce.

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Adolescent pregnancy, whether planned or unplanned, is considered as a high risk pregnancy, in terms of physiological, psychological and undesirable social risks (Ladewig, London & Olds, 1994). There are conflicting reports in the literature on maternal and birth outcomes among adolescent pregnancies. Most of the studies in developed and developing countries brought out that young maternal age increased the risk of pre-term delivery, low birth weight, eclampsia, operational vaginal delivery, maternal, and perinatal and infant death (Isaranurag et al., 2006; Thato et al., 2007; Bozkaya, Mocan, Beser & Gumustekin, 1996; Conde-Agudelo, Jose & Christina, 2005; Demir et al., 2000; Chen et al., 2007; Gilbert, Jandial, Field, Bigelow & Danielsen, 2004; Fraser, Brockert & Ward, 1995; Gortzak-Uzan, Hallak, Press, Katz & Shoham-Vardi, 2001; Idwegbe & Udigwe, 2001; Jolly, Sebire, Harris, Robinson & Regan, 2000; Bacci, Manhica, Machungo, Bugalho & Cuttini, 1993; Kumar, Tej, Sriparna, Sulekha & Bhargava, 2007; Nehra & Agarwal, 2004; Adhikari, 2003). Contrary to the above, other investigators concluded that adolescent pregnancies did not affect the outcome of pregnancy and were not high-risk pregnancies (Mahfouz, el-Said, al-Erian & Hamid, 1995). Therefore, the present study makes an attempt to understand what the reality in a country like India is.

It was clear that most of the earlier studies were conducted in African countries like Nigeria and in developed countries like Scotland and the United States. But it is evident that the problem of adolescent pregnancy and its negative outcomes were more prevalent in Asian countries. Few studies conducted in India were based either on hospital records or on small sample size. Earlier studies have shown that most of the studies were based either on hospital or on clinical records which may not represent the population as a whole. The striking fact is that the hospital or clinical records considered only for women who had visited the hospital, but the conditions could be more vulnerable for women who had not visited. It should also be remembered that utilizing the hospital facilities is often influenced by their socio-economic and other background characteristics. Hence, it is obvious that studies based on hospital or clinical records may leave out a section of population which needs necessary attention.

An insight into the earlier studies showed that adolescent marriages and pregnancies were greatly influenced by the socio-economic and other background characteristics. Further, early marriage and early pregnancy are more common among rural residents than urban residents and the health care service delivery system is different in rural and urban areas. Until recently, there was paucity of data on birth outcomes at the national level. To fulfil these research gaps, it is necessary to study the influence of age of women at birth on their birth outcomes controlling for their socioeconomic, demographic and other background characteristics for rural and urban areas separately using a nationally representative sample. The main objective of this study is to examine the effect of age of women at birth on low weight of the baby and infant loss controlling for other factors by their place of residence.

II. Data and methods

This study used data from the National Family Health Survey (NFHS)-3, India that was carried out in 2005-2006. NFHS is a nationally representative sample that covered 29 states. Information for the present study was used from the women's questionnaire in which women of reproductive age (15-49 years) were asked detailed information on their reproductive history for the births in the last five years as well as on other socio-economic, demographic and other background characteristics.

In the absence of birth weight, a mother's subjective assessment of the size of the baby at birth is a useful proxy for birth weight. It was recorded in the NFHS-3 questionnaire for the births in the five years preceding the survey either from a written record or the mother's recall. Since the birth weight may not be known for many babies, mother's estimate of the baby's size at birth was obtained for all births (IIPS and ORC Macro, 2007). Since only one-third of the births in the five years preceding the survey had information on birth weight, it was decided to use the information on the size of the baby at birth in the present study. Size of the baby (as per mother's subjective

assessment), has been collected in NFHS-3 as very large, larger than average, average, smaller than average and very small. In order to study the low birth weight, it has been categorized as 0 if size of the baby is very large, larger than average and average, i.e., normal birth weight and 1 if it is smaller than average and very small i.e., low birth weight. Information was collected whether the baby died during the first year of life. Age of women for this study was defined as whether women gave birth during the ages of 19 years or below (adolescent) or during 20-29age group(adult). Women who gave birth at ages 30 years and above have been removed from the analysis because risk of pregnancy is higher among them and also ages 20-29 years considered to be more fecund. Comparing these high risk pregnancies with teenage pregnancies would not be appropriate.

Other variables included in the analysis were: women's education (illiterates or literates); domestic violence in terms of less severe violence (ever pushed, shook or threw something, ever slapped, ever punched with fist or did something harmful and ever kicked or dragged) and severe violence (ever tried to strangle or burn and ever threatened or attacked with knife or gun); sexual violence (ever physically forced sex when not desired and ever forced other sexual acts when not wanted); work participation of women (non-working and working); birth order (birth order number one, two and three and above); wealth index as a proxy for socio-economic status [Wealth status of the family indicates the overall level of economic status of their own and the family. Wealth Index of households has been calculated in NFHS-3 using information on possession of different types of assets and different household characteristics (IIPS and ORC Macro, 2007). The five categories of wealth index are named as low, very low, medium, high and very high. These categories have been pooled together to form two categories: poor (comprises of very low and low) and non-poor (comprises of medium, high and very high)]; Body Mass Index [information on height and weight of women in the age group of 15-49 years was collected in NFHS-3. The height and weight measurements were used to calculate the BMI. The BMI is defined as weight in kilograms divided by height in meters squared (kg/m^2). This index excludes women who were pregnant at the time of survey and women who gave birth during the two months preceding the survey. A cut-off point of 18.5 is used to define thinness or acute under-nutrition and a BMI of 25 or above indicates overweight and obesity]; exposure to mass media [respondents' media exposure was measured by asking women about the frequency (almost every day; at least once in a week; less than once in a week; or not at all) with which they watch television or listen to radio. In the present research work, exposure to radio and television are considered. If the respondent was exposed to both television and radio, then she is considered to have high level exposure to mass media, but if the respondent was exposed to either television or radio, then she is considered to have medium level of exposure to mass media and if the respondent was not exposed to either television or radio, then she is considered to have low level of exposure to mass media]; religion (Hindu and others); caste (scheduled caste/tribes, other backward caste and others) and region. Region in India is divided into four categories based on the geographical location. Northern region consists of Jammu & Kashmir, Himachal Pradesh, Punjab, Uttaranchal, Haryana, Delhi, Rajasthan, Chhattisgarh, Madhya Pradesh, and Uttar Pradesh. West Bangal, Jharkhand, Orissa, Bihar Sikkim, Arunachal Pradesh, Nagaland, Manipur, Mizoram, Tripura, Meghalaya and Assam are categorized as eastern region. Western region comprises Gujarat, Maharashtra and Goa. Southern region includes Andhra Pradesh, Karnataka, Kerala and Tamil Nadu. Region of residence of the respondent is also controlled to see the net effect of adolescent pregnancy on the birth outcomes. Adequate antenatal care was defined as percentage of live births in the preceding five years of the survey received antenatal care services recommended by WHO (full care, partial care and no care).

The association of area of residence, birth outcomes and age of the women at birth were examined in the first step. Logistic regression analysis was used to examine the impact of adolescent pregnancy on the size of the baby at birth and infant loss after controlling other socio-economic, demographic and behavioural characteristics separately for urban and rural areas. Table 1 presents the distribution of size of the baby at birth and infant loss of the adolescent as well as adult women by their place of residence. Table 2 and Table 3 provide the results of logistic regression analyses of influence of age of women at birth on low birth weight and infant loss.

For the multivariate analysis, three models were used. Model 1 controls for the variables, women's education, birth order, work participation of women, wealth index, religion, caste, exposure to mass media, body mass index and region of residence. Model 2 controls for all the above variables and also for adequate use of antenatal care. Model 3 controls for all variables in Model 1 and also for the domestic violence experienced by women. The reason for considering different models was that information on antenatal care was collected only for the recent births in the five years preceding the survey, whereas the information on birth weight and infant loss was collected for all births in the five years preceding the survey. In the case of domestic violence, information was collected from only one woman, from all women in the household eligible for the interview. The sample size reduces significantly when introducing the variable on the use of antenatal care in Model 2 and when introducing domestic violence variable in it.

III. Results

Results presented in Table 1 brought out that the percentage of small size babies was higher among adolescent women than adult women in urban areas. However, in rural areas, significant differentials do not exist. Regarding the loss of infant, in both urban and rural areas, the percentage of live births ended their life during the first 12 months found to be higher among adolescent women as compared to adult women.

Table 1: Percent distribution of small size of the baby and infant loss by place of residence for adolescent and adult women

Age of women	Small Size Baby				Infant Loss			
	Urban		Rural		Urban		Rural	
	%	No.	%	No.	%	No.	%	No.
Adolescent women	25.3	1413	22.9	6375	5.0	1448	8.7	6516
Adult women	18.2	12714	21.7	35130	4.0	12855	5.7	35618

Sample Births: Births to women in the age group of 15-29 years in the preceding five years of the survey

Logistic regression results

Age of women at birth and low birth weight

In urban areas, the age of women at the time of birth showed strong influence on size of the baby at birth. The odds of having small size baby were higher among births to adolescent women as compared with births to adult women. However, in rural areas age of women at birth did not show any significant influence on the size of the baby at birth. Other explanatory variables used in the model showed significant influence on the size of the baby at birth. Primary level of education of women did not show any significant impact on having low birth weight infant, whereas secondary level education showed greater negative influence in both urban and rural areas. In both the settings, odds of having small size babies at birth were lower among second and higher order births when compared with first order births. Births to non-poor women, non-Hindu women (only in urban areas) and women who have medium to high body mass index were less likely to have low birth weight as compared with other women. Births to women living in southern region (only in urban areas) and women living in the eastern region (only in rural areas) have lower odds for low birth weight as compared with women in the northern region. In urban areas, use of adequate antenatal care services significantly reduced the risk of low birth weight. Experience of domestic violence by women increased the odds of low birth weight in both the settings.

Age of women at birth and infant loss

In urban areas, women who had their birth at younger ages (<=19) were more likely to have lost their babies during the first year of life than women who had their birth at later ages (20-29). The statistical significance of age of women at the time of birth on infant loss vanished when

Table 2: Logistic regression results of effect of age of women at the time of birth on low birth weight by place of residence

Explanatory variables	Urban			Rural		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Age at birth of women						
Adult (<=19) (Ref.)						
Young (20 and above)	1.26***	1.29***	1.25***	0.99	0.96	0.96
Women's education						
Illiterates						
Primary Education	1.06	1.08	1.01	0.94	0.97	0.94
Secondary Education	0.79***	0.78***	0.81***	0.83***	0.81***	0.85***
Birth order						
1 (Ref.)						
2	0.80***	0.79***	0.78***	0.89***	0.85***	0.91*
3 and above	0.73***	0.67***	0.68***	0.85***	0.81***	0.87***
Work participation of women						
Non-working (Ref.)						
Working	1.02	0.97	1.03	0.95	0.90**	0.95
Wealth index						
Poor (Ref.)						
Non-poor	0.80***	0.88	0.82**	0.84***	0.85***	0.82***
Religion						
Hindu (Ref.)						
Others	0.85***	0.88	0.87**	1.05	1.07	1.03
Caste						
SC/ST (Ref.)						
OBC	0.1	0.95	0.99	1.01	0.97	0.99
Others	0.99	0.99	0.98	1.08	1.01	1.10*
Exposure to mass media						
Low (Ref.)						
Medium	0.99	0.91	1.03	0.1	0.99	0.99
High	1.02	0.95	1.02	1.03	1.01	0.98
Body mass index						
Low (Ref.)						
Medium	0.79***	0.76***	0.79***	0.91***	0.88***	0.92***
High	0.74***	0.67***	0.78***	0.80***	0.81*	0.81*
Region						
North (Ref.)						
East	1.05	0.98	1.08	0.94*	0.89***	0.93
West	0.91	0.87*	0.91	0.93	0.91	0.99
South	0.78***	0.75***	0.77***	0.9	0.89*	0.92
Utilization of antenatal care						
No (Ref.)						
Inadequate		0.82			0.99	
Adequate		0.74***			0.96	
Less severe violence						
No (Ref.)						
Yes			1.21***			1.03
Severe violence						
No (Ref.)						
Yes			1.20*			1.24***
Sexual violence						
No (Ref.)						
Yes			0.96			1.13**
Constant	0.43	0.61	0.39	0.41	0.5	0.39
-2 log likelihood	16083.1	11844.63	12873.23	31766.97	22301	24832.52
Chi-Square Value	244.637	238.65	234.547	138.657	136.15	164.473
Level of Significance	0	0	0	0	0	0
Number of Women	17329	12917	13862	30104	21914	23637

Level of significance: *** p<0.001, ** p<0.01 and * p<0.05.

Sample Births: Births to women in the age group of 15-49 years in the preceding five years of the survey and who were in the age group of 15-29 years at the time of birth

Table 3. Logistic regression results of effect of age of women at the time of birth on infant loss by place of residence

Explanatory variables	Urban			Rural		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Age at birth of women						
Adult (<=19) (Ref.)						
Young (20 and above)	1.34***	1.26	1.25*	1.13*	1.02	1.1
Women's education						
Illiterates						
Primary Education	1	1.4	0.95	0.87	0.85	0.84*
Secondary Education	0.64***	0.93	0.63***	0.62***	0.53***	0.64***
Birth order						
1 (Ref.)						
2	0.74***	0.83	0.73**	0.70***	0.70***	0.65***
3 and above	0.91	1.25	0.92	0.70***	0.68***	0.66***
Work participation of women						
Non-working (Ref.)						
Working	1.26*	1.24	1.23*	1.01	1.14	1.04
Wealth index						
Poor (Ref.)						
Non-poor	0.88	0.8	0.96	0.75***	0.81*	0.76***
Religion						
Hindu (Ref.)						
Others	0.85	0.77	0.79	0.91	1.01	0.91
Caste						
SC/ST (Ref.)						
OBC	0.95	1	1.01	0.95	0.99	0.91
Others	0.9	0.96	0.9	0.94	0.92	0.89
Exposure to mass media						
Low (Ref.)						
Medium	0.89	0.9	0.99	1.02	1.22*	1.02
High	0.98	0.91	1.1	0.99	0.97	0.94
Body mass index						
Low (Ref.)						
Medium	1.12	1.44*	1.14	0.95	1.1	0.98
High	1.25	1.68**	1.32	1.15	1.69**	1.19
Region						
North (Ref.)						
East	0.86	0.84	0.89	0.85**	0.86	0.85*
West	0.60***	0.60*	0.54***	0.77*	0.92	0.76*
South	0.64***	0.76	0.58***	0.70***	0.65	0.67***
Size of the baby						
Smaller than Average						
Average	0.46***	0.51***	0.44***	0.63***	0.69***	0.63***
Larger than Average	0.48***	0.51***	0.48***	0.66***	0.73**	0.66***
Utilization of antenatal care						
No (Ref.)						
Inadequate		0.54**			0.77**	
Adequate		0.42***			0.67**	
Less Severe violence						
No (Ref.)						
Yes			1.24*			1.06
Severe violence						
No (Ref.)						
Yes			1.13			1.05
Sexual violence						
No (Ref.)						
Yes			0.75			1.11
Constant	0.13	0.09	0.11	0.15	0.1	0.16
-2 log likelihood	55251.2	2836.4	4490.7	12490.3	6261.7	9754.6
Chi-Square Value	224.311	197.17	200.426	277.609	151.803	233.958
Level of Significance	0	0	0	0	0	0
Number of Women	18843	14001	13862	31550	21914	24801

Level of significance: *** p<0.001, ** p<0.01 and * p<0.05.

Sample Births: Births to women in the age group of 15-49 years in the preceding five years of the survey and who were in the age group of 15-29 years at the time of birth

the use of antenatal care was introduced in the model. However, model 3 showed moderate level of influence of age of women at the time of birth. In rural areas, the likelihood of having infant loss was higher among younger women than among adult women. There was no statistical significance found in model 2 and model 3.

Among other variables, women's secondary level education played an important role in determining infant loss. Women who educated up to secondary level had lower likelihood of infant loss than illiterate women in both urban and rural areas. In urban areas, second order births and in rural areas, both second and third or higher order births have lower odds of infant loss as compared with first order births. Births to working women were more likely to end up in death during infancy than births to working women in urban areas. Wealth index of the households exhibited negative influence on the incidence of infant loss in rural areas. Size of the baby at birth is found to be a significant predictor of infant loss. Average to larger than average size at birth decrease the likelihood of infant loss irrespective of their place of residence. Births to women who live in eastern (only in rural areas), western and southern regions have lower likelihood of infant loss than births to women who live in the northern region. In both urban and rural areas, use of antenatal care significantly decreased the risk of infant loss. In urban areas, women who experienced less severe violence had lower odds of infant loss as compared to women who had not experienced it. In rural areas, domestic violence did not show any significant influence on infant loss.

IV. Discussion

The large population-based study compared the adverse birth outcomes of adolescent pregnancies of mothers aged 19 or less years with adult pregnancies of mothers aged 20-29 years. The analysis clearly indicated that adolescent mothers are at increased risk of low birth weight and infant loss in urban areas. The socio-demographic factors known to be more prevalent among teenage gravida on the low weight and infant loss were poverty, low educational level, and inadequate prenatal care. Some of the earlier studies believed that the adverse outcomes observed in teenage pregnancies were attributable to socio-demographic factors (Bulkulmz & Deren, 2000). Some studies concluded that teenage mothers were not high risk group if appropriate prenatal care was provided (Mahfouz, el-Said, al-Erian & Hamid, 1995). However, the present study found that after controlling for other socio-economic and demographic factors, increased risk of low birth weight and infant loss were more intrinsic to teenage mothers in urban areas. However, in the case of infant loss, the significant effect of age of women at birth is vanished when the effect of use of prenatal care services is controlled and use of prenatal care services attained statistical significance. This finding implies that teenage pregnancy is not risky in the case of infant loss if prenatal care services are provided. However, in the case of low birth weight, teenage pregnancy has independent effect even after controlling for the use of prenatal care services. This may be due to the fact that teenage mothers who themselves require more nutrients for their own growth, could have to compete with the developing foetus for nutrients which would ultimately lead to adverse birth outcomes such as low birth weight. In order to see the effect of age of women, body mass index of the women was controlled representing an overall female under nutrition. Poor illiterate young girls are getting married early and becoming pregnant before achieving their own growth potential.

The present study implies that teenagers need special attention during pregnancy and child-birth as their requirements may be different from adults. Importance should be given in the health care system for the pregnant teenagers according to their needs and requirements. Efforts should be made to create awareness to teenage women as well as their family members, particularly men and mothers-in-law because most of the time they are the decision-makers for young married women. Not only there should be efforts to improve the socio-demographic background of teenagers to improve the reproductive outcome, but also to decrease the incidence of teenage pregnancy by increasing public awareness, ensuring female education and providing attractive incentives to those who marry at later ages. Though, there are programmes to provide incentives for the girls who get married after 18 years of age, there is a need for comprehensive programme at the national level to

promote higher age at marriage. Programmes should be designed to improve economic status as well as the age at marriage. Compulsory education at least up to secondary level may be an alternative to arise the age at marriage. However, it is difficult to increase the literacy level of a large segment of the population during a short period of time. The alternative could be to design and implement health education programmes, mass campaigns and public health awareness programmes about the consequences of early marriage.

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