

Maternal care utilization among adolescent mothers in Urban India: Evidence from DLHS-3

Introduction

Reducing maternal mortality remains an important challenge to global public health systems, particularly in developing countries [1, 2]. According to recent estimates, annual decline in maternal mortality has been observed about 2% against the target of 5.5% set in the Millennium Development Goals-5. The number of maternal deaths, accounted by complications during pregnancy and childbirth, has reduced substantially from 409,053 deaths in 1990 to 273,645 deaths in 2011 [3]. Despite this overall decline, developing countries still account for about 99% of all maternal deaths in the world with major contribution (95%) from Sub-Saharan Africa and South Asia [4].

Every woman has a basic human right to survive pregnancy and childbirth. India, being a signatory to many regional and international agreements including the Alma-Ata Declaration, bears a legal obligation to make sure that women do not die or suffer complications from preventable pregnancy-related causes. However, the shocking scale of maternal mortality occurrence reveals the government's failure to protect women's reproductive rights, and comply with international law. Although, according to government's Sample Registration System, the Maternal Mortality Ratio (MMR) in continues to be above 200, UN agencies put the number much higher, approximately 450 deaths per 100,000 live births [5]. Most of these maternal deaths are preventable if women have proper access to essential healthcare before, during, and after childbirth [6, 7].

Maternal health care among certain vulnerable groups remains a challenge to health systems around the world. Adolescent mothers in developing countries are one of them [8, 9]. Many developing societies even today are characterised by early marriages and teenage pregnancy [10, 11, 12, 13, 14, 15]. In India, due to early marriage, adolescent women become sexually active at an early age and face tremendous social and familial pressure for child bearing soon after marriage which brings unfamiliar problems related to reproductive health [16]. Teenage pregnancies have been found to be associated with premature deliveries, low birth weight, high neonatal and post neonatal mortality, delivery and postnatal complications in mothers and maternal deaths, obesity, anemia, STIs, mental illness, unsafe abortion complications and obstetric fistula. [17, 18, 19]. Maternal death is a leading cause of deaths among adolescent girls in developing countries. Similarly, the maternal mortality in India too is very high and has been a cause of concern for the government. Although a substantial improvement has been witnessed in maternal mortality in India in last two decades as a result of several government programs, the proportion of adolescent maternal deaths (9%) to total maternal mortality is still unacceptably high [20].

Many previous have identified a range of social, economic and geographic factors that contribute to low use of skilled maternity care before, during and after childbirth. Thaddeus & Maine (1994) provided a framework to study pregnancy-related maternal mortality. They grouped different factors into under three types of 'delays' namely delays in seeking proper medical help, reaching a health facility in time and receiving adequate maternal care. Many studies in India have identified different factors affecting maternal

care which include quality of care, distance of health facility, lack of transportation facility, women's low social status, caste, religion, educational level, lack of autonomy and decision-making power, cultural norms that encourage birth at home or discourage institutional delivery care [21, 22, 23, 24, 25, 26]. Literature also emphasizes that whatever progress in terms of utilization of maternal health care services has been made so far is skewed in favour of few forward social and economic groups [27, 28].

Although a majority of India's population lives in villages, the proportion of urban population has been increasing rapidly in recent decades. For instance, about 31% of the Indian population was living in urban areas in 2011 [29], which is almost five times higher than in 1951. Though the proportion of urban population appears to be small, the country has second largest urban population in the world with 377 million people living in urban areas. The rapid explosive growth in urban population of the country is largely due to poverty led massive rural to urban migration and natural increase [30]. Majority of these migrants are contributed by young and female population [31]. Moreover, like other developing countries, in India too, the growth of the young population is likely to be concentrated in urban areas [32]. Young adults are the most fertile section of the population so that urban growth has now become self-perpetuating. Another feature of the rapid urbanization of India is increasing urban poverty. For instance, according to the "Urban Poverty in India report", 2009, 26% of India's urban population lives below the poverty line [33].

The growing urban poor reside in difficult physical and social environment which has adverse health impact. Among the urban poor, children and adolescent women are at greater risk of dismal health. The adolescent girls of poor urban community, face the problem of early marriage, unwanted pregnancy, illegal and unsafe abortion, that compound the difficulties of adolescent physical and psycho-social development [34]. Early marriage has been and continues to be the norm, particularly for girls [35]. The risks of early pregnancy are exacerbated by poverty and inadequate access to maternal and child health services. Additionally, family support networks are generally weaker in cities than in villages, leaving adolescent women, without the support in providing childcare or obtaining adequate antenatal and obstetric care [36]. Social heterogeneity and stratification according to ethnicity, occupation, neighbourhood of residence and place of origin, and other features are typically more common in cities than in more homogeneous villages, and may lead, at best, to selective provision of service to clients by practitioners, and at worst to poor or inadequate service as a result of discrimination.

The Government of India has announced several policies and programs over past decades - such as Child Survival and Safe-motherhood Program (CSSM, 1992), Reproductive and Child Health Program (Phase I - 1997-2004, Phase II - 2005-2010), the National Population Policy (2000), the National Health Policy (2002), and recently launched National Urban Health Mission, to reduce the burden of maternal mortality and improve maternal health. However, it is sad that urban adolescent mothers were never on their priority list. It must also be noted that although a few studies in India have focused on maternal care among adolescent women, none of them have focused on urban adolescent mothers [37, 38]. For better health of adolescent mothers and their new born in urban areas, it is necessary to examine the healthcare needs of these women and identify the factors affecting it. Identifying the determinants that affect healthcare use of urban adolescent mother is important in order to design appropriate, context-relevant program and policy responses. The present study, therefore, using the most recent

available data from the third wave of District Level Household Survey (2007-08), examines the factors associated with the utilization of maternal healthcare services among married adolescent women (aged 15-19 years) in urban India.

Data and Methodology

We use data from the third round of the District Level Household Survey (DLHS) conducted during 2007-08. The DLHS is a nationally representative and one of largest ever demographic surveys conducted in India. It covers all the states and union territories of India except Nagaland. The basic aim of DLHS-3 was to provide reliable estimated of maternal and child health, family planning and other reproductive health indicators at district level. A multi-stage stratified systematic sampling design was employed for this survey. More information about sampling employed in this survey can be found in the DLHS-3 National Report at <http://www.rchiips.org> [39]. In DLHS-3, out of all ever-married women who had experienced a birth three years preceding the survey, 40,135 lived in urban areas. Out of that, 3,506 were aged 15-19 at the time of the survey. We used information on these 3,506 women in our study.

Outcome Measurements

We use three outcome measures in this study namely, full antenatal care, safe delivery and postnatal care as the indicators of maternal healthcare utilization. These three selected indicators of maternal healthcare utilization and their components are based on the guidelines of the Government of India and the World Health Organization [40, 41]. A mother is considered to have received full antenatal care only when she had a minimum of three antenatal care visits, at least two tetanus toxoid injections during the pregnancy, and received iron and folic acid tablets for 90 days or more [41, 42]. A delivery conducted either in a medical institution or home deliveries assisted by doctor/nurse/Lady Health Visitor (LHV)/Auxiliary Nurse Midwife (ANM)/other health professionals is considered a safe delivery in this study. We consider a postnatal check-up within 42 days after child birth as an indicator for postnatal care [43].

Defining Predictor Variables

The key socio-economic and demographic variables taken as predictor variables in the study were guided by existing literature, particularly for India. Socioeconomic and demographic predictors such as woman's education, husband's education, religion, caste/tribe, women's exposure to mass media, economic status, mother's employment, birth order, and region of residence were included as predictor variables in the study.

The educational level of the women and their husbands was defined using years of schooling and grouped into illiterate, literate but below primary, primary but below middle school, middle but below high school, and high school and above. The religion of the mother has three categories as Hindu, Muslim, and others (Sikh, Christians, Buddhist and others). The type of work in which mother was engaged during last one year from the date of interview was considered to be her employment. The variable was divided in three categories - unemployed, professional / service / production worker, agricultural worker / farmer / labourers. Unemployed mothers are those who stay at

home and work as homemaker (do not work outside home) which is generally not considered an employment. The birth order of children of adolescent women was group into two – first birth order children and children of birth order second and above.

The identity of the social group was based on the self-reporting by mothers as Others, Scheduled Castes (SCs), Scheduled Tribes (STs) and Other Backward Classes (OBCs). These are the official categories used by the Government of India. The social system in India is characterised by numerous castes irrespective of religion. The castes deemed elite by the Indian society in the past are now officially classified as “General” or “Others”. Apart from them, other socio-economically deprived communities have been categorized as ‘lower castes’. These communities (lower castes) are further divided based on their status in the society – Other Backward Classes and Scheduled Castes. Scheduled Castes comprise those groups, which were thought to be ‘untouchables’. The category of Other Backward Classes comprises castes other than elites and untouchables. Scheduled Tribes are those groups or tribes, which did not practice caste system and lived in hilly, forested and remote areas secluded from mainstream society of India. STs and SCs make up around 7% and 16% of total population of India. The estimates of OBC population vary according to the source. The Government of India follows the report submitted in 1980 by the Second Backward Classes Commission, which puts the figure as high as 52% of total population. Rest of the people of India, who are officially categorised as ‘General’ (we call it as ‘Others’), make up around 25% of total population of India. Several policies and programs have been introduced to facilitate the use of services and resources across all social groups at equal measure and people belonging to these groups are now offered equal access to education, employment, subsidized food, healthcare, legal aid, financial loans and so on.

Wealth Index is generally used as a proxy for the economic status of the household [44, 45]. It is a composite index of household amenities and assets which has five categories - poorest, poorer, middle, richer, and richest. The index is calculated from the standard set of assets owned by the household which includes possession of consumer items and dwelling characteristics. Individuals were ranked on the basis of their household scores and divided into different quintiles, each representing 20% of the score, between 1 (poorest) and 5 (wealthiest). The variable of exposure to maternity care related messages was constructed separately for antenatal care and safe delivery care. It has four categories – not heard/seen/read any messages; heard / seen / read from mass media (TV / Radio / Newspaper / Books / Magazine / Hoardings / Pamphlets / Posters); received message through interpersonal communication (Drama / Song / Dance Performance / Street Play / Puppet Show / Exhibition / Mela / Group Meeting / Doctor / ANM / ASHA / Friends / Relatives); and both (mass media and interpersonal communication). There was no question asked in the survey about the exposure to the message of postnatal care.

To adjust for the regional variation in the utilization of maternal healthcare, we include the region of residence as an explanatory variable in the analysis. For this purpose, we divide India into six regions based on geographical location and cultural settings. The six regions consist of North (Jammu and Kashmir, Himachal Pradesh, Punjab, Haryana, Rajasthan, Delhi and Uttaranchal), Central (Uttar Pradesh, Madhya Pradesh and Chhattisgarh), East (Bihar, Jharkhand, West Bengal and Orissa), North-East (Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and

Tripura), West (Gujarat, Maharashtra and Goa), and South (Andhra Pradesh, Karnataka, Kerala and Tamil Nadu).

Analytical Approach

We use both bivariate and multivariate analysis to identify the factors associated with maternal healthcare utilization among adolescent women in urban India. Chi-square test was used to determine the difference in proportions. Simple binary logistic regression models were applied to understand the net effect of predictor variables on selected outcomes (in our case full antenatal care, safe delivery and postnatal care). Logistic regression function is applied when the response variable is dichotomous (i.e., binary or 0–1). The binary response (y, whether received full antenatal care; whether used safe delivery care; whether received postnatal care) for each individual is associated to a set of categorical predictors X . The model can be expressed as follows:

$$\text{Log}(\delta) = \log \left[\frac{\delta}{1-\delta} \right] = \beta + \beta x + \mu$$

Where,

δ = the probability of a woman who has received full antenatal care or used safe delivery care or received postnatal care.

β = the log odds of full antenatal care or safe delivery care or postnatal care for the reference group,

βx = the differential log odds of full antenatal or safe delivery or postnatal care are associated with the predictor X , as compared to the reference group.

μ = presents the error term in the model.

Only those variables, which were found to be significant in chi-square test, were included in the binary logistic regression models. The results of logistic regression are presented by estimated odds-ratio with 95% Confidence Interval (CI). The whole analysis was performed using Stata 12 SE [46].

Results

Profile of the respondents

Table 1 represents the weighted percentage distribution of the adolescents, who had delivered the last child during the three years preceding the survey by select background characteristics. Majority of the adolescent women (81%) had given birth after 17 years of age. About 28% of adolescent women were illiterate and majority of them belonged to the Hindu religion. Among social groups, most of the adolescent mothers (46.7%) were from Other Backward Castes (OBCs). About 83% mothers were unemployed and 18% women had an illiterate husband. About 7% had no exposure to antenatal care messages while about 16% had no exposure to safe delivery care messages. About 5% and 9% adolescent women in the study were from the poorest and poorer wealth quintiles, respectively.

Differentials in the Utilization of Maternal Healthcare Services

To identify the factors associated with the utilization of maternal healthcare services, namely, full antenatal care, safe delivery and postnatal care, we examined the bivariate differential of the selected socioeconomic and demographic characteristics. Table 2 illustrates the weighted percentage of women who utilized maternal healthcare services by selected background characteristics. Overall, 23% of the rural adolescent women received full antenatal care, 70% utilized safe delivery care and 65% had postnatal care check-ups.

The rate of full antenatal care (13%) was very low among illiterate women. Similarly, safe delivery care use was 49% among women with no formal education while the same was found to be high at 88% for those with high school education and above. Only 47% of illiterate women had a postnatal check-up within 42 days after the delivery compared to 79% among women with high school and above education. Utilization of all three services was observed to be higher among those women whose husbands had high school education and above. About one in three and four in five women whose husbands had high school education and above, had utilized full antenatal care services and had safe deliveries respectively. Utilization of postnatal care was 74% among women whose husbands had high school education and above, and it was found to be low for those, whose husbands were illiterate (51%).

Nearly four out of five adolescent women from other religions utilized safe delivery care. Only two-third of Muslim adolescent women utilized safe delivery care compared to 71% among their Hindu counterparts. Similarly, postnatal care was utilized more by women from other religious groups (69%), followed by Muslim (67%) and Hindu (64%) women. The utilization of full antenatal care (19%), safe delivery (68%) was lowest among women from Scheduled Tribes (ST) while postnatal care utilization was found lowest among SCs (60%). It should be noticed here that caste differentials in urban areas are not quite large.

The utilization of all three maternal healthcare services was observed to increase with the increase in wealth quintile. For instance, only 5% of urban adolescent mothers belonging to the poorest wealth quintile received full antenatal care, while this proportion was found to be 30% among adolescents from the richest wealth quintile. A similar pattern was observed where 42% and 37% of the women belonging to the poorest wealth quintile utilized safe delivery and postnatal care respectively, compared to 82% and 77% from the richest wealth quintile.

Only about 18% and 59% of urban adolescent mothers working as agricultural labourer/workers received full antenatal and safe delivery care, respectively compared to 27% and 72% of mothers working as professional/service/production workers. About 27% of women who were exposed to mass media received full antenatal care; however the corresponding figure was observed to be just 8% among women who had no mass media exposure. Similarly, safe delivery and postnatal care were 74% and 68% respectively among urban adolescent ever married women who had any exposure of mass media. Fewer adolescent women with children of birth order two or above were able to receive full antenatal care (17%) and safe delivery (58%) compared to women with just one child.

Adolescent women from the South region were found to be utilizing maternal healthcare services more than the women from other regions. While the highest utilization of full antenatal care (50%) was observed in the Southern region, only 10%

women from Central region received full antenatal care. Similarly, the utilization of safe delivery (51%) and postnatal care (17%) was also found to be lowest in Central region.

Determinants of Full Antenatal Care Utilization

Binary logistic regression results for full antenatal care utilization have been presented in Table 3. Women's education, husband's education, religion caste, economic status, birth order, mass media exposure and region of residence were found to be significant determinants of the utilization of antenatal care services among urban adolescent women.

Women with middle and higher education were two (OR = 1.935, CI = 1.402-2.670) to two and half times (OR = 2.346 CI = 1.680-3.276) more likely to receive full antenatal care than illiterate women. Similar was the case with women who had primary level education (OR = 1.535, CI = 1.127-2.090). Adolescent women whose husbands had education up to high school or above, were more likely to utilized full antenatal care compared to women whose husbands had no formal education (OR = 1.373, CI = 0.969-1.945).

The wealth quintile showed a significant positive effect on the utilization of full antenatal care among urban adolescent women. Women from the richer and richest wealth quintiles were nearly four times (OR = 3.646, CI = 1.621-8.201; OR =3.850, CI =1.688-8.782) more likely to receive full antenatal care compared to women from the poorest wealth quintile. Women with children of two or more birth orders were less likely to utilize full antenatal care than women who had experienced childbirth for the first time (OR = 0.710, CI = 0.554 0.910).

Another significant finding is the regional variation in the utilization of antenatal care. Adolescent urban women from West and South region were more likely to receive full antenatal care utilization compared to the women from North region. The highest odds of full antenatal care utilization among adolescent women were evident in the South Region (OR =4.757, CI =3.372-6.711) followed by the West region (OR = 1.953, CI = 1.365-2.795) with reference to North region. The women from Central region were 35% less likely to receive full antenatal care compared to women from North region.

Adolescent urban women who had heard antenatal care messages or had interpersonal communication with a health worker or lucky enough to have an exposure to both were about two times more likely to receive full antenatal compared to those who had no exposure to mass media. Adolescent Muslim women in urban India were 27% less likely (CI =0.574-0.931) to receive full antenatal care compared to their Hindu counterparts. On the other hand, the odds of receiving full antenatal care were higher among SCs (OR =1.008-2.356) compared to STs.

Determinants of Safe Delivery Care Utilization

Results of the logistic regression analysis for safe delivery care are presented in Table 4. Findings show that wealth index, religion, woman's education, husband's education; full antenatal care, birth order and region of residence are statistically significant determinants of safe delivery care utilization.

Economic status was also found to be an important significant determinant in the utilization of safe delivery care. Adolescent women from the richer and richest wealth quintiles were 2.1 (CI = 1.419-3.220) and 2.9 times (CI = 1.895-4.583) more likely to use safe delivery care respectively compared to those from the poorest wealth quintiles. The likelihood of safe delivery care utilization increases with the level of women's education. Compared to illiterate urban adolescent women, women with high school and above education were more likely to utilize safe delivery care (OR = 2.249, CI = 1.623-3.117). Similarly, the odds of safe delivery care utilization also increase with the level of husband's education.

The likelihood of using safe delivery care was observed to be low among adolescent women belonging to the Muslim religion (OR = 0.755, CI = 0.600-0.952) compared to adolescent women belonging to the Hindu religion. The probability of safe delivery care was found to be less among women with children of birth order two and above compared to women with only one child (OR = 0.509, CI = 0.414-0.626). Those adolescent women who had full antenatal care during their pregnancy were almost three times more likely to go for safe delivery (CI = 2.174-3.930). The regional variation reveals that compared to the North region, the odds of utilizing safe delivery care were highest in the South region (OR = 5.398, CI = 3.692-7.892), followed by the West (OR = 3.759, CI = 2.586 -5.464), the East (OR = 3.814, CI = 2.579-5.640) and the North-East region (OR = 2.416, CI = 1.550-3.765).

Determinants of Postnatal Care Utilization

Table 5 demonstrates the results of the logistic regression analysis on the use of postnatal care by rural adolescent women in India. The findings reveal wealth index, women's education, full antenatal care, safe delivery care and region as significant factors affecting postnatal care utilization. The likelihood of utilizing postnatal care was found to be nearly two times higher (OR = 2.148, CI = 1.324-3.486) among women from the richest wealth quintile than among those from the poorest wealth quintile. The odds of receiving postnatal care by adolescent women with primary (OR = 1.341, CI = 1.029-1.747) and middle education (OR = 1.390, CI = 1.035-1.867) were more compared to illiterate adolescent women. Quite surprisingly, we find that adolescent Muslim women were one and a half times more likely to receive postnatal care than their Hindu counterparts in urban India (OR = 1.545, CI = 1.197-1.996).

The likelihood of use of postnatal care was found to be more among those women had received full antenatal care and safe delivery care. Those who had received full antenatal care were twice more likely to use postnatal care compared to those with no full antenatal care (CI = 1.452-2.488). Similarly, the odd of receiving postnatal care increase by almost ten times among women with safe delivery compared to women with no safe delivery care (CI = 8.191-12.371).

Region of residence again appeared as a strong factor affecting the utilization of postnatal care. Urban adolescent mothers from the northeast region were found to be less likely to use postnatal care compared to their counterparts from the North region (OR = 0.553, CI = 0.353-0.865). On the other hand, women from the South (OR = 2.0201, CI = 1.367-2.988) and the West (OR = 2.432, CI = 1.609-3.676) showed that they were almost twice more likely to use postnatal care compared to their counterparts living in urban areas of the North region.

Discussion

Maternal health care utilization has been on the top of the agenda of the Government of India since 1996 when the integration of the Safe Motherhood and Child Health Program into the Reproductive and Child Health Program (RCH) took place. Since the focus in the past has mostly been on rural areas, vulnerable groups such as urban adolescent women rarely get into the limelight of policy discussions. Considering the fact that there is no study available on the issue of factor affecting maternal health care utilization among urban adolescent women in India, the present study, using information on 3,315 women from the latest round of DLHS conducted in 2007-08, attempts to explore the factors affecting the use of maternity care services, namely, full antenatal care, safe delivery and postnatal care among married adolescents in urban India with an intention to improving the information available to policy-makers responsible for planning and administering health care programs.

The findings of this study reveal unacceptable low level of full antenatal care utilization and moderate level of safe delivery and postnatal care among adolescent ever married women in urban India. This study has also identified several other determinants that have a significant influence on the utilization of maternal healthcare services such as women's education, husband's education, mother's employment type, social group, religion, economic status, region of residence and use of maternity services itself.

The disparity in the use of maternal healthcare utilization across economic groups is an area of concern for many [28, 47]. Many studies have already documented the fact that the household wealth has a positive effect on the use of maternal healthcare [27, 48, 49, 50]. Our study confirms the same in the context of urban adolescent mothers in India. Women from richer households were more likely to use maternal care. It is argued that household wealth may facilitate the use of maternal care in many ways. Women from rich households are generally more educated and have more autonomy compared to the women from poor households. Moreover, wealthier women also have enough resources to meet the expenses on healthcare whereas women from poor households, often less educated and unemployed, have innumerable difficulties to manage enough money to pay for healthcare expenses because most of their earnings go into daily living expense like food and other necessary items leaving behind little or no amount to spend on healthcare [51].

Although, social group was not a significant predictor for safe delivery and postnatal care utilization, it emerged as a significant factor affecting the utilization of full antenatal care among urban adolescent women in India. Despite several affirmative actions by central and state governments, the caste/tribe of an individual still turns out to be a significant predictor of health care utilization in urban India [52]. SC women were more likely to receive full antenatal care compared to women from STs. They are the most backward indigenous group of India in terms of socio-economic progress [53]. It is the result of their long geographical and socio-economic isolation from mainstream Indian society. A great majority of them are migrants engaged in casual labour getting lowest wages among all social groups [54]. Moreover, a large proportion of urban STs live in slums which are often illegal lacking basic public utilities such as drinking water, sanitation, education and health care facilities [55].

Most of the studies on maternal healthcare have documented that the use of healthcare services is lower in among Muslim women than among Hindu women [56, 57].

In our study as well we found that Muslim adolescent women were less likely to use full antenatal care and safe delivery care compared to their Hindu counterparts. The Government of India's panel in 2005, also known as Rajinder Sachar Committee, to conduct a systematic study of the social, economic and educational status of the Muslim community, concludes that Muslims 'exhibit deficits and deprivation in practically all dimensions of development' and 'the deficits are particularly salient in the areas of female schooling and economic status' [58, 59, 60]. Apart from that there has been a considerable discussion on how religious and social customs prevalent among Muslims such as '*burkha/niqab*', physical separation of males and females, and the obligation for women to cover and hide their bodies may be affecting the adolescent women's health care behaviours adversely [57]. Muslim women generally wield less autonomy to interact with males outside their immediate family members. Presence of a male doctor which is often a case in many government hospitals, Muslim women prefer not to go to him for antenatal check-up and delivery assistance [55]. Therefore, it is not surprising to witness Muslim women being less likely to go for full antenatal care and safe delivery.

However, it is surprising to see that adolescent Muslim women in urban areas were more likely to use the postnatal care than their Hindu counterparts. This finding is in contrast with most of the previous studies. However, a recent multilevel study in Madhya Pradesh (a state of India), conducted using same dataset that we have used in this study, confirms the results of our study. They have not given any explanation for this anomaly [61]. However, the anomaly in our case can be explained by the fact that Muslim women urban areas suffer from postpartum complications more than their Hindu counterparts. A simple cross tabulation from DLHS-3 datasets suggests that the proportion of urban Muslim women who experienced high fever (20% vs. 29%), pain in lower abdomen (20% vs. 27%), foul vaginal smell (6.5% vs. 8.0%), excessive bleeding (8.0% vs. 10.4%), convulsions (4% vs. 5%) and severe headache (16.7% vs. 24.0%) is always higher than urban Hindu women. Hence, the prevalence of higher postpartum morbidity can be one of the reasons for greater use of health care in postnatal period by Muslim women. However, the relationship of religion and maternal healthcare utilization needs to be further investigated.

Similar to many other studies, the likelihood of using maternal care significantly declined if an adolescent mother had two or more children compared to those with only one child [62, 63, 64]. First birth is often considered more difficult by any woman than second and third births because she experiences the difficulties of childbirth for the first time. First time pregnant women and their family members are often more conscious about their health and healthcare needs. Therefore, such women are more motivated to go for maternity care. Apart from that, first time pregnant woman in Indian settings is often sent to her parents' place during pregnancy and childbirth. Her parents decide the kind of care she needs. Parents generally provide her the best possible care during pregnancy and childbirth. Hence, it is not surprising that first time mothers were better-off in term of maternity care utilization [55, 62]. On the other hand, it is argued that women with two or more children in India often rely on their previous knowledge and experiences related to maternity. It is possible that they gain confidence from their experiences of previous pregnancies and births and develop a belief that modern healthcare is not a must for them [48]. Such mothers must be identified and provided appropriate counselling by community health workers. Apart from that, it must also be

noted that women with high parity face difficulties in attending a health facility when caring for small children [62].

The findings of this study suggest that the use of antenatal care have a remarkable effect on the use of safe delivery care and the use of both antenatal care and safe delivery have substantial influence on the use of postnatal care. Previous studies conducted in different setting have recorded similar findings. No statistically significant differences were found in the use of maternal health care according to type of employment mothers were engaged in.

We find a significant influence of higher education levels of adolescent women on the use of maternal health services by them, even after controlling for other selected covariates. These results are consistent with other studies in India and other countries [55, 56, 61, 62, 63, 64, 65, 66]. The education of the mother is argued to be an effective means of achieving greater autonomy in the family, getting an employment, thereby achieving economic independence [64, 67]. It is also argued that education of the mother gives her exposure to the outer world from where she gathers knowledge not only about pregnancy and childbirth but also about the postnatal care of both, the new-born and the mother. Moreover, education makes mothers confident; brings a feeling of self-worth and self-confidence; enhances communication with their husbands and other family members on different issues including her own health [68]. In Indian society, where mother-in-laws dominate the household decision-making regarding issues of women of the household, an educated woman may have an upper hand in household decision-making, especially when it is about her own health and health care [55].

Husband's level of education emerges out to be a significant predictor of full antenatal care and delivery care in our study similar to many previous studies. In India, husband's education may contribute to women's healthcare utilization at least in two different ways. First, his education could lead to a better economic status, which, in turn, gives him enough resources to spend on her wife's healthcare needs. Second, his education level decides the level of his understanding about healthcare needs of her wife. Even in urban India today, many restrictions are placed on a woman's freedom of movement. In such situations, it is the attitude of the husband towards her wife's health needs which decides the utilization of the health services. Mobilizing and involving husbands can positively contribute in improving maternal health [69, 70, 71].

Urban adolescent women who had seen/heard/read the messages related to maternity care through mass media or interpersonal communication were found to be more likely to utilize maternity services compared to those who had not seen/heard/read the messages at all. It is argued that exposure to mass media results into greater awareness and dissemination of knowledge about existing program and policies related to health care which may in turn bring about behavioural changes among people [72, 73, 74]. Although electronic and print media have always been preferred to promote reproductive and health care services and behaviours, interpersonal communication especially between mothers and health workers can bring about significant behavioural changes in short time. It has been seen that grass-root level workers such as ASHAs could be successful in bringing about significant changes in thinking and behaviour of the people [75]. Since there was no information available in the data about messages related to postnatal care, we could not include it in the analysis.

Regional disparities in health and health care utilization are often discussed in academic and policy documents. Our results, confirming the same, also clearly illustrate regional differentials in maternal health care utilization. It was found that urban adolescent mothers from 'South' and 'West' regions were more likely go for maternal health care utilization. Higher levels of socioeconomic development and better functioning of the government healthcare system could be some of the factors behind the better performance of the states belonging to South and West regions. The states covered under North and Central regions included Madhya Pradesh, Rajasthan, Bihar and Uttar Pradesh (including Uttarakhand, Jharkhand and Chhattisgarh). The socioeconomic and demographic indicators of these states are very poor compared to the states covered in West and South regions [76, 77]. Not only about 50% of poor urban population lives in these two regions [78], the government health care systems in urban and semi-urban areas of these states are in a very bad condition; for example, according to DLHS-3, the proportion of Community Health Centres (CHCs) in Uttar Pradesh (the largest state of India in terms of population) which have a Gynaecologist, Paediatrician, Anaesthetist, Health Manager and First Referral Unit (FRUs) having blood storage facility was 50.0%, 20.8%, 16.0%, 2.7%, and 1.3% respectively. Similarly, Government-run District Hospitals (DHs) also suffer from severe shortage of drugs and human resources [79].

Conclusion

The present study has examined the utilization of maternal healthcare services among adolescent women in urban India using data from DLHS-3 conducted in 2007-08. The coverage of maternal health care, particularly full antenatal care is inadequate and far from satisfactory which affects maternal and child health adversely in urban adolescent women. Urban adolescent women as a group have drawn very little attention in policies and programs related to maternal health despite the fact they are among the most vulnerable groups of women in reproductive ages.

Although efforts of the government (such as *Janani Suraksha Yojana*) and non-governmental organization have raised the level of safe deliveries and postnatal care, low level of full antenatal care is a cause of concern [80]. Our study shows that availing full antenatal care increases the likelihood of safe delivery and postnatal care. Hence, it becomes all the more important to increase the level of full antenatal care. About 50 million adolescent in India suffer from anaemia. It is hoped that recently launched nationwide Weekly Iron and Folic Acid Supplementation (WIFS) programme of Government of India would be able to combat the intergenerational cycle of anaemia in urban adolescent women [81]. Since we find that mass media messages and interpersonal communication have a significant impact on the level of care utilization, government must focus on promotion of maternal care services through mass media and interpersonal communication utilizing grass-root level community health workers such ASHAs.

The education of woman and her partner has significant impact on the likelihood of using maternal health care. This is suggestive of the importance of education in enhancing the levels of maternal care utilization. We find that proving woman just 5 to 8 years of schooling can improve the likelihood of utilizing maternal care services by 30% to 95%. In a low resource setting such as India, girls also have to 'sacrifice' their educational opportunities for the 'boys' in their families mainly due to higher costs of

education [82]. Although urban India has registered a significant improvement in the girls' enrolment at primary and secondary levels, high drop-out rates still pose a great threat to the efforts [83]. Educational reforms need to focus on these factors which can improve the level of education not only among current generation but also future generations of adolescent women. Some of them could be providing financial incentives, promoting distance education and improving educational infrastructure at school and university levels. Similarly, the education among male partners should also be encouraged as it is the males who generally have an upper hand in decision-making at household level. Their education may lead to their greater involvement in maternal care [71].

Low age at marriage is not only a barrier in adolescent woman's education but also in her husband's. Hence, government should actively work towards increasing the age at marriage and providing more educational opportunities to young girls. The government should ensure proper implementation of the Prohibition of Child Marriage Act, 2006 to stop child marriages in the country [84]. Mothers with high parity show lower likelihood of utilising health care. Low contraceptive use and low age at marriage is the main reasons behind high parity. There is a need to spread awareness about benefits of contraceptive use and legal age at marriage not only through mass media but also through active involvement of the community as these issues are intricately related with people's cultural and religious values and beliefs.

The study reveals that socio-economic status, caste, religion and region also affect the use of maternity care among urban adolescents. These findings highlight the need to address the social determinants of health as highlighted by the WHO Commission on Social Determinants of Health and the Rio political declaration, 2011 to turn urban adolescent women's disadvantage into advantage in terms of maternity care utilization [85, 86]. Poor women in urban settings are often uneducated, unemployed, excluded from social networks. For such groups, government should follow targeted interventions. In case of Muslim adolescent, where perceptions, religious beliefs and traditions shape their health care behaviour, the health system should work in close collaboration with religious leaders of the community. Apart from that, future programs and intervention must also consider reducing regional variation in maternal care utilization among urban adolescent.

Limitations of the study

The study could not include some of the variables which could influence the health care utilization behaviour of the women. These variables could be related to the quality of health care received, quality of services and infrastructure available at the government health facilities, practices and local practices and behaviours related to maternity etc.

References

1. United Nations General Assembly. United Nations Millennium Declaration. A/RES/55/2 edn. New York, NY: United Nations, 2000
2. United Nations Secretary-General. Road map towards the implementation of the United Nations Millennium Declaration: Report of the Secretary-General 2001. New York, NY: United Nations, 2001.

3. Lozano R, Wang H, Foreman KJ, Rajaratnam JK, Naghavi M, Marcus JR, Dwyer-Lindgren L, Lofgren KT, Phillips D, Atkinson C, Lopez AD, Murray CJ (2011) Progress towards Millennium Development Goals 4 and 5 on maternal and child mortality: an updated systematic analysis. *Lancet* 378(9797):1139-65. Epub 2011 Sep 19.
4. WHO, UNICEF, UNFPA, The World Bank (2010) Trends in maternal mortality: 1990 to 2008. Geneva: World Health Organization.
5. Centre for Reproductive Rights (2008) Maternal Mortality in India: Using International and Constitutional Law to Promote Accountability and Change. Available at http://www.unfpa.org/sowmy/resources/docs/library/R414_CenterRepRights_2008_INDIA_Maternal_Mortality_in_India_Center_for_Huiman_Rights.pdf and accessed on 19 September 2013
6. WHO (2005) The World Health Report 2005: Make every mother and child count. Geneva: World Health Organization.
7. Dhakal S, Chapman GN, Simkhada PP, van Teijlingen ER, Stephens J, et al. (2007) Utilization of postnatal care among rural women in Nepal. *BMC Pregnancy and Childhealth* 7:1-9.
8. Paxton, A and Wardlaw, T. (2011). Are we making progress in maternal mortality? *New England Journal of Medicine*, 364, 1990-1993.
9. United Nations Children's Fund (UNICEF). (2011). Adolescence: An age of opportunity. New York
10. Fatusi AO, Hindin MJ (2010) Adolescents and youth in developing countries: health and development issues in context. *Journal of Adolescence* 33(4): 499-508. doi:10.1016/j.adolescence.2010.05.019.
11. Hampton T (2010) Child marriage threatens girl's health. *JAMA* 304(5): 509-510. doi:10.1001/jama.2010.1009.
12. Omar K, Hasim S, Muhammad NA, Jaffar A, Hashim SM, et al. (2010) Adolescent pregnancy outcomes and risk factors in Malaysia. *International Journal of Gynecology and Obstetrics* 111(3): 220-223. doi: 10.1016/j.ijgo.2010.06.023.
13. Klingberg-Allvin M, Graner S, Phuc HD, Höjer B, Johansson A (2010) Pregnancies and births among adolescents: a population-based prospective study in rural Vietnam. *Sexual and Reproductive Healthcare* 1(1): 15-19. doi: 10.1016/j.srhc.2009.09.002.
14. Rasheed S, Abdelmonem A, Amin M (2011) Adolescent pregnancy in Upper Egypt. *International Journal of Gynecology and Obstetrics* 112(1): 21-24. doi:10.1016/j.ijgo.2010.08.006.
15. Rai RK, Ramadhan AA, Tulchinsky TH (2011) Prioritizing maternal and child health in independent South Sudan. *Maternal and Child Health Journal*. doi:10.1007/s10995-011-0886-6.
16. Kumar C, Rai RK, Singh PK, Singh L (2013) Socioeconomic Disparities in Maternity Care among Indian Adolescents, 1990-2006. *PLoS ONE* 8(7): e69094. doi:10.1371/journal.pone.0069094
17. Kamal S M M (2009) Factors affecting utilization of skilled maternity care services among married adolescent in Bangladesh. *Asian Population Studies* 5(2), 153-170.
18. Raj A, Saggurti N, Balaiah D, Silverman JG (2009) Prevalence of child marriage and its effects on fertility and fertility-control outcomes of young women in india: a cross-sectional, observational study. *Lancet* 373(9678), 1883-1889.
19. World Health Organisation (2008) Adolescent Pregnancy. Geneva, Switzerland.

20. Government of India (2009) Maternal Mortality in India 2004–06. Special Bulletin. Sample Registration System. Office of the Registrar General, Ministry of Home Affairs, New Delhi
21. Sunil TS, Rajaram S, Zottarelli LK (2006) Do individual and program factors matter in the utilization of maternal care services in rural India? a theoretical approach. *Social Science and Medicine* 62(8): 1943–1957
22. Navaneetham K, Dharmalingam A (2002) Utilization of maternal health care services in southern India. *Social Science and Medicine* 55(10): 1849–1869. doi: 10.1016/S0277-9536(01)00313-6.
23. Ram F, Singh A (2006) Is antenatal care effective in improving maternal health in rural Uttar Pradesh: evidence from a district level household survey. *Journal of Biosocial Science* 38(4): 433–448. doi: 10.1017/S0021932005026453.
24. Singh L, Rai RK, Singh PK (2012) Assessing the utilization of maternal and child health care among married adolescent women: evidence from India. *Journal of Biosocial Science* 44(1): 1–26. doi: 10.1017/S0021932011000472.
25. Saikia N, Singh A (2009) Does type of household affect maternal health? Evidence from India. *Journal of Biosocial Science* 41(3): 329–353. doi: 10.1017/S0021932008003209.
26. Stephenson R, Tsui AO (2002) Contextual influences on reproductive health service use in Uttar Pradesh, India. *Studies in Family Planning* 33(4): 309–320. doi: 10.1111/j.1728-4465.2002.00309.x.
27. Pathak PK, Singh A, Subramanian SV (2010) Economic inequalities in maternal health care: prenatal care and skilled birth attendance in India, 1992–2006. *PLoS ONE* 5(10): e13593. doi: 10.1371/journal.pone.0013593.
28. Mohanty SK, Pathak PK (2009) Rich–poor gap in utilization of reproductive and child health services in India, 1992–2005. *Journal of Biosocial Science* 41(3): 381–398. doi: 10.1017/S002193200800309X.
29. Office of the Registrar General and Census Commissioner (2011) Provisional Population Totals. Paper 2, Vol. 1, Series 1. Office of the Registrar General and Census Commissioner, New Delhi.
30. Bhagat, RB (2005) Rural–urban classification and municipal governance in India. *Singapore Journal of Tropical Geography* 26(1), 61–73.
31. Kundu, A. (2007) Migration and Urbanization in India in the Context of Poverty Alleviation'. Paper presented at international conference and workshop on Policy Perspectives on Growth, Economic Structures and Poverty Reduction, Beijing, China.
32. Mehra S and Agrawal D. (2004) Adolescent Health Determinants for Pregnancy and Child Health Outcomes among the Urban Poor Indian Pediatrics; 41:137-145.
33. The Ministry of Housing and Urban Poverty Alleviation (HUPA), Government of India and United Nations Development Program (2009) India: Urban Poverty Report 2009. Oxford University Press, Oxford.
34. Mulgaonkar VB. Reproductive health of women in urban slums of Bombay. *Social Change* 1996; 26: 137-156.
35. Santhya KG, Ram U, Acharya R, Jejeebhoy SJ, Ram F, et al. (2010) Associations between early marriage and young women's marital and reproductive health outcomes: evidence from India. *International Perspectives on Sexual and Reproductive Health* 36(3): 132–139. doi: 10.1363/3613210.
36. Magadi, MA, Zulu, EM, Brockerhoff M (2003) The Inequality of Maternal Health Care in Urban Sub-Saharan Africa in the 1990s. *Population Studies*, 57(3): 347-366.
37. Singh PK, Rai RK, Alagarajan M, Singh L (2012) Determinants of Maternity Care Services Utilization among Married Adolescents in Rural India. *PLoS ONE* 7(2): e31666. doi:10.1371/journal.pone.0031666

38. Singh L, Rai, RK Singh PK (2012). Assessing the utilization of maternal and child health care among married adolescent women: evidence from India. *Journal of Biosocial Science*, 44, pp 1-26. doi:10.1017/S0021932011000472.
39. International Institute for Population Sciences (IIPS) (2010) District Level Household and Facility Survey (DLHS-3), 2007-08: India. Mumbai: IIPS. Accessed on 23 May 2013 from http://www.rchiips.org/pdf/INDIA_REPORT_DLHS-3.pdf.
40. Ministry of Health and Family Welfare. Service Providers' Manual: Understanding Health Management Information Systems. 2011. Volume I, New Delhi.
41. World Health Organisation. Provision of effective antenatal care: Integrated Management of Pregnancy and Child Birth (IMPAC). 2006. Standards for Maternal and Neonatal care (1.6), Department of Making Pregnancy Safer, Geneva, Switzerland. Available: http://www.who.int/making_pregnancy_safer/publications/Standards1.6N.pdf. Accessed 2011 November 6.
42. Ministry of Health and Family Welfare (2005) Annual report 2004–2005. New Delhi: MOHFW
43. World Health Organisation (1998) Postpartum care of the mother and new-born: A practical guide. Maternal and Newborn Health/Safe Motherhood Unit, Division of Reproductive Health (Technical Support), Geneva, Switzerland.
44. Montgomery MR, Gragnolati M, Burke KA, Paredes E (2000) Measuring living standards with proxy variables. *Demography* 37(2), 155–174.
45. Filmer, D. & Pritchett, L. H. (2001) Estimating wealth effects without expenditure data or tears: an application to educational enrolments in states of India. *Demography* 38(1), 115–132.
46. Stata Corporation (2011) Stata Statistical Software: Release 12. Texas: College Station, StataCorp LP.
47. Mukherjee S, Singh A, Chandra R. (2013) Maternity or catastrophe: A study of household expenditure on maternal health care in India. *Health*, 5, 109-118. doi: 0.4236/health.2013.51015.
48. Kesterton AJ, Cleland J, Sloggett A, Ronsmans C. (2010) Institutional delivery in rural India: the relative importance of accessibility and economic status. *BMC Pregnancy and Childbirth*. 10(30):2–9.
49. Gage A J, Calixte MG (2006) Effects of the Physical Accessibility of Maternal Health Services on Their Use in Rural Haiti. *Population Studies* 60(3):271-288
50. Rahman MM, Haque SE, Zahan MS (2010) Factors affecting the utilisation of postpartum care among young mothers in Bangladesh. *Health and Social Care in the Community* (2011)19(2), 138–147
51. Bonu S, Bhusan I, Rani M, Anderson I. 2009. Incidence and correlates of catastrophic maternal health care expenditure in India. *Health Policy and Planning* 24:445–456
52. Saroha E, Altarac M, Sibley LM. (2008) Caste and maternal health care service use among rural Hindu women in Maitha, Uttar Pradesh, India. *Journal of Midwifery & Women's Health*. 53(5):e41–e47.
53. Sundaram K, Tendulkar SD. (2003) Poverty among Social and Economic Groups in India in 1990s. *Economic and Political Weekly*. 38(50):5263-5276
54. Das MB, Hall G, Kapoor S, Nikitin D. (2012) Chapter 6 - India: The Scheduled Tribes, in the book 'Indigenous Peoples, Poverty, and Development' edited by G Hall and HA Patrinos. Cambridge University Press.
55. Navaneetham K, Dharmalingam A 2002. Utilization of maternal health care services in southern India. *Social Science and Medicine*, 55: 1849-1869
56. Salam A, Siddiqui SA. Socioeconomic inequalities in use of delivery care services in India. *Journal of Obstetrics Gynecology of India*. 2006;56(2):123–127.
57. Singh PK, Rai RK, Alagarajan M, Singh L (2012) Determinants of Maternity Care Services Utilization among Married Adolescents in Rural India. *PLoS ONE* 7(2): e31666. doi:10.1371/journal.pone.0031666

58. Sachar RS, Hamid TK, Ooman MA, Basith R, Basant AM, et al. Social, economic and educational status of the Muslim community of India. New Delhi: 2006.
59. Shariff A (1995) Socioeconomic and demographic differentials between Hindus and Muslims in India. *Economic and Political Weekly* 30(46): 2947–2953
60. Basant R (2007) Social, Economic and Educational Conditions of Indian Muslims. *Economic and Political Weekly* 42(10): 828–832.
61. Jat TJ, Nag N, Sebastian MS (2011) Factors affecting the use of maternal health services in Madhya Pradesh state of India: a multilevel analysis. *International Journal for Equity in Health* 10: 59. doi: 10.1186/1475–9276–10–59.
62. Pallikadvath S, Foss M, Stones RW (2004) Antenatal care: provision and inequality in rural north India. *Social Science & Medicine* 59: 1147–1158.
63. Adekunle, C., Filippi, V., Graham, W., Onyemunwa, P. & Udjo, E. (1990) Patterns of maternity care among women in Ondo States, Nigeria. In Hill, A. G. (eds) *Determinants of Health and Mortality in Africa*. Issue 10. Demographic and Health Survey Further Analysis Series. Population Council, New York, pp. 1–45.
64. Celik, Y. & Hotchkiss, D. R. (2000) The socioeconomic determinants of maternal health care utilization in Turkey. *Social Science & Medicine* 50(12), 1797–1806.
65. Gage A J, Calixte M G (2006) Effects of the Physical Accessibility of Maternal Health Services on Their Use in Rural Haiti. *Population Studies* 60(3):271–288
66. Sunil TS, Rajaram S, Zottarelli LK (2006) Do individual and program factors matter in the utilization of maternal care services in rural India? a theoretical approach. *Social Science and Medicine* 62(8):1943–1957.
67. Chanana K (1996) Education attainment, status production and women's autonomy: a study of two generations of Punjabi women in New Delhi. In: Jeffery R, Basu AM, editors. *Girls' Schooling, Women's Autonomy and Fertility Change in South Asia* (pp. 107–132). New Delhi: Sage Publications.
68. Chakraborty N, Islam M A, Chowdhury R I, Bari W (2002) Utilisation of postnatal care in Bangladesh: evidence from a longitudinal study. *Health and Social Care in the Community* 10(6):492–502.
69. Singh A, Ram F (2007) Men's involvement in maternal care during pregnancy and child birth in rural Maharashtra. In *Population Association of America Annual Meeting 2007*.
70. Singh, KK (1998) Husbands' reproductive health knowledge, attitudes, and behaviour in Uttar Pradesh, India. *Studies in Family Planning* 29(4), 388–399.
71. Chattopadhyay A (2013) Men in Maternal Care: Evidence from India. *Journal of Biosocial Science*. 44(02):129 – 153. doi: 10.1017/S0021932011000502.
72. Rao, K.V., Mishra, V.K., & Retherford, R.D. (1998). Effects of exposure to mass media on knowledge and use of oral rehydration therapy for childhood diarrhea in India. *National Family Health Survey Subject Report No.10*. Mumbai: International Institute for Population Sciences and Honolulu: East West Center Program on Population.
73. Retherford RD, Mishra VK. (1997). Media exposure increases contraceptive use. *National Family Health Survey Bulletin* August (7). Mumbai: International Institute for Population Sciences and Honolulu: East-West Center Program on Population.
74. Valente TW, Poppe PR, Merritt AP. (1996). Mass media generated inter-personnel communication as sources of information about family planning. *Journal of Health Communication* 1(3), 247–265.
75. Scott K, Shankar S (2010) Tying their hands? Institutional obstacles to the success of the ASHA community health worker programme in rural north India. *AIDS Care: Psychological and Socio-medical Aspects of AIDS/HIV*. 22(2):1606–1612.
76. Dyson M, Moore M. On kinship structure, female autonomy, and demographic behaviour in India. *Population and Development Review*. 1983;9(1):35–60.

77. Griffiths P, Matthews Z, Hinde A. Gender, family and the nutritional status of children in three culturally contrasting states of India. *Social Science and Medicine*. 2002;55(5):775–790.
78. Planning Commission, Government of India (2013) Press Note on Poverty Estimates, 2011-12. New Delhi. Available at http://planningcommission.nic.in/news/pre_pov2307.pdf, accessed on 23 September 2013.
79. International Institute for Population Sciences (2010) District Level Household and Facility Survey (DLHS-3), 2007-08: India. Uttar Pradesh: Mumbai: IIPS. Available at <http://www.rchiips.org/pdf/rch3/report/UP.pdf> accessed on 05 September 2013.
80. Gupta SK, Pal DK, Tiwari R, Garg R et al. (2012) Impact of Janani Suraksha Yojana on Institutional Delivery Rate and Maternal Morbidity and Mortality: An Observational Study in India. *Journal of Health Population and Nutrition*. 30(4): 464–471.
81. Iron Folic Acid supplementation programme to be launched. *The Indian Express*. 16th July 2013. Available at <http://newindianexpress.com/nation/Iron-Folic-Acid-supplementation-programme-to-be-launched/2013/07/16/article1685669.ece>, accessed on 23 September 2013.
82. Fatusi AO, Hindin MJ. (2003) Adolescents and youth in developing countries: health and development issues in context. *Journal of Adolescence*. 33(4):499–508.
83. Nanda P, Das P, Singh A & Negi R (2013), “Addressing Comprehensive Needs of Adolescent Girls in India: A Potential for Creating Livelihoods”, New Delhi, International Centre for Research on Women.
84. Government of India. The Prohibition of Child Marriage ACT, 2006, No.6 of 2007, the Gazette of India, New Delhi. 2007. Ministry of Law and Justice, Government of India.
85. Commission on Social Determinants of Health (2008) Closing the gap in a generation: health equity through action on the social determinants of health. Final Report of the Commission on Social Determinants of Health. Geneva: World Health Organization.
86. World Health Organization (2012) Rio Political Declaration on Social Determinants of Health. Geneva: World Health Organization. Available:<http://www.who.int/sdhconference/declaration/en/index.html>. Accessed July 13, 2013.