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Does premarital exposure to messages about family size and contraceptive methods affect contraceptive use within marriage? A study among rural Indian women

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Introduction

Contraceptive use and its determinants have long been of interest to demographers and social scientists alike. Starting with the World Fertility Surveys through recent Demographic and Health Surveys, data on this topic are widely available in most countries around the world. These data have fostered a number of studies on the trends and determinants of contraceptive use in the developed and developing world, with an almost exclusive focus on use within marriage or union in developing countries. Additional studies exploring the influence of social networks and diffusion on contraceptive use have alluded to the possible effects of exposure to these factors before marriage on subsequent behaviors (Mita and Simmons 1995, Carpenter-Yaman 1982). However, there remains a paucity of information on the role of premarital influences in shaping women's reproductive goals, and enabling more effective communication of their preferences– which, in turn, may translate into reporductive behaviors within marriage. As a result, we know little about when individuals first acquire information in adolescence, and if and how this exposure might influence the timing of contraceptive use and childbearing events later in life.

Panel data among young, married, rural women from three different demographic and socio-economic contexts of India are used to assess the association between premarital exposures to messages about family size and family planning methods and subsequent behavior – in this case contraceptive use within marriage. In assessing that association, we control for background characteristics such as education, age at marriage, marital household standard of living, and state of residence. We believe this paper will help to bridge a gap in the literature by bringing together women's experiences and exposures before marriage with behaviors after they get married; in doing so, it will apply a life-course perspective to our understanding of contraceptive use, a key dimension of fertility control.

Data and Methods

Survey Data

The present study is a fixed panel design with data from two sources: (1) the 1998-99 National Family Health Survey of India (NFHS-2) which serves as the baseline, and (2) a study conducted four years later, in 2002-03, of rural eligible women who were interviewed during NFHS-2 (hereon referred to as the Follow-up Survey or follow-up study). The NFHS-2 had a two-stage stratified sampling design in rural areas: primary sampling units (villages) were selected with probability proportional to size followed by a random selection of households within each PSU (IIPS and ORC Macro 2000a). The survey covered approximately 99 percent of the country's population; detailed information from eligible women was collected regarding their background characteristics, reproductive behavior and fertility intentions, quality of care of health services received, knowledge, use and sources of family planning methods, maternal and child health and status of women (IIPS and ORC Macro 2000a).

The aim of the Follow-up Survey was to assess the effect of the quality of care of family planning services on contraceptive adoption and fertility among rural women in Bihar (and Jharkhand)[1], Maharashtra and Tamil Nadu (IIPS and JHU 2005). The Follow-up Survey was

[1] Jharkhand was formed as a new state by separating the southern part of Bihar from the northern area on 15 December 2000, and has a population of about 26.9 million (IIPS and ORC Macro 2002). As these two states were governed by the same policies and programs until their division and during the baseline survey conducted in 1998-99), they are treated as one entity for this study and referred to as Bihar/Jharkhand in this paper.

limited to the rural areas in these states to allow comparison across varied social and cultural contexts, and because of the relative stability of rural households and limited the heterogeneity of health care service providers and institutions in these areas. Women living in rural areas in these states between the ages of 15-39 years, who completed an interview during the NFHS-2, were usual residents of the household and currently married, were interviewed during the follow-up. In Maharashtra and Tamil Nadu, only those women who had agreed to be contacted in the future at the time of the NFHS-2 study were approached for a follow-up interview. As women in Bihar/Jharkhand were not asked if they would be willing to participate in a subsequent interview at baseline, all women were approached for the follow-up.

The sample for the current study consists of rural, currently married women in the states aged 30 years or younger at the time of the Follow-up Survey who were interviewed at both points in time. The sample is restricted to younger women in order to minimize the potential bias due to poor recall of events (exposure to premarital information). The total sample of eligible women is 3,155: 61 percent are in Bihar/Jharkhand, 22 percent in Tamil Nadu and 17 percent in Maharashtra.

Setting

Socio-economic and demographic data for Bihar/Jharkhand, Maharashtra and Tamil Nadu from the state level NFHS-2 reports reflect the continuum that exists in India, and the variations between these states (IIPS and ORC Macro 2001a, 2001b, 2001c, 2001d, 2000a). On every indicator, Bihar and Jharkhand score well below or above the national level in the direction expressing more disadvantage (IIPS and ORC Macro 2001a, 2001b, 2000a). The total fertility rate among currently married women in Tamil Nadu is 2.0, followed by 2.5 in Maharashtra (IIPS and ORC Macro 2001c, 2001d). In contrast, the total fertility rate in Bihar/Jharkhand is 3.9, higher than the national average of 2.8. Current modern method use at NFHS-2 among married women aged 15-49 is highest in Maharashtra at 60 percent, followed by Tamil Nadu (50 percent), and Bihar/Jharkhand (22 percent) (IIPS and ORC Macro 2001a, 2001c, 2001d).

Analytic Approach

Data in the tables and figures are presented by state and all states combined to highlight the variations that exist across these states in sample characteristics, levels of premarital exposure to messages on family size and family planning methods, as well as percentages reporting contraceptive use by number of living children.

Our primary interest is to determine the effect of premarital exposures to information about family size and family planning methods on first modern contraceptive method adoption by parity, net of education and context. In order to assess the risk of first adopting a contraceptive method by parity, parity (sequence of births 0 to 5+) is applied as the time scale in a discrete-time hazards model; replacing the conventional time (t) with time related to parity sequence (t_p). Our choice of a discrete-time hazards model is guided by the decision to use parity (number of living children 0 through 5+) instead of a unit of time such as weeks, months or years; thus modeling discrete periods, not a continuous time scale (Willett and Singer 1993, Allison 1984). We justify our choice of parity in lieu of a time variable because, in India, contraceptive use is more likely to be influenced by number of living children and sons, than duration of marriage (Arokiaswamy 2002, IIPS and ORC Macro 2000a, Dwivedi and Sundaram 2000, Zavier and

Padmadas 2000, Savaala 1999, Arnold et al. 1998, Rajaretnam and Deshpande 1994, Basu 1993). These studies note that, for the most part, modern method use is considered only after women have had at least one child; this is even more relevant in the case of rural women. Additionally, we do not have precise information on month or year of first temporary modern method use for women who reported such use during NFHS-2. Instead, we have information on the parity at first use for women who reported ever use of a modern method (temporary or permanent) at NFHS-2, and can extract the information from the four-year inter-survey calendar data for eligible women at follow-up. The model representing discrete-time hazards analyses is represented as follows:

$$\text{Log}\,(P(t_p)/(1-P(t_p)) = \alpha(t_p) + \beta_1 X_1$$

In our analyses, we model a single event - the probability that a woman first adopts a modern contraceptive method at parity (t_p), given that she is at risk at that parity, and is assessed by a set of time-invariant predictors (X_1) and different constants for each level of parity, represented by $\alpha(t_p)$ (Allison 1984). We expect that contraceptive adoption will increase as parity increases and women achieve their family size, and therefore include dummy variables to account for the expected change in the hazard of use by parity level.

All women enter the set at the same time – that is, currently married and at parity zero – and are observed until the Follow-up Survey. As they move to the next parity they either experience the event (adopt a modern contraceptive method) or move to the next parity, if they have not used a modern method at that parity and have another living child. Women are censored at the parity they have reached if they do not have another child at the time of the Follow-up Survey, nor use a modern method by that time. Hence, at any given parity, a woman either experiences the event (adopts a modern method) or goes on to have another child and moves to the next parity, or is censored at that parity if she experiences neither the event nor a subsequent birth.

The models are adjusted for clustering at the village level, as well as weighted. Additionally, we specify a complementary log-log transformation which allows us to interpret the antilogged coefficient as a hazards ratio (Singer and Willett 2003, Carlin et al. 1999). The inclusion of dummy variables representing parity in the model allows us to assess the probability of first adopting a modern method at each parity level. The independent variables in our model are time invariant; our primary interest is to assess the hazard of first adopting a contraceptive method by premarital exposure to family size and family planning methods, at each parity level, adjusting for background characteristics.

Due to sample size limitations we are unable to stratify our analyses by state. Our results are presented for the combined sample of all states, and we use a dummy variable for state in the final, adjusted models. Observations from Bihar and Jharkhand are combined into a single entity for all analyses. We combine these two states because they were one state, Bihar, until their division in 2000, well after women had been married for at least two or more years. Thus women in these two states were subject to policies and programs governed by that one state. Interaction terms between the independent variable of interest and background characteristics were assessed to determine whether levels of exposure differ by specific characteristics and by state. Analyses were conducted using STATA SE v8.0 (StataCorp 2003).

Dataset for Discrete-time Hazard Analyses

Using the information from the two datasets (baseline and follow-up), we created a variable that serves as the time variable (in this case, parity on a scale from 0 to 5+) (StataCorp 2003). This time variable reflects the number of living children at the time of first adoption of a modern method for those women who reported ever use, as well as the number of living children at follow-up for women who reported never using a modern method up to that time. In addition, we also created an event variable to represent women who reported using a modern method by the follow-up interview (coded as 1) and those who did not (coded as 0) (StataCorp 2003).

These two variables (time and event) along with the unique case identification number of individual women were then used to convert our data set into one that allows us to conduct discrete-time hazard analyses using the 'prsnperd' command in STATA (StataCorp 2003). This command exchanges a single woman's observation in the original dataset into a person-period dataset – in this case the number of observations is equal to the woman's parity at first use or if never used, then her parity at the time of the Follow-up Survey (StataCorp 2003, Allison 1984). In so doing, the program also creates dummy variables representing parity, and an outcome variable representing whether the event occurred (0=no contraceptive use and 1= contraceptive use), as well as accounts for women who are censored at their current parity at follow-up if they did not adopt a modern method during this time.

Measurement of Independent Variables

Assessment of premarital exposures

During the Follow-up Survey women were asked about their exposure to family planning messages before marriage –specifically whether they had seen, heard or discussed reproductive and sexual health issues such as sexual relations, family composition and size, and family planning methods. Women also reported with whom or where this information was made available to them, and whether they knew of a family member's or neighbor's use of a contraceptive method. Binary variables were created to represent whether women had heard, discussed or saw information on each issue (menstruation, sexual relations, benefits of a small family, number of children to have, and methods for family planning) relative to each of the four sources: friends, family members, media and family planning/ health worker.

The inter-item reliability of the observed variables representing the sources and dimensions of premarital exposure to family size and contraceptive information was high for all 12 variables (3 messages by 4 sources) with a Cronbach's alpha of 0.75, and for the nine variables (not including exposure from a family planning worker) the coefficient is 0.76. We further subdivided the variables as they represent both sources of information and types of messages to determine if these are different from the overall measure. The reliability coefficient for indices created by specific messages- that is, benefits of a small family, number of children to have and family planning methods – was relatively low (Cronbach's alpha 0.40 for each). However, reliability was high for indices created by source: premarital exposure via media, friends and family (Cronbach's alpha 0.79, 0.73 and 0.74, respectively).

We conducted principal components analyses for the set of variables related to each of the sources separately in order to get a weighted, linear combination of these same variables

(Fabriger et al. 1999). Exposure via family planning workers was not included because only a small proportion of women in each state cited family planning workers as a source for premarital information on these issues (an exception was 12 percent in Tamil Nadu on family planning methods). Further, separate analyses including this variable did not add to the information and were not significant in the final models (not shown).

For analyses of the all-state combined sample, first factors extracted from each of the three principal component analyses conducted by source accounted for significant variation in the data: 71 percent for exposure via media and 66 percent for exposure via either family or friends; each had eigenvalues greater than 1. These three factors representing premarital exposure to the three messages (benefits of a small family, number of children to have and family planning methods) via the media, friends and family have a low correlation with each other (less than 0.35) and are therefore, retained as continuous independent variables in models to predict the hazard of first adopting of a modern contraceptive method by parity.

Other background variables

The background variables of interest reflect the conceptual framework, and follow a woman's life-course identifying both premarital (as a proxy for her family), age at marriage and marital characteristics. Individual background variables for women, such as their educational levels, religion, caste and age at marriage are included in the models as categorical variables. Age at marriage is a binary variable, differentiating women married before 18 years from those married at 18 years or older, as 18 is the legal age of marriage for women in India. A three-level categorical variable was created to represent women who are illiterate, those who are literate or have a middle school education (7 years of schooling), and those who have completed middle school or higher education. Following the NFHS-2 definition, women who reported no schooling or up to five years of schooling but who could not read and write were categorized as illiterate (IIPS and ORC Macro 2001a, 2001b, 2001c, 2001d, 2000a).

For marital characteristics, we include household standard of living index constructed by an assessment of the household structure and ownership of land and goods at baseline (NFHS-2). We use a summary measure of the index in our analyses comprising of three categories– low, medium and high– as developed and included in the NFHS-2 data set. (For details on the construction of the household standard of living index and summary measure see IIPS and ORG Macro 2001a). We chose household standard of living over husband's education as the latter has a high correlation with woman's education. These background variables are included in our models based on our conceptual framework and to control for factors that have in the literature been demonstrated to influence fertility and family formation decisions. We justify the use of categorical variables over continuous variables not only for ease of interpretation but to account for the poor levels of numeric literacy in the population; we therefore reduce the potential for error in reporting education and age in absolute years. Similar models assessed using relevant predictors as continuous variables did not significantly change the results or interpretation (results not shown). Additionally, whether a woman ever experienced the death of a child is also considered. State of residence and timing of a family planning worker's visit are also included in the model to account for context and availability of health services.

Results

The data underscore the significant differences across background characteristics between Tamil Nadu and Maharashtra in the south and the northern state, Bihar/Jharkhand (Table 1). Women in Tamil Nadu have a higher standard of living, a higher level of education – as do their husbands – a higher age at marriage and fewer children than women in Bihar/Jharkhand. With the exception of Tamil Nadu, three in four women in each state were married before 18 years, the legal age of marriage in India. About 44 percent of the women in Tamil Nadu were married before this age which, while less than in other states, is still a substantial proportion. Women with two or more children ever born comprise about 84 percent of women in this sample. About a third of women in Bihar/Jharkhand reported giving birth to 4 or more children; in Maharashtra over a fifth of women so reported compared to one in ten in Tamil Nadu.

The majority of households in all the states had a low standard of living; roughly fewer than a tenth of households had a high standard of living, in Maharashtra this figure was about 13 percent. While visits by female workers are almost universal in Tamil Nadu (96 percent), only one in ten women reported being visited by a female health/family planning worker in Bihar/Jhakhand. In contrast, high proportions of women in all states had visited a private health facility. However, the percent of women who visited a government facility in Maharashtra and Tamil Nadu is twice that of Bihar/Jharkhand. Additionally, there is substantial variation in reports of weekly media access across states, although more so for reports of television viewing than listening to the radio.

Women in Tamil Nadu reported almost universal exposure before marriage to each of the three messages (Figure 1); in contrast, between 18-40 percent and 40-50 percent of women in Bihar/Jharkhand and Maharashtra, respectively, reported such exposure. Women in Bihar/Jharkhand are equally likely to report exposure to information about the benefits of a small family and family planning methods (about 40 percent) but much less so about the number of children to have (18 percent). While differences in premarital exposure are less pronounced between Bihar/Jharkhand and Maharashtra across messages, the exception to this is exposure to messages on the number of children to have. An overwhelming proportion of women in each state who reported exposure to family planning methods before marriage indicated knowledge of female sterilization over any other method (Figure 2). Of note is the low proportion of women in Tamil Nadu who reported premarital exposure to modern temporary methods, compared to women in the other states (Figure 2).

In Figures 3-5 we present data on the percent of all women who reported premarital exposures to each of the three messages by the source of that information at the state level as well as overall. On information related to family size (Figures 3-4) and family planning methods (Figure 5), family members are the key sources of information in all states. Additionally, friends are also an important source of premarital information on family size in all states. Women in the more developed states of Maharashtra and Tamil Nadu are as likely to cite media as they are friends as a source of premarital information. In contrast, this is not the case for women in Bihar/Jharkhand. And finally, the limited role of the family planning worker as a source of premarital information is evident from the data. Overall we note low exposure before marriage by any source in Bihar/Jharkhand compared to universal exposure in Tamil Nadu.

Reports of current modern contraceptive method use are higher in Maharashtra (71 percent) than in Tamil Nadu (58 percent), and over three fold higher than in Bihar/Jharkhand (about 18 percent) (Table 1). We note that a larger proportion of women in Maharashtra reported temporary modern contraceptive method use compared to women from other states (Figure 6). And almost twice as many women in Mahashtra and Tamil Nadu reported sterilization as the method first used compared to those who reported temporary method use in these states (Figure 6). Women in Bihar/ Jharkhand consistently reported low levels of first use of either type of method, temporary or permanent, compared to the other two states, and this pattern is further reflected in reports of first modern method use by parity at the state level. We note that significantly higher proportions of women at each parity reported first modern method use in Maharashtra compared to women in Bihar/Jharkhand and in Tamil Nadu (Figure 7). In Bihar/Jharkhand almost equal proportions of women at parity 0 and parity 1 (about 20 percent) reported adopting a modern method, and only about 27 percent of women at parity 2 so reported (Figure 7). In Tamil Nadu, however, while about 5 percent of women with no children reported adopting a modern method at that parity, this proportion increases to about 48 percent among those with 1 child, and to 66 percent for those with 2 children. While equal proportions of women at parity 3 in both Maharashtra and Tamil Nadu, about 86 percent, reported first modern method use at that parity, only about 32 percent of women at the same parity reported use in Bihar/ Jharkhand.

Contraceptive Use by Parity

Figure 8a represents the cumulative probability of adopting a modern contraceptive method at each parity level for the combined sample. We see that the probability increases with parity, and there is a significant increase in the probability of use at parity 2 compared to parity 1, and a more substantial increase in the probability of adoption at parity 3 compared to parities 1 and 2. We present the cumulative probability of modern method adoption at each parity level by state in Figure 8b. We see here that there is no difference in the probability of adoption by state at parity zero and a marginal difference at parity 1 between women in Bihar/Jharkhand and those in Maharashtra and Tamil Nadu. However, there are significant differences in the probability of contraceptive adoption by state at parity 2 and higher; women in the southern states of Maharashtra and Tamil Nadu have a higher probability of modern method adoption at parity 2 or higher parity compared to women in Bihar/Jharkhand. The significant increase (over double) in the probability of adoption at parity 2, compared to parity 1, within each of these southern states represents the norm of the two-child family in these states. In Bihar/Jharkhand the probability of contraceptive adoption increases almost two-fold from parity 2 to parity 3 and four-fold from parity 2 to parity 4.

Contraceptive Use by Parity and Premarital Exposure

The percent distribution of women using a modern contraceptive method by parity and exposure status to each of the three messages for all states is presented in Table 2. Overall, a higher proportion of women who were exposed to each of the three messages before marriage reported using a modern method at some point during the observation period (marriage/parity 0 until the Follow-up Survey) compared to women who were not exposed. For example, 51 percent of women exposed to benefits of a small family reported modern method use compared to only 33

percent of those who were not exposed. We note similar differences in overall modern method use by premarital exposure to number of children to have (58 percent among exposed compared to 32 percent among unexposed) and family planning methods (50 percent among exposed compared to 35 percent among unexposed).

While there is no difference in contraceptive use at parity 0 by premarital exposure to any of the three messages, there are differences in the proportion of women who reported modern method use by exposure at parity 1 through parity 5+. The proportion of women using a modern method regardless of exposure to messages before marriage peaks at parity 3, however, the proportion of women who reported using a method is higher at each parity level for those who reported premarital exposure to each of the three messages compared to those who reported no exposure.

Multivariate Analyses

The main purpose of our analysis is to determine whether premarital exposures to messages on family size and family planning methods affect the probability of first adoption of a modern method at every parity level, controlling for background factors. Hazard ratios comparing modern method use to no use at each level of parity by premarital background characteristics, exposures to information before marriage, marital characteristics, and context are presented in Table 3. Our model building approach for the multivariate analyses draws from our theoretical framework, and represents different stages of a woman's life: Model 1 includes premarital variables other than exposures to messages; Models 2 and 3 show the effects of exposure before marriage on contraceptive adoption by parity adjusted for premarital background characteristics including premarital exposure and age at marriage, respectively. Models 4 and 5 present hazard ratios by premarital and marital characteristics and experiences, and context. Because dummy variables are included for parity in our models, the resultant hazard ratios represent the probability of adopting a modern method at each parity level.

In Model 1, women who are literate or have a higher education compared to those who are illiterate have a higher probability of adopting a modern contraceptive method. And those of the majority religion (Hindu) compared to non Hindus are also more likely to adopt a method at each parity. At every parity level, women who were exposed to information about family size and contraceptive methods via media or from family before marriage have a higher likelihood of adopting a modern method than those who were not exposed, (HR=1.1, $p<0.001$) (Model 2). The likelihood of contraceptive adoption among women who reported premarital exposures to information from friends compared to those who were not exposed is not significantly different.

The effects of premarital exposure via the three sources on the probability of first modern method adoption retain the magnitude of their effects with the inclusion of age at marriage (Table 3, Model 3). Women who were married at 18 years or older are more likely to adopt a method at a given parity level compared to those were married at a younger age (HR= 1.47, $p<0.001$). Interaction terms to test whether the hazard changes for age at marriage by levels of exposure did not yield significant results. Household standard of living and whether the woman experienced the death of a child also exhibit a significant effect on the likelihood of contraceptive adoption. Specifically, women with a medium or higher household standard of living are more likely to adopt a method at each parity compared to those with a lower living

standard (HR=1.33 and HR=1.91, $p<0.001$, respectively), while women who experienced the death of a child during the inter-survey period are less likely to do so (HR= 0.82, $p<0.05$).

The effect of the state of residence on modern method use is of interest, both in terms of its magnitude and strength of association as well as its moderating influence on other background characteristics (Table 3, Model 5). At every parity, the probability of adoption of a modern method among women from Maharashtra and from Tamil Nadu is greater than for women from Bihar/Jharkhand (HR=3.56 and HR=3.62, $p<0.001$, respectively). State moderates the influence of all background variables as well as premarital exposure. State of residence exerts a stronger moderating influence on contraceptive use for women with premarital exposure from family members than from media. While premarital exposure via media retains a positive and significant association with contraceptive use, premarital exposure via family is no longer significant, controlling for background characteristics and context (Model 5). Family planning workers' visit is not included in the final model because the state of residence mediates the relationship between that timing of worker visit and contraceptive use (not shown). None of the interaction terms we tested, (background characteristics by exposure status and by state) were significant in the final model.

Discussion and Conclusion

In this paper, we highlight varying levels of premarital exposure to family size and family planning messages among rural women in diverse contexts of India. We note the significant influence of premarital exposure to messages about family size and family planning methods from various sources on contraceptive adoption within marriage at each parity level. Our analysis also draws attention to the important moderating influence of state of residence on the relationship between background characteristics and premarital exposures, and increased modern method use among rural women. The results clearly indicate that premarital exposure to family formation messages has a significant effect on contraceptive use in marriage in this sample, and highlight the importance of including them in marital models. These findings support exploring how early in their lives women and men are exposed to these ideas, and how and under what circumstances information acquired at an earlier age shapes future action. While our analyses of messages are restricted given the limits of the data, our results highlight promising possibilities for undertaking in depth and focused research in this area.

Results indicate that the effect of these exposures on contraceptive adoption by parity varies by context, and is more pronounced at parity 2 and 3 –a finding that has been documented in previous research in this context, as women rarely use a modern method before their first live birth (Savaala 1999, Dwivedi and Sundaram 2000, Arokiaswamy 2002). Additionally, our finding of modern method use at parity two or higher is not unexpected given that the majority of first modern contraceptive use in our sample is female sterilization. As a result, we find that the effect of premarital exposure to messages on method use appears to be directed more at limitation than at the postponement or spacing of children. Maharashtra is an exception, where significant proportions of women reported using a modern method at parity 0 and parity 1 regardless of exposure status. Unfortunately, the sample size inhibits our ability to explore the differential effects of exposures on contraceptive use stratified by state as well as by type of modern method used (temporary versus permanent).

There is clear evidence of the significant and strong influence that state of residence exhibits on contraceptive adoption by parity, indicating the varying experiences and pathways through which the small family ideal and fertility limitation issues are operationalized in different settings beyond the traditional factors such educational level and age at marriage. Given what we have learned so far from our results, we believe it would be promising to use data from Indian states that are at different stages of the fertility transition and those with a higher rate of temporary method use that might shed light on differing characteristics and exposures of women who first use a temporary versus a permanent method. We might gain some understanding from this type of analysis on how to better target interventions in specific states in order to encourage and support the small family norm, as well as promote delaying and spacing of births through the use of modern temporary contraceptive methods. In fact, the difference in contraceptive use by exposure and parity, and by state provides added justification for an increased focus on promoting the small family norm and contraceptive use among young women and men well before they are married.

Clearly, our findings have implications for program and policy, highlighting, first and foremost, that delaying age at marriage through legislation is not enough; about 50 percent of women in our sample married before 18 years. And, despite over 50 years of family planning programs and increasing use of media to disburse messages, a significant proportion of women in Bihar, Jharkhand and Mahrashtra continue to report no exposure to these messages before marriage.
Our results support the need for interventions at multiple levels: foremost to provide information to men and women before marriage and not just once they get married. As Miller (1992) and others suggest, early adolescence is a time when personalities and ideas are shaped; exposing young people to these issues before marriage and early in life might be more effective in the long run (Bablola and Vondrasek 2005, Casterline 2001, Kincaid 2000, et al, Bongaarts and Watkins 1996, Miller 1992). Additionally, the limited use of contraceptive methods for delaying first births and spacing subsequent ones revealed in our findings are well-documented in the literature on contraceptive use and fertility in India (IIPS and ORC Macro 2000a and 2000b, Zavier and Padmadas 2000, Saavala 1999, Rajaretnam and Deshpande 1994). From a research perspective, our results highlight an innovative way of exploring the determinants of contraceptive use in various settings, and advocates for policies and programs to follow a life course approach.

There are some limitations to the study, specifically the time of assessment of premarital exposure. Ideally, we would have liked to have some record of exposure to sexual and reproductive health information before marriage at that time or stage in a person's life to avoid recall bias. In fact, this information was collected among women who had been married for an average of about 10 years (at follow-up). However, by linking our questions to a significant event (marriage) in a woman's life as well as to specific issues, we believe that we are able to attenuate some of the potential recall bias. An additional limitation of the study is the lack of information on the content and depth of messages on sexual and reproductive health information before marriage to which women are exposed. Therefore, we are unable to account for the intensity of exposure to messages which would provide a more nuanced understanding of how information is transmitted and retained over time (Bablola and Vondrasek 2005, McNay et al. 2003).

We are also unable to assess the effects of childhood context such as parent's education level and specific childhood contextual factors, as we did not have data for these variables. However, we believe a woman's education level is strongly influenced by that of her parents', and this relationship has been documented in other studies conducted in similar contexts (Tambashe and Shapiro 1990). And as women tend to live and marry close to their maternal homes, we believe that state does to a considerable extent account for the childhood context as well. Finally, due to limited numbers, our data do not lend themselves to a stratified analyses by state or by method at first use (temporary versus permanent), which would provide a deeper understanding of the process of family formation in different settings. However, our findings provide evidence that exposure to information about family size and family planning methods before marriage does influence use of a modern contraceptive method in marriage, and, in so doing, highlights the importance of considering a life-course approach in exploring the determinants of fertility and other behaviors related to sexual and reproductive health.

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Figure 1. Percent of rural, married women age 30 years or younger who reported exposure to family size and family planning information before marriage, by state

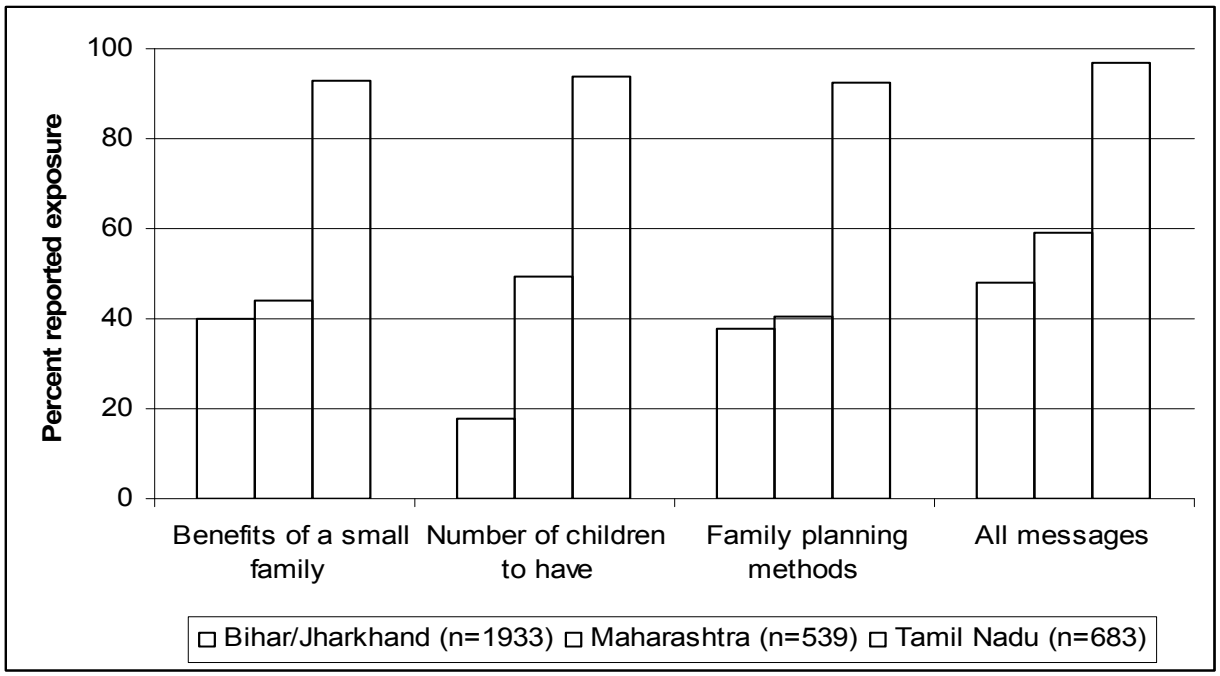

Figure 2. Percent distribution of rural, married women age 30 years or younger who reported exposure to information about family planning methods before marriage by each method, by state

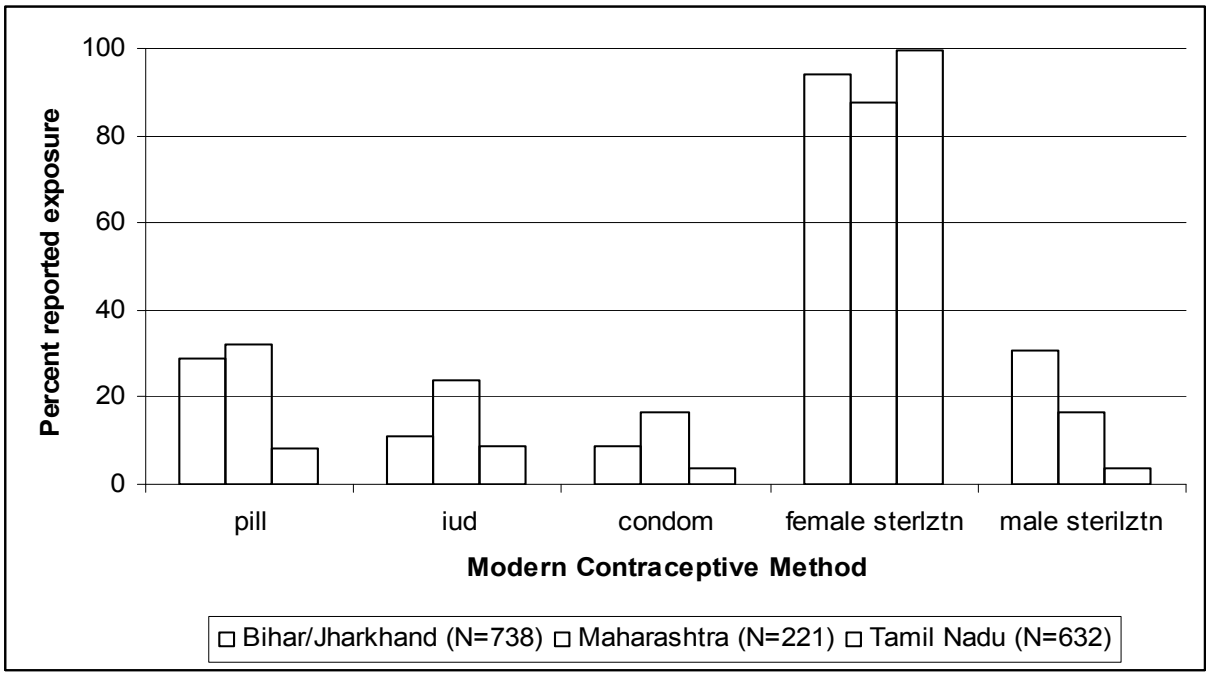

Figure 3. Percent distribution of rural, married women age 30 years or younger by exposure to information about benefits of a small family before marriage, source and by state

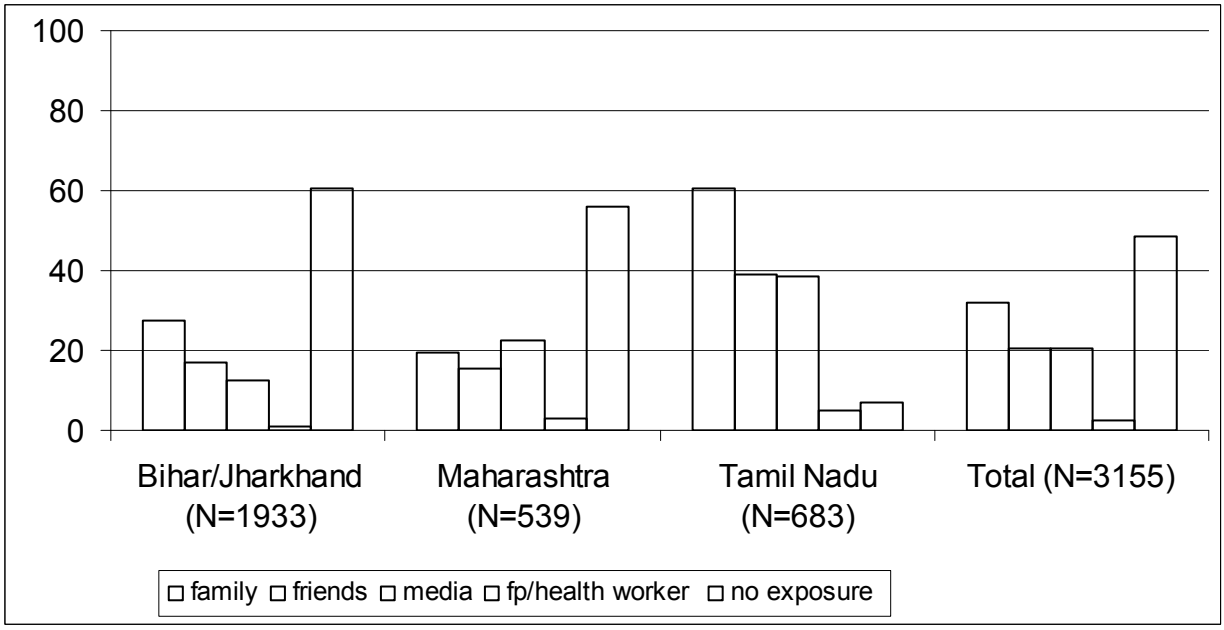

Figure 4. Percent distribution of rural, married women age 30 years or younger by exposure to information about number of children to have before marriage by source and by state

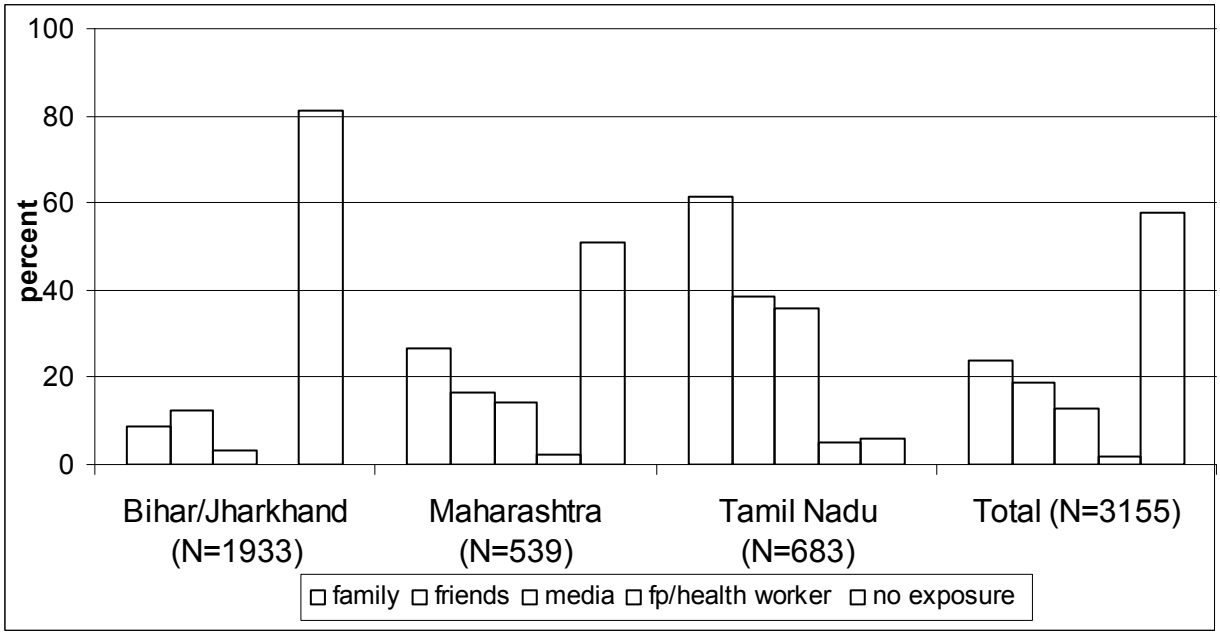

Figure 5. Percent distribution of rural, married women age 30 years or younger by exposure to information about family planning methods before marriage by source and by state

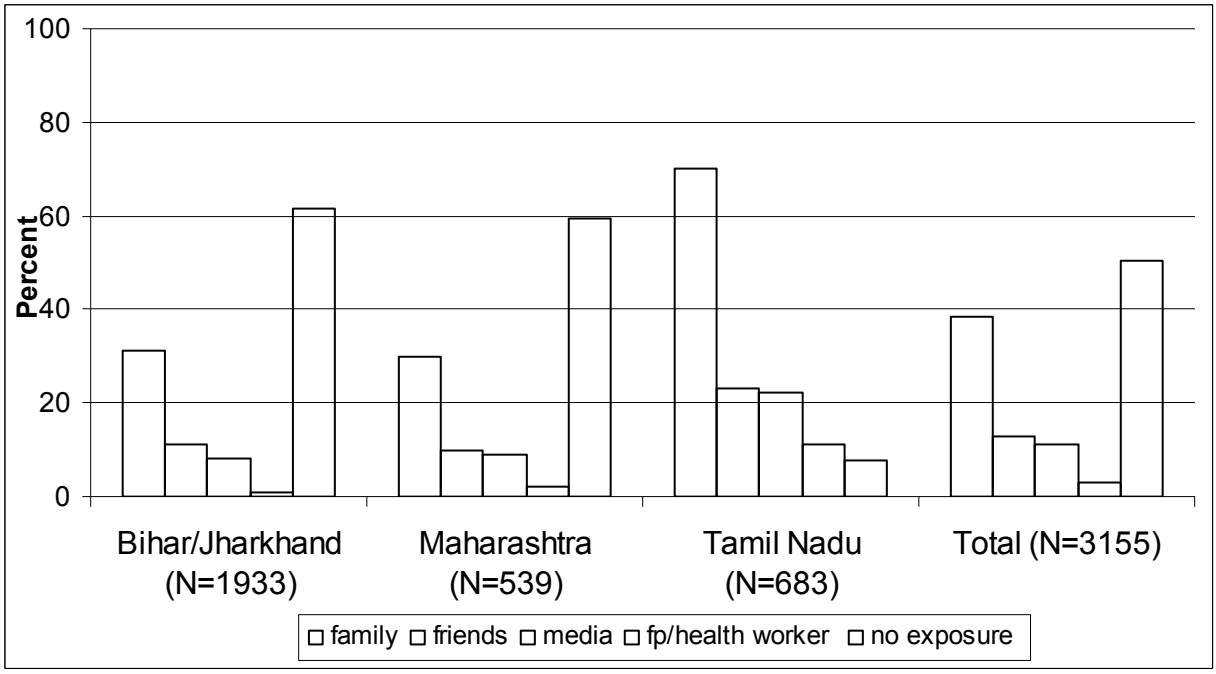

Figure 6. Percent of rural, married women age 30 years or younger who reported first contraceptive use by method, by state

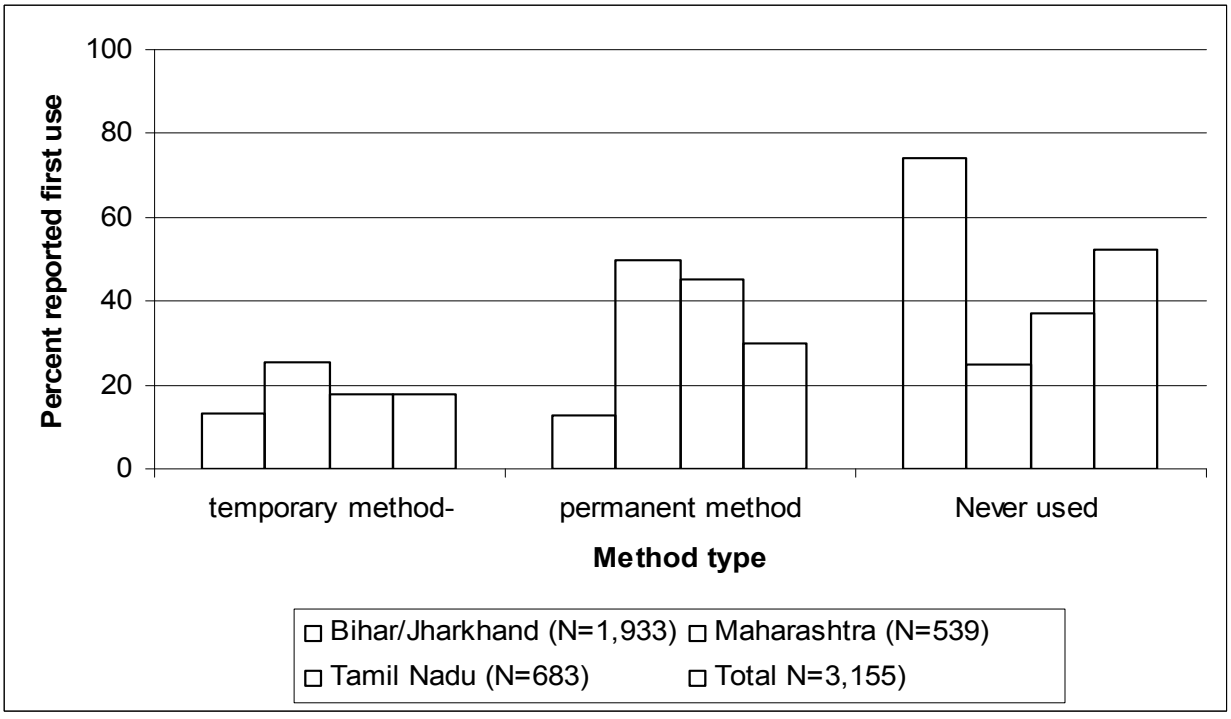

Figure 7. Percent distribution of women 30 years or younger at each parity who reported first modern method use by that parity, by state and overall

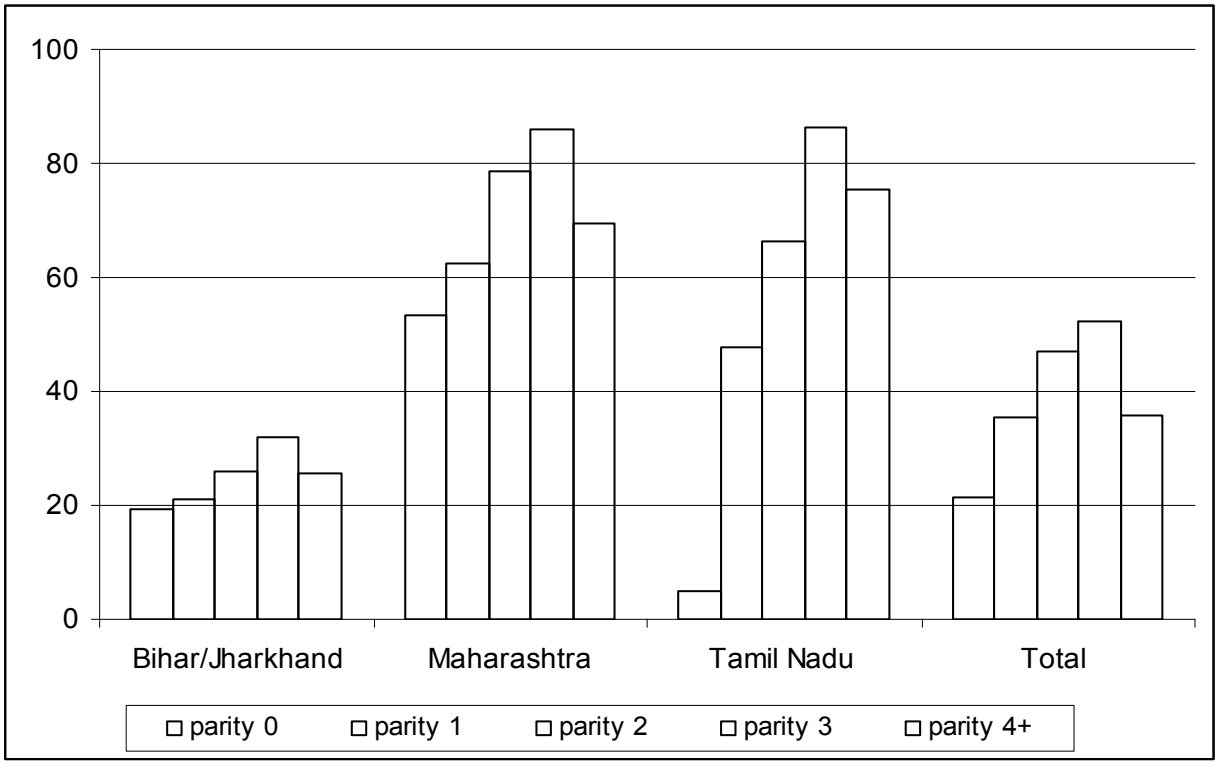

Figure 8a. Cumulative probability of adopting modern contraception at each parity level, all states.

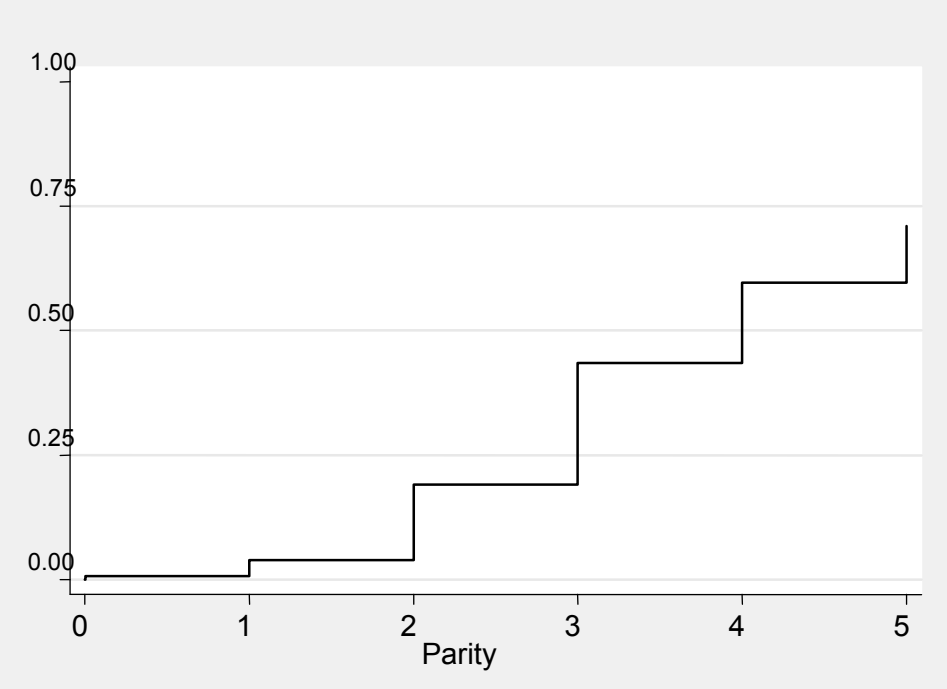

Figure 8b. Cumulative probability of adopting modern contraception at each parity level, by state.

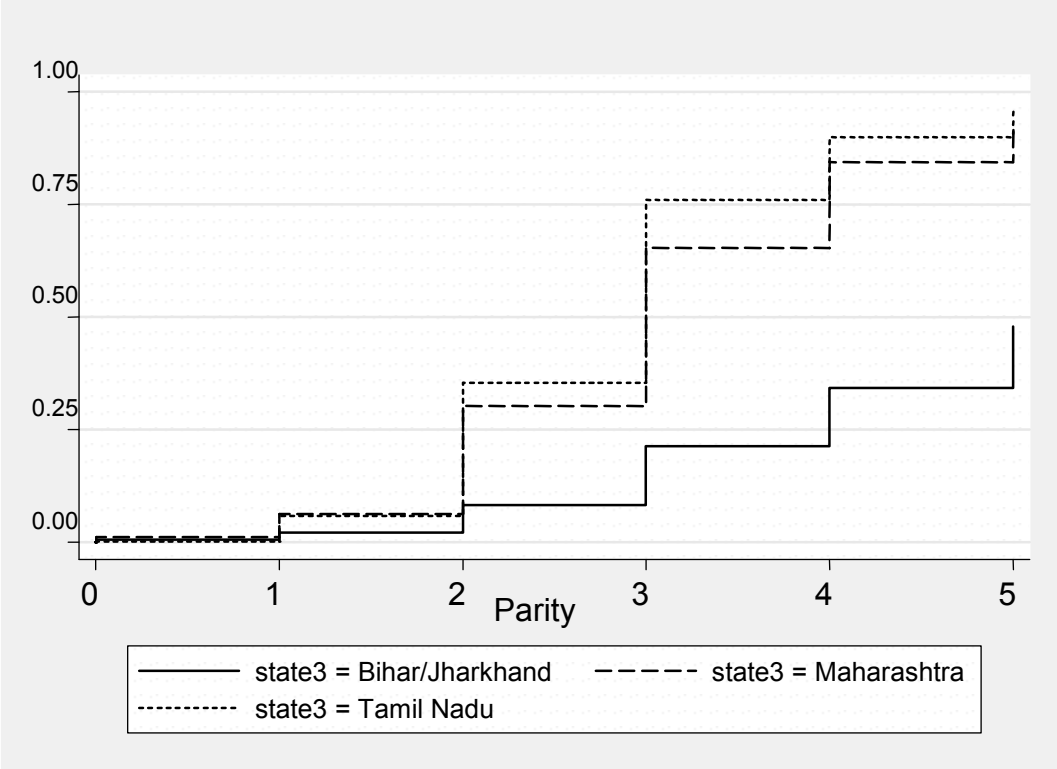

Table 1. Percent distribution of married, rural women 30 years or younger in 2002-03 by select background characteristics and exposure to family size and family planning messages before marriage, by state (N=3,155)

Characteristics	Bihar/ Jharkhand	Maharashtra	Tamil Nadu	Total
Woman's education				
Illiterate	**75.2**	**51.6**	**50.1**	**63.5**
Literate – middle school	**13.8**	**24.7**	**18.1**	**17.8**
Middle school complete or higher	**11.0**	**23.7**	**31.8**	**18.8**
Age at marriage				
12 – 17 years	**75.7**	**74.6**	**44.1**	**68.8**
18 – 25 years	**24.3**	**25.4**	**55.9**	**31.2**
Husband's education				
Illiterate	**43.1**	**25.9**	**30.1**	**35.6**
Literate – middle school	**20.2**	**28.5**	**28.7**	**24.2**
Middle school complete or higher	**36.7**	**45.6**	**41.2**	**40.2**
Caste				
Other	**15.0**	**55.7**	**0.2**	**23.8**
Scheduled caste/ scheduled tribe	**32.9**	**22.7**	**28.8**	**29.2**
Other backward castes	**52.1**	**21.6**	**71.0**	**47.0**
Religion				
Hindu	**84.6**	**90.7**	**93.9**	**88.2**
Other	**15.4**	**9.3**	**6.1**	**11.8**
Children ever born				
0-1	**17.5**	**11.1**	**20.3**	**16.2**
2	**23.1**	**32.9**	**42.9**	**29.8**
3	**25.8**	**32.6**	**25.4**	**27.7**
4+	**33.6**	**23.4**	**11.4**	**26.3**
Current use of modern contraception				
Temporary method	**3.4**	**5.3**	**2.9**	**3.9**
Permanent method	**14.7**	**65.4**	**54.7**	**37.1**
Not using (includes currently pregnant)	**81.9**	**29.3**	**42.4**	**59.0**
Standard of living index summary				
Low	**58.6**	**45.6**	**46.3**	**52.5**
Medium	**34.9**	**41.5**	**45.8**	**38.9**
High	**6.5**	**12.9**	**7.9**	**8.6**
Media access at least once a week				
Radio	**45.6**	**52.0**	**60.1**	**50.2**
Television	**23.9**	**67.1**	**85.2**	**48.3**
Visit by family planning worker				
Before first birth	**2.4**	**35.9**	**78.2**	**26.8**
After first birth	**8.7**	**30.6**	**18.1**	**16.8**
Never visited	**88.9**	**33.5**	**3.7**	**56.4**
Health Facility visit				
Ever visited government health facility	**41.3**	**88.1**	**95.5**	**65.4**
Ever visited private health facility	**87.1**	**97.2**	**99.3**	**92.4**
Number of women	**1,933**	**539**	**683**	**3155**

All analysis weighted; numbers presented are not weighted
Note: assessment of factors at follow-up survey unless otherwise noted

Table 2. Percentage of currently married, rural women aged 30 years or less who reported first use of a modern method by number of living children by premarital exposure to information about family size and family planning methods, all states (N)

Number of living children	Benefits of a small family			Number of children to have			Family planning methods		
	Not exposed	*Exposed*	*Total*	*Not exposed*	*Exposed*	*Total*	*Not exposed*	*Exposed*	*Total*
0	20.7 (111)	21.9 (105)	21.3 (216)	22.0 (132)	20.2 (84)	21.3 (216)	22.8 (114)	19.6 (102)	21.3 (216)
1	21.1 (232)	44.2 (369)	35.3 (601)	21.0 (304)	49.8 (297)	35.3 (601)	25.5 (247)	42.1 (354)	35.3 (601)
2	35.1 (436)	56.1 (565)	47.0 (1001)	32.6 (527)	62.9 (474)	47.0 (1001)	36.0 (458)	56.2 (543)	47.0 (1001)
3	43.4 (417)	62.1 (388)	52.4 (805)	41.5 (518)	72.1 (287)	52.4 (805)	44.1 (419)	61.4 (386)	52.4 (805)
4	34.2 (205)	50.0 (146)	40.7 (351)	34.4 (262)	59.6 (89)	40.7 (351)	37.6 (210)	45.4 (141)	40.7 (351)
5+	22.6 (115)	31.8 (66)	26.0 (181)	23.3 (146)	37.1 (35)	26.0 (181)	22.4 (116)	32.3 (65)	26.0 (181)
Total (N)	33.1 (1,516)	51.1 (1,639)	42.5 (3,155)	32.0 (1,889)	58.1 (1,266)	42.5 (3,155)	34.8 (1,564)	50.0 (1,591)	42.5 (3,155)

Table 3. Hazard ratios (and 95% confidence intervals) of the effects of premarital exposure to reproductive and sexual health information and background characteristics on modern contraceptive use at every parity among married, rural women 30 years or younger in 2002-03

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Premarital Characteristics					
Woman's Education **(completed years)**					
Illiterate (ref)					
Literate – middle school	**1.78 (1.53-2.08)*** **	**1.61 (1.38-1.89)*** **	**1.56 (1.34-1.81)*** **	**1.42 (1.23-1.65)*** **	**1.26 (1.06-1.50)** **
Middle school complete+	**2.98 (2.53-3.50)*** **	**2.20 (1.82-2.66)*** **	**1.96 (1.62-2.37)*** **	**1.68 (1.39-2.03)*** **	**1.60 (1.33-1.94)*** **
Religion					
Hindu (ref)					
Other	**0.57 (0.44-0.74)*** **	**0.60 (0.47-0.78)*** **	**0.59 (0.46-0.76)*** **	**0.61 (0.48-0.79)*** **	**0.75 (0.60-0.93)***
Caste					
Other (ref)					
Scheduled Caste/ Scheduled Tribe	**0.48 (0.40-0.59)*** **	**0.48 (0.39-0.58)*** **	**0.46 (0.38-0.56)*** **	**0.51 (0.42-0.62)*** **	**0.62 (0.50-0.77)*** **
Other backward Class	**0.64 (0.55-0.75)*** **	**0.60 (0.51-0.70)*** **	**0.57 (0.49-0.67)*** **	**0.59 (0.50-0.70)*** **	**0.78 (0.63-0.96)***
Premarital Exposure¥					
Exposure via media		**1.12 (1.08-1.17)*** **	**1.12 (1.07-1.17)*** **	**1.11(1.07-1.16)*** **	**1.07 (1.02-1.12)** **
Exposure through friends		**1.04 (1.00-1.08)**	**1.03 (1.00-1.07)**	**1.02 (1.00-1.06)**	**1.03 (1.00-1.07)**
Exposure through family		**1.12 (1.07-1.18)*** **	**1.12 (1.07-1.17)*** **	**1.11 (1.06-1.17)*** **	**1.04 (1.00-1.09)**
Age at marriage					
12-17 yrs (ref)					
18+ yrs			**1.47 (1.27-1.70)*** **	**1.43 (1.23-1.65)*** **	**1.33 (1.16-1.54)*** **
Marital Family Characteristics					
Standard of living Index					
Low (ref)					
Medium				**1.21 (1.05-1.41)***	**1.33 (1.16-1.53)*** **
High				**1.51 (1.19-1.92)** **	**1.91 (1.51-2.43)*** **
Experience death of a child					
No deaths (ref)					
One or more deaths				**0.74 (0.64-0.87)*** **	**0.82 (0.70-0.97)***
Contextual Factors					
State					
Bihar/ Jharkhand (ref)					
Maharashtra					**3.56 (2.88-4.42)*** **
Tamil Nadu					**3.62 (2.93-4.48)*** **

*** p < 0.05, ** p< 0.01, *** p<0.001. (ref) Reference category Note: analysis is weighted and adjusted for clustering at the village level**
¥ These indices created through principal components analysis.