Contextual influences on young unmarried women's knowledge about various contraceptive methods in rural India

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Data from the District Level Household Survey (DLHS) conducted in 2007-08 was used to examine the contextual influences on young unmarried women's knowledge about various contraceptive methods in India using multilevel models. The contextual variables used in the models include connectivity of villages with all-weather roads, contraceptive use at the village level, and women's literacy at the district level. Findings suggest that unmarried young women have limited knowledge about various temporary contraceptive methods. However, knowledge about terminal methods was substantial, particularly female methods. Multilevel analysis revealed that connectivity with all-weather roads was independently associated with knowledge about different methods of contraception. Women's literacy at the district level was independently associated with knowledge about oral contraceptive pills, emergency contraceptive pills, condoms and female condoms. The decomposition of variance suggests a significant contribution of contextual variables in explaining young women's knowledge about contraceptive methods in India.

Introduction

The youth population in the age group 15–24 years constituted almost 189 million, representing 18% of the Indian population in 2001 and this number is projected to increase to 238 million by 2016 (RGI 2006). Not only does this group represent India's future in the socio-economic and political realms, but also its experiences will largely determine India's achievement of its goal of population stabilisation and the extent to which the nation will be able to harness its demographic dividend. In the course of transition to adulthood, young people face significant risks related to sexual and reproductive health, and many lack the knowledge and power to make informed sexual and reproductive choices (IIPS and Population Council 2010). For example, worldwide, about 6 000 youth aged 15-24 are infected with HIV each day. It is also estimated that young people experience over 100 million new cases of sexually transmitted infections (STIs) each year (UNICEF et al. 2002). Young women are particularly at risks related to sexual and reproductive health. Adolescent women in countries most affected by HIV/AIDS are two to six times more likely to become infected with HIV than their male counterparts (Zwicker and Ringheim 2004). Some estimates reveal that 50 to 75 percent of women in India are married during adolescence (Mathur et al. 2003) and thus require knowledge about contraception. In addition, young women experience high rates of unintended pregnancy with about 15 million teenage women giving birth each year (Boyd 2000).

Not only are the young women at greatest level of exposure to the risks related to sexual and reproductive health, but addressing their needs is also important for achieving the Millennium Development Goals (MDGs) at the country level. For example, infant mortality is highest in countries with the largest proportions of births to adolescents. Moreover, children born to mothers under age of 20 are significantly more likely to die than those born

to mothers aged 20 to 29 (Zwicker and Ringheim 2004). In addition, maternal mortality is twice as high for women aged 15 to 19 than for women aged 20 to 34 years (Mathur et al. 2003).

An important question that arises is whether the young people in India have sexual and reproductive health needs. While the evidence is limited, a number of studies have noted that despite socio-cultural taboos, the youth population do find opportunities to mix and form romantic relationships, and to engage in pre-marital sex with a range of partners and in a variety of situations (Abraham 2001, 2002; Abraham and Kumar 1999; Alexander et al. 2006b; Alexander et al. 2006a; Awasthi et al. 2000). Indeed, notable proportions of young men and women consider various forms of sexual activities acceptable. For example, while 88% of young men compared to 74% of young women had held hands with a romantic partner, 68% and 46% of young men and women, respectively, had kissed a romantic partner, and 42% and 26%, respectively, had sex with a romantic partner (IIPS and Population Council 2010). Not only did the young people have opportunities to mix, a significant proportion of them feared for unwanted pregnancy and sexually transmitted infections. Findings from the 'Youth in India Study' suggest that 57% and 25% of young women reported fear of pregnancy and infection, respectively. Moreover, significant proportions of young people had experienced pre-marital sex before age 20 and a notable proportion of them actually engaged in sex with multiple partners before marriage (IIPS and Population Council 2010).

Evidence also suggests that about 3-5% of young women have exposure to pornographic materials in films, in books and magazines, or on the internet (IIPS and Population Council 2010). Such exposures might encourage young women to experiment different sexual acts as depicted in the media without being fully aware of the risks involved.

Evidence further shows that awareness about contraception is not universal among young people, especially young women. Traditionally, Indian women are married off at a younger age (47% of young women aged 20-24 had married before the age of 18), but a high proportion (78% of young women who had begun cohabiting with their spouse) were not aware at the time of their marriage of what to expect from their married life. The practice of contraception during their married life is also limited among young women probably due to lack of knowledge about various contraceptive methods (IIPS and Population Council 2010). All these put young women at particularly high risk of unintended pregnancies and sexually transmitted infections.

Recognising the multiple needs of young people and the importance of investing in young people, several national policies and programmes including the National Population Policy 2000 (MOHFW 2000), The National Health Policy 2002 (MOHFW 2002), The National Youth Policy 2003 (Ministry of Youth Affairs and Sports 2003), the Tenth and Eleventh Five-Year Plans (RGI 2006), the National Adolescent Reproductive and Sexual Health Strategy (MOHFW 2005a), and the National Rural Health Mission (MOHFW 2005b) have been formulated and implemented by the Indian Government since the beginning of the decade. These policies and programmes have strategies committed towards addressing the needs of young people in the country.

Studies have shown that the knowledge about contraception among ever-married women is almost universal in India (IIPS and Macro International 2007). However, there is no evidence on knowledge of contraception among unmarried young women. Given the fact that unmarried young women also have opportunities to mix and to get engaged in pre-marital sexual activities, we cannot ignore the importance of knowledge and awareness about contraception among this group of women. Moreover, knowledge about contraception would

facilitate use of appropriate method to delay, space, or limit children within marriage. It is therefore important to understand the knowledge of contraception among unmarried young women in India. The focus of this research is on rural women as their needs and circumstances are distinctively different form urban women. Further, contraceptive knowledge of urban unmarried women are significantly higher than rural unmarried women.

Previous studies have highlighted the importance of contextual variables in explaining demographic behaviour including knowledge and attitudes towards contraception (Chacko 2001; Degraff et al. 1997; Entwisle et al. 1989; Entwisle and Mason 1985; Greenwell 1996; Magadi et al. 2000; Osmond and Manda 1998; Pebley et al. 1996; Ram and Singh 2006; Stephenson and Tsui 2002; Von Korff et al. 1992). Given the importance of contextual variables in influencing knowledge and attitude, this study aims to analyse the role of contextual variables in shaping the knowledge of young unmarried women about various contraceptive methods in India.

In this paper we use an ecological approach (Perry et al. 1996) to explain the rural young unmarried women's knowledge about various contraceptive methods. An ecological model is based on the idea that behaviour has multiple levels of influences such as intrapersonal, interpersonal, organisational, community and public policy. It also considers that influences on behaviours interact across these levels (Glanz et al. 2008). This study hypothesises that knowledge about contraception is influenced by woman's own characteristics (such as education, age, etc.), characteristics of the community in which she lives (i.e. village), and the public policy environment (i.e. district and state) that shapes macro level development levels. Knowledge of contraception is thus an outcome of influences at various levels and the interaction across these levels.

Data and Methods

We used data from the third round of the District Level Household Survey (DLHS) conducted in 2007-08 in 601 districts from 34 states and union territories of India. DLHS-3 was conducted by the International Institute for Population Sciences Mumbai under the stewardship of the Ministry of Health and Family Welfare, Government of India. The DLHS-3 was designed to provide estimates on maternal and child health, family planning and other reproductive health indicators at the district level (IIPS 2010). DLHS-3 also provides information related to the programmes under the National Rural Health Mission (NRHM). The main instrument for collection of data in DLHS-3 was a set of structured questionnaires, namely, household, ever married women, unmarried women and village questionnaires. In addition, DLHS-3 also integrated the Facility Survey of health institution (Sub centre, Primary Health Centre, Community Health Centre and District Hospital) accessible to the sampled villages. The earlier two rounds of DLHS were conducted in 1998-99 and 2002-04.

The DLHS-3 collected data from 720 320 households from 34 states and union territories of India (excluding Nagaland). In total 643 944 ever married women aged 15-49 years and 166 260 unmarried women aged 15-24 years were interviewed in the survey. Since the analysis is restricted to rural areas only, we excluded the unmarried women interviewed from urban areas in the analysis. This resulted in a sample size of 121 569 unmarried women aged 15-24 years. Of this number, 824 (0.68%) had no information on some of the explanatory variables leaving a final sample of 120 745 unmarried women. A multi-stage stratified systematic sampling design was adopted in DLHS-3 to select the primary sampling units (PSU) and the required number of households for interviews. In each district, 50 PSUs which were census villages in rural areas and wards in urban areas were selected in the first stage by systematic Probability Proportional to Size (PPS) sampling. The PSUs were

allocated to rural and urban areas of each district proportionally to the actual rural-urban population ratio. In rural areas, households were systematically drawn from the selected PSUs after house listing at the second stage. Whereas in urban areas the second stage of sampling included the selection of Census Enumeration Blocks (CEBs) followed by selection of households in the third stage of sampling (IIPS 2010). By virtue of its design, DLHS is similar to any other Demographic and Health Survey (DHS) carried out in many other countries of the world including India.

The household and ever married woman response rates were 94 percent and 89 percent, respectively. There were only small variations in the household and eligible informant response rates across different states of the country. Since DLHS follows a complex survey design the results are representative only after applying proper weights. The weights are already given in the DLHS-3 data files.

The unmarried women's questionnaire contained information, on demographic characteristics, family life education, age at marriage, reproductive health-knowledge and awareness about contraception and HIV / AIDS. Each respondent was asked which family planning methods they had heard about. The respondent was first asked to name all the methods she knew or had heard of, without any prompting. Then the interviewer read out the name and a short description of each method not mentioned, and asked if she knew the method. Eight modern methods (female sterilization, male sterilization, IUDs, pills, emergency contraception, injectables, condoms, and female condoms) were included, as well as two traditional methods, periodic abstinence (the rhythm method) and withdrawal.

The dependent variable used in the analysis was a binary variable representing the knowledge about each of the eight modern methods of contraception listed above (i.e. whether the respondent was aware of the method or not). The explanatory variables used in the analysis were wealth (Poor, Non-poor); age of women (15-19, 20-24); level of schooling of women (no schooling, below primary, primary and above); attained family life education- i.e., education on sex and sexual behaviour, bodily changes during puberty, contraception etc (Yes; No); religion (Hindu, Muslim, Others); caste (SC, ST, Others); road connectivity- i.e., village connected by all-weather road (Yes, No); percentage of currently married women using any contraception in the community (<58%; 58% and above); and percentage of women who have been to school in the district. In the absence of direct data on income or expenditure in household sample surveys like NFHS, the wealth index based on the ownership of household assets is widely used as a proxy for assessing the economic status of the households (Filmer and Pritchett 2001; Gwatkin et al. 2000; Howe et al. 2009; Johnson and Bradley 2008; Montgomery et al. 2000; O'donnell et al. 2008; Rutstein 2008; Rutstein and Johnson 2004; Vyas and Kumaranayake 2006). Moreover, studies have noted that the wealth index is an indicator of the level of wealth that is consistent with expenditure and income measure, and widely tested in a large number of developing countries to examine economic inequalities in household income, including India (IIPS and Macro International 2007; Rutstein 1999). The wealth index is already computed and is given in the DLHS dataset. We created a new variable named wealth where we merged the bottom two categories of wealth quintile and coded them as 'poor' and the remaining categories were merged together and were coded as 'non-poor'. This categorization of 'poor' and 'non-poor' goes in conformity to the fact that revised estimates of absolute poverty i.e. head count poverty ratio works out to be 37.3 percent (Government of India-Planning Commission 2009)

as weighted average of rural and urban poverty being 41.8 percent and 25.7 percent, respectively.

Statistical Analysis

Since the data used in this study had a hierarchical structure, with women living within PSUs, which are located within districts, which are within the states, a multilevel modelling technique was employed to account for such hierarchical structure of the data and to facilitate the estimation of community- and district-level influences on the unmarried women's awareness of modern contraceptive. Multilevel modelling techniques offer a mechanism for measuring simultaneously the influence of individual and community factors and unobserved community effects on health outcomes while providing a robust method for analyzing hierarchically clustered data (Diez Roux 2001; Diprete and Forristal 1994; Duncan et al. 1998; Goldstein 2010). They also offer a great opportunity to examine health behaviour using ecological models (Glanz et al. 2008). The DLHS-3 provides us a unique opportunity to use four level models accounting for the variations at individual, community, district, and state levels. We therefore, used four level models to account for the overall variations present in the data. Separate multilevel logistic models were fitted for each of the seven methods of contraception. The community level variables included 'connectivity of villages with all-weather roads' and 'percentage of currently married women using any contraception in the community'. The 'percentage of women using any contraception' was generated from the ever married women's file. The district level variable included 'percentage of women who had been to school'. This variable at community level was not included in the analysis because of multicollinearity. We did not include any state level variable in the models but have included state to account for the clustering. All the analyses were carried out using Stata 11.2 (Statacorp 2009) and MLwiN (Rasbash et al. 2009) software.

Results

Table 1 presents the background characteristics of young unmarried women. Around 77% of the young unmarried women were in the age-group 15-19 and the rest were aged 20-24 years. Young unmarried women had significantly high levels of schooling with 82% having primary or higher levels schooling. Only 11% of the young unmarried women had no schooling. The access to family life education was limited as only 43% of young unmarried women reported receiving such education. The majority of young unmarried women belonged to 'Hindu' religion (71%). Only 12% of the young unmarried women belonged to 'Muslim' religion. Seventeen percent and 23% of the young unmarried women belonged to 'Scheduled Castes (SCs)' and 'Scheduled tribes (STs)', respectively. Interestingly, a high proportion (86%) of young unmarried women resided in villages connected by all-weather roads.

Young unmarried women's knowledge about methods of contraception was far from universal and varied considerably across the different methods of contraception available in India. For example, 88% of unmarried young women knew about female sterilisation compared to only 10% who knew about female condoms (Table 1). Similarly, 75% reported awareness about oral contraceptive pills (OCPs) compared to only 24% reporting awareness about emergency contraceptive pills (ECPs). Young unmarried women's knowledge about IUDs and injectables was also limited. An interesting picture emerged when we examined the knowledge about various contraceptive methods by socio-economic and demographic characteristics of the young unmarried women. Age was significantly and positively associated with the knowledge of almost all methods of contraception. Higher schooling and enrolment in family life education were also positively correlated with the unmarried young women's knowledge about contraceptive methods. Results also showed that the non-poor were more likely than the poor to have knowledge about various contraceptive methods.

Findings also showed that the young unmarried women's knowledge was significantly and positively correlated with two of the three contextual variables included in the study. Connectivity of the village with an all-weather road was associated with a higher knowledge of all the methods of contraception – young unmarried women living in villages connected with an all-weather road were significantly more likely than the women residing in villages not connected by all-weather roads to know about the different methods of contraception (Table 1). Similarly, women's literacy at the district level was also positively correlated with the young unmarried women's knowledge about methods of contraception. Interestingly, contraceptive use at the community level was associated only with knowledge about sterilization (including both male and female sterilization) and IUDs.

The results of the multilevel analysis are presented in Table 2. The findings clearly underscore the important role of contextual variables in explaining young unmarried women's knowledge about various contraceptive methods in India. Connectivity of village with an all-weather road was significantly and positively associated with higher knowledge about almost all the contraceptive methods even when we controlled for other important variables in our models. Similarly, women's literacy at the district level was significantly and positively associated with young unmarried women's knowledge about OCPs, ECPs, condoms and female condoms. As in the case of the univariate analysis, contraceptive use at the community level was not associated with the different methods of contraception. Significant interactions were found between schooling and connectivity of village by all-weather roads in models for IUDs, OCPs, ECPs, injectables and condoms suggesting that young unmarried women having lower levels of schooling but residing in villages connected by all-weather roads were more likely to know about these contraceptive methods compared to women having lower levels of education but residing in villages that are not connected by all-weather roads.

The variance structure presented in Table 2 also supports our argument that contextual variables play an important role in explaining demographic behaviour including knowledge and attitudes. Community level variables explained a significant amount of variation in the young unmarried women's knowledge about various methods of contraception. District level variables also explained a significant proportion of variations– though the variance accounted for by the district level variable was lower than that of the community levels variables. These findings suggest that immediate community (villages in this analysis) exerts a much stronger force than the distant community (district and state). Interestingly, state explained a higher proportion of variation in case of sterilization (including both male and female sterilization) compared to community (model results for female sterilization not shown). This is not surprising given the fact that state policies have consistently focussed on sterilization as a method of contraception and that the thrust on such methods by state various across the different states of India.

Family life education was also found to be associated with young unmarried women's knowledge about various methods of contraception. For example, young unmarried women who had received family life/sex education were about two times more likely to know about the different methods of contraception as compared to those who had not received family life education. Age of the women, economic status and schooling were also significantly and positively correlated with young unmarried women's knowledge about contraceptive methods even after adjusting for other variables included in the models. On the other hand, Muslim women and women belonging to scheduled tribes were less likely to have knowledge compared to Hindu women and women belonging to scheduled castes, respectively.

Discussion

This paper examines, for the first time, young unmarried women's knowledge about different methods of contraception in India. This study is also novel because it utilizes ecological approach to analyze the young unmarried women's knowledge about different methods of contraception. In addition, this study for the first time has decomposed the total variance into contributions of different levels coming under the ecological modelling framework, including state, district, community, and individual. This approach allowed us to examine the contribution of contextual factors along with other socio-economic and demographic determinants in influencing young unmarried women's knowledge about contraceptive methods. Our findings do suggest the significant contribution of contextual factors in influencing knowledge about contraceptive methods. The contribution of the immediate community factors was much more than the contribution of more distant levels such as the district and state.

Connectivity of villages with all-weather roads turned out to be one of the important community level factors in shaping knowledge and awareness about different contraceptive methods. This finding is vital since connectivity with an all-weather road provides opportunities for young people to interact with other members both within and between communities. Such connectivity is likely to provide opportunity to the young unmarried women to be part of sparse social networks that are considered to be very important for the diffusion of newer concepts and ideas (Burt 2001). Mixing and interaction in a dense network is likely to promote redundant information and can significantly reduce information flows (Burt 1995; Granovetter 1973). The connectivity with an all-weather road may act as a channel to break this vicious cycle of knowledge transfer from one individual to the other. District level women's literacy also came out to be significant in the multilevel models for

OCPs, ECPs, condoms and female condoms. This finding is significant because living in an educated community and interacting with educated network partners is again likely to impart new knowledge. This is demonstrated by the finding that district level women's literacy was more likely to explain knowledge about modern temporary methods of contraception rather than the most widely used and promoted methods of contraception such as IUDs and sterilization.

The 'percentage of currently married women using contraception in the community' was not a significant predictor of young unmarried women's knowledge about contraception. This suggests that married women using various contraceptive methods do not discuss or disclose those to unmarried young women in the village. It appears that young unmarried women are not in the social network of married women and private matters such as contraception are not shared with them. However, this may not be the case for female sterilisation which is more discussed and disclosed among community members.

A key finding that is again very important from the policy point of view is the association between family life education and young unmarried women's knowledge about contraceptive methods – young unmarried women who had received family life education were significantly more likely than those who had not to have knowledge about the different methods of contraception. Given the fact that young unmarried women do get opportunities to engage in unsafe pre-marital sex and that their knowledge about different methods of contraception is limited, family life education can act as a very important and cost-effective channel to make young unmarried women aware about contraceptive methods. Imparting family life education at the school level can be a good strategy to impart such knowledge and to prevent unintended pregnancies and sexually transmitted infections among this group of women. This finding also gains significance in the light of the ongoing debate in the country

on inclusion of family life education in the school curriculum. For example, the Rajya Sabha Committee on Petitions, formed to evolve a consensus on the implementation of Adolescent Education Programme, recommended that 'there should be no family life education in schools' (Rajya Sabha Committee on Petitions 2009).

Finally, policies and programmes addressing reproductive health needs of women must also strive to address the knowledge related needs of young unmarried women. In particular, these programmes must take steps to make this group of women aware about methods like ECPs, injectables, condoms and female condoms on which the young unmarried women's knowledge is limited. A significant majority of young unmarried women were aware of female sterilization but only small proportions were aware about ECPs, condoms or female condoms. Unfortunately knowledge about female sterilization is not likely to protect young unmarried women from the risk of unintended pregnancies or sexually transmitted infections. The findings thus call for efforts to make our younger generation aware about the methods of contraception that can protect them from newer and emerging infections and consequences of unintended pregnancies.

References

Abraham, L., 2001. Redrawing the lakshman rekha: Gender differences and cultural constructions in youth sexuality in urban india. *South Asia,* 24, 133-156.

Abraham, L., 2002. Bhai-behen, true love, time pass: Friendships and sexual partnerships among youth in an indian metropolis. *Culture, health & sexuality,* 4 (3), 337-353.

Abraham, L., and Kumar, K.A., 1999. Sexual experiences and their correlates among college students in mumbai city, india. *International Family Planning Perspectives,* 25 (3), 139-152.

Alexander, Mallika, Garda, L, Kanade, Savita, Jejeebhoy, Shireen J., and Ganatra, Bela. 2006a. *Formation of partnerships among young women and men in pune district, maharashtra.* New Delhi: Population Council.

Alexander, Mallika, Garda, Laila, Kanade, Savita, Jejeebhoy, Shireen, and Ganatra, Bela. 2006b. Romance and sex: Pre-marital partnership formation among young women and men, pune district, india. *Reproductive Health Matters,* 14 (28), 144-155.

Awasthi, Shally, Nichter, Mark, and Pande, V. K., 2000. Developing an interactive std-prevention program for youth: Lessons from a north indian slum. *Studies in Family Planning,* 31 (2), 138-150.

Boyd, A., 2000. *The world's youth 2000.* Washington DC: Population Reference Bureau.

Burt, R.S., 1995. *Structural holes: The social structure of competition.* Harvard Univ Pr.

Burt, R.S., 2001. Structural holes versus network closure as social capital. *Social capital: Theory and research*, 31-56.

Chacko, E., 2001. Women's use of contraception in rural india: A village-level study. *Health & Place,* 7 (3), 197-208.

Degraff, D.S., Bilsborrow, R.E., and Guilkey, D.K., 1997. Community-level determinants of contraceptive use in the philippines: A structural analysis. *Demography,* 34 (3), 385-398.

Diez Roux, Ana V., 2001. Investigating neighborhood and area effects on health. *Am J Public Health,* 91 (11), 1783-1789.

Diprete, T.A., and Forristal, J.D., 1994. Multilevel models: Methods and substance. *Annual Review of Sociology,* 20, 331-357.

Duncan, Craig, Jones, Kelvyn, and Moon, Graham. 1998. Context, composition and heterogeneity: Using multilevel models in health research. *Social Science & Medicine,* 46 (1), 97-117.

Entwisle, B., Casterline, J.B., and Sayed, H.A.A., 1989. Villages as contexts for contraceptive behavior in rural egypt. *American Sociological Review*, 1019-1034.

Entwisle, B., and Mason, W.M., 1985. Multilevel effects of socioeconomic development and family planning programs on children ever born. *The American Journal of Sociology,* 91 (3), 616-649.

Filmer, Deon, and Pritchett, Lant. 2001. Estimating wealth effects without expenditure data—or tears: An application to educational enrollments in states of india*. *Demography,* 38 (1), 115-132.

Glanz, K., Rimer, B.K., and Viswanath, K., 2008. *Health behavior and health education: Theory, research, and practice.* 4th ed. USA: Jossey-Bass.

Goldstein, H., 2010. *Multilevel statistical models.* 4th ed. Chicester/GB: John Wiley and Sons Ltd.

Government of India-Planning Commission. 2009. *Report of the expert group to review the methodology for estimation of poverty.* New Delhi.

Granovetter, M.S., 1973. The strength of weak ties. *The American Journal of Sociology,* 78 (6), 1360-1380.

Greenwell, K. F., 1996. Contraceptive method mix menu: Providing healthy choices for women. *World Health Stat Q,* 49 (2), 88-93.

Gwatkin, D.R., Rutstein, S., Johnson, K., Suliman, E., Wagstaff, A., and Amouzou, A., 2000. *Socio-economic differences in health, nutrition, and population within developing countries: An overview.* Washington DC: World Bank.

Howe, L D, Hargreaves, J R, Gabrysch, S, and Huttly, S R A. 2009. Is the wealth index a proxy for consumption expenditure? A systematic review. *Journal of Epidemiology and Community Health,* 63 (11), 871-877.

IIPS. 2010. *District level household survey 2007-08.* Mumbai: International Institute for Population Sciences.

IIPS, and Macro International. 2007. *National family health survey (nfhs-3), 2005–06.* Mumbai India: International Institute for Population Sciences.

IIPS, and Population Council. 2010. *Youth in india: Situation and needs 2006-07.* Mumbai: International Institute for Population Sciences.

Johnson, K., and Bradley, S.E.K., 2008. *Trends in economic differentials in population and health outcomes: Further analysis of the 2006 nepal demographic and health survey.* Calverton, Maryland, USA: Macro International Inc.

Magadi, Monica Akinyi, Madise, Nyovani Janet, and Rodrigues, Roberto Nascimento. 2000. Frequency and timing of antenatal care in kenya: Explaining the variations between women of different communities. *Social Science & Medicine,* 51 (4), 551-561.

Mathur, S., Greene, M., and Malhotra, A., 2003. *Too young to wed:* . Washington, DC: International Center for Research on Women.

Ministry of Youth Affairs and Sports. 2003. *National youth policy 2003.* New Delh: Ministry of Youth Affairs and Sports, Government of India.

MOHFW. 2000. *National population policy 2000.* New Delhi: Government of India, Ministry of Health and Family Welfare (MOHFW), Department of Family Welfare.

MOHFW. 2002. *National health policy.* New Delhi: Government of India, Ministry of Health and Family Welfare (MOHFW).

MOHFW. 2005a. *National program implementation plan- RCH phase II.* New Delhi: Ministry of Health & Family Welfare, Government of India.

MOHFW. 2005b. National rural health mission: Meeting people's health needs, framework for implementation 2006–2012 (Vol. 2011). New Delhi: Government of India, Ministry of Health and Family Welfare (MOHFW).

Montgomery, Mark, Gragnolati, Michele, Burke, Kathleen, and Paredes, Edmundo. 2000. Measuring living standards with proxy variables. *Demography,* 37 (2), 155-174.

O'donnell, O., Van Doorsslaer, E., Wagstaff, A., and Lindelöw, M., 2008. *Analyzing health equity using household survey data: A guide to techniques and their implementation.* Washington, D.C: WBI Learning Resource Series, World Bank Publications.

Osmond, S., and Manda, M., 1998. Unobserved family and community effects on infant mortality in malawi. *Genus,* 54 (1-2), 143-164.

Pebley, Anne, Goldman, Noreen, and Rodríguez, Germán. 1996. Prenatal and delivery care and childhood immunization in guatemala: Do family and community matter?*. *Demography,* 33 (2), 231-247.

Perry, C L, Williams, C L, Veblen-Mortenson, S, Toomey, T L, Komro, K A, Anstine, P S, Mcgovern, P G, Finnegan, J R, Forster, J L, Wagenaar, A C, and Wolfson, M. 1996. Project northland: Outcomes of a communitywide alcohol use prevention program during early adolescence. *Am J Public Health,* 86 (7), 956-965.

Rajya Sabha Committee on Petitions. 2009. Hundred and thirty-fifth report on petition praying for national debate and evolving consensus on the implementation of the policy for introduction of sex education in the schools and holding back its introduction until then. Available from: http://164.100.47.5:8080/newcommittee/reports/EnglishCommittees/Committee%20on%20Petitions/135%20Report.htm [Accessed: 18th July 2011].

Ram, F., and 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 (04), 433-448.

Rasbash, J, Charlton, C, Browne, W J, Healy, M, and Cameron, B. 2009. Mlwin version 2.1. University of Bristol: Centre for Multilevel Modelling

RGI. 2006. *Population projections for india and states 2001-2016.* New Delhi: Office of the Registrar General and Census Commissioner of India.

Rutstein, S O. 2008. *The dhs wealth index: Approaches for rural and urban areas:*. Calverton, MD: Macro International, USA

Rutstein, S O, and Johnson, K. 2004. *Dhs comparative report 6: The dhs wealth index.* Calverton, MD: ORC Macro; Measure DHS, USA.

Rutstein, S., 1999. *Wealth versus expenditure: Comparison between the dhs wealth index and household expenditures in four departments of guatemala.* Calverton, Maryland: ORC Macro.

Statacorp. 2009. Stata statistical software: Release 11. College Station, TX: Stata Corp LP.

Stephenson, Rob, and Tsui, Amy Ong. 2002. Contextual influences on reproductive health service use in uttar pradesh, india. *Studies in Family Planning,* 33 (4), 309-320.

UNICEF, UNAIDS, and WHO. 2002. *Young people and hiv/aids: Opportunity in crisis*. New York: UNICEF.

Von Korff, Michael, Koepsell, Thomas, Curry, Susan, and Diehr, Paula. 1992. Multi-level analysis in epidemiologic research on health behaviors and outcomes. *American Journal of Epidemiology,* 135 (10), 1077-1082.

Vyas, Seema, and Kumaranayake, Lilani. 2006. Constructing socio-economic status indices: How to use principal components analysis. *Health Policy and Planning,* 21 (6), 459-468.

Zwicker, C., and Ringheim, K., 2004. *Commitments: Youth reproductive health, the world bank, and the millennium development goals.* Washington, DC: Global Health Council.

Table 1: Knowledge of contraceptive methods among the young unmarried women in rural India by selected background characteristics

Background Characteristics	Number of women (%)	FS	MS	IUD	Pill	EC	Injectables	Condom	FC
India	121 569	88.0	61.7	47.2	75.4	23.8	39.3	64.8	10.4
Age Group	p-value [a]	***	***	***	***	***	***	***	***
15-19	94 122 (77.4)	86.9	60.0	43.0	72.8	20.9	37.5	61.0	9.0
20-24	27 447 (22.6)	91.3	67.8	61.3	84.3	33.7	45.5	77.5	15.2
Education		***	0.0	***	***	***	***	***	***
No schooling	13 621 (11.2)	77.6	48.2	26.1	54.1	8.4	24.2	35.7	2.3
Below primary	8 293 (6.8)	78.8	45.1	27.6	59.5	10.1	25.3	41.7	3.4
Primary and above	99 655 (82.0)	90.01	65.0	51.7	79.6	27.0	42.6	70.6	12.1
Family Life Educ.		***	***	***	***	***	***	***	***
No	69 400 (57.1)	83.3	54.4	36.8	67.4	15.1	30.7	54.7	5.7
Yes	52 168 (42.9)	93.9	71.5	61.0	86.0	35.3	50.8	78.1	16.7
Religion		***	***	***	***	0.4	***	***	***
Hindu	85 835 (70.6)	89.1	64.5	45.5	75.1	23.8	40.0	62.8	10.9
Muslim	14 844 (12.2)	83.2	55.3	44.8	72.1	23.5	46.1	55.0	8.3
Others/non-religious	20 890 (17.2)	86.5	54.8	55.6	78.9	24.1	31.8	79.8	9.7
Caste/Tribes		***	***	***	***	***	***	***	***
Scheduled Castes	20 120 (16.6)	89.2	63.3	44.1	73.2	22.1	38.1	61.9	8.7
Scheduled Tribes	28 543 (23.5)	83.2	50.5	42.5	71.8	19.2	27.9	64.8	8.9
Others	72 906 (59.9)	89.5	65.7	49.8	77.4	26.0	44.1	65.5	11.5
Wealth Index		***	***	***	***	***	***	***	***
Poor	41 342 (34.0)	83.4	53.2	33.1	65.6	13.6	29.3	49.7	5.9
Non-poor	80 208 (66.0)	90.3	66.2	54.4	80.5	29.0	44.5	72.5	12.7
Village contraceptive use		*	*	**					
Up to 58 %	29 588 (59.0)	87.7	61.2	47.1	75.6	24.03	39.1	65.1	10.4
More than 58 %	64 213 (41.0)	88.1	61.8	47.9	75.3	24.03	38.7	65.3	10.6
Village road connectivity		***	***	***	***	***	***	***	***
No	12 710 (14.3)	86.2	58.6	42.4	71.5	20.4	35.8	60.2	8.7
Yes	81 091 (85.7)	88.8	63.4	47.8	75.9	24.2	40.5	65.1	10.8
Women's literacy at dist. level (%)	93 801	50.6 (19.4)[b]	49.6 (19.2) ***	51.8 (19.3) ***	51.6(19.4) ***	54.5 (20.0) ***	50.2 (19.3) ***	53.2 (19.5) ***	57.8 (20.1) ***

Notes: Values presented are the percentages of unmarried women with the knowledge of the specific method of contraception. FS=Female sterilization; MS=Male sterilization; EC=Emergency contraceptive; FC=Female condom

[a] P-values for the design-based Chi-square test of association between the variable and each contraceptive use

*** p<0.001, **p<0.01. *p<0.05

[b] Mean of the proportion of women who are literate at district level (and SD), and the p-value for Man-Whitney U test between those with and without knowledge of the contraceptive method.

Table 2: Adjusted odds ratios (ORs) and 95% confidence interval for the knowledge of contraceptive methods among the young unmarried women in rural India.

Background Characteristics	Male Sterilization		IUD		Pill	
	OR	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**
Age Group (15-19)						
20-24	1.68	(1.63, 1.73)***	2.02	(1.96, 2.08)***	1.80	(1.74, 1.87)***
Education (No schooling)						
Below primary	1.10	(1.03, 1.16)**	1.19	(1.01, 1.39)*	1.34	(1.17, 1.54)***
Primary and above	1.69	(1.62, 1.77)***	2.30	(2.05, 2.59)***	2.30	(2.08, 2.54)***
Family Life Educ (No)						
Yes	1.85	(1.80, 1.90)***	2.04	(1.99, 2.1)***	2.42	(2.34, 2.50)***
Religion (Hindu)						
Muslim	0.84	(0.80, 0.88)***	0.91	(0.86, 0.96)***	0.89	(0.84, 0.94)***
Others/non-religious	1.02	(0.96, 1.09)	1.05	(0.99, 1.12)	1.08	(1.01, 1.16)*
Caste/Tribes (Scheduled Castes)						
Schedules Tribes	0.93	(0.88, 0.98)**	1.01	(0.96, 1.07)	0.95	(0.89, 1.00)
Others	1.10	(1.06, 1.14)***	1.15	(1.10, 1.19)***	1.13	(1.08, 1.17)***
Wealth Index (Poor)						
Non-poor	1.31	(1.27, 1.35)***	1.45	(1.40, 1.50)***	1.49	(1.44, 1.54)***
Village contraceptive use (up to 58%)						
More than 58%	1.02	(0.99, 1.05)	1.00	(0.98, 1.04)	0.99	(0.96, 1.02)
Village road connectivity (No)						
Yes	1.04	(0.99, 1.09)	1.21	(1.07, 1.36)**	1.19	(1.08, 1.32)**
Women's literacy at dist. level (%)	0.93	(0.66, 1.32)	1.15	(0.86, 1.54)	1.91	(1.39, 2.63)***
Significant interactions[a]						
Schooling * Road						
Below primary & connected by all weather roads					1.13	(1.05, 1.22)***
Primary and above & connected by all weather roads					1.97	(1.87, 2.07)***
Schooling * Contraceptive use						
Below primary & more than 58%						
Primary and above & more than 58%						
Variance (SE)						
State	0.457	(0.121)	0.242	(0.065)	0.38	(0.100)
District	0.205	(0.014)	0.131	(0.010)	0.16	(0.012)
Village	0.272	(0.010)	0.302	(0.011)	0.30	(0.012)

*** p<0.001, **p<0.01. *p<0.05; CI= Confidence interval; SE= Standard error
The reference categories are shown in parentheses.
[a] Interactions were also investigated between wealth and road connectivity and wealth and contraceptive use but were not significant

Table 2: (...cont')

Background Characteristics	Emergency Contraception		Injectables		Condom		Female Condom	
	OR	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**
Age Group (15-19)								
20-24	1.67	(1.62, 1.731)***	1.47	(1.43, 1.52)***	1.76	(1.70, 1.83)***	1.47	(1.40, 1.53)***
Education (No schooling)								
Below primary	1.38	(1.08, 1.759)*	1.34	(1.13, 1.59)**	1.27	(1.10, 1.47)**	1.37	(1.11, 1.69)**
Primary and above	2.89	(2.41, 3.466)***	2.28	(2.01, 2.58)***	2.69	(2.42, 3.00)***	3.06	(2.63, 3.57)***
Family Life Educ (No)								
Yes	2.20	(2.14, 2.275)***	1.97	(1.91, 2.02)***	2.27	(2.21, 2.34)***	2.37	(2.27, 2.47)***
Religion (Hindu)								
Muslim	0.89	(0.83, 0.946)***	0.98	(0.93, 1.04)	0.86	(0.81, 0.90)***	0.76	(0.69, 0.83)***
Others/non-religiou	1.06	(0.99, 1.132)	1.03	(0.97, 1.10)	1.18	(1.11, 1.26)***	1.01	(0.92, 1.10)
Caste/Tribes (Scheduled Castes)								
Schedules Tribes	0.93	(0.88, 0.998)*	0.92	(0.87, 0.97)**	0.97	(0.92, 1.03)	1.05	(0.96, 1.14)
Others	1.12	(1.07, 1.172)***	1.09	(1.05, 1.13)***	1.13	(1.09, 1.17)***	1.17	(1.11, 1.24)***
Wealth Index (Poor)								
Non-poor	1.55	(1.49, 1.612)***	1.33	(1.28, 1.37)***	1.61	(1.56, 1.66)***	1.56	(1.48, 1.65)***
Village contraceptive use (up to 58%)								
More than 58%	0.97	(0.93, 1.002)	0.97	(0.94, 1.00)	0.99	(0.96, 1.02)	1.28	(1.03, 1.60)*
Village road connectivity (No)								
Yes	1.47	(1.22, 1.779)***	1.19	(1.05, 1.36)**	1.30	(1.17, 1.45)***	1.07	(1.00, 1.15)*
Women's literacy at	2.08	(1.54, 2.792)***	1.35	(0.98, 1.85)	3.29	(2.34, 4.62)***	2.80	(1.91, 4.12)***
Interactions (Only significant ones)[a]								
Schooling * Road								
Below primary & c	1.12	(1.01, 1.24)*	1.15	(1.07, 1.25)***	1.10	(1.03, 1.18)**		
Primary and above	2.04	(1.89, 2.19)***	1.85	(1.75, 1.95)***	2.20	(2.09, 2.31)***		
Schooling * Contraceptive use								
Below primary & more than 58%							1.00	(0.78, 1.28)
Primary and above & more than 58%							2.33	(1.97, 2.75)***
Variance (SE)								
State	0.130	(0.038)	0.266	(0.073)	0.315	(0.086)	0.191	(0.056)
District	0.134	(0.011)	0.163	(0.012)	0.194	(0.014)	0.231	(0.019)
Village	0.467	(0.015)	0.389	(0.012)	0.328	(0.012)	0.531	(0.023)

*** p<0.001, **p<0.01. *p<0.05; CI= Confidence interval; SE= Standard error; The reference categories are shown in parentheses.

[a]Interactions were also investigated between wealth and road connectivity and wealth and contraceptive use but were not significant