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A Reproductive Health Communication Model That Helps Improve Young Women's Reproductive Life and Reduce Population Growth: The Case of PRACHAR from Bihar, India

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Abstract

Despite declining fertility in some states of India, early childbearing, inequity in health care utilization, and population momentum are continuing challenges that will have important consequences for fertility levels nationally, as well as for individual health and wellbeing, if not addressed. PRACHAR, a reproductive health communication model developed and tested in rural Bihar, has been found to be successful in (a) delaying age at marriage and onset of childbearing, (b) increasing contraceptive use for spacing of pregnancies, and (c) generating the most positive impact on contraceptive use among the socioeconomically least advantaged. It thus provides a model that can help reduce excess fertility among socioeconomically disadvantaged groups and help to ameliorate persistent high fertility in India. This paper presents the results of a projection exercise that estimates the impact of implementing the PRACHAR model in the reproductive health and family planning (RH/FP) programs in Bihar and Uttar Pradesh. It shows a substantial reduction in population size during 2005-25; implementing PRACHAR in just these two states could result in the national population growing by 64 million fewer people.

Introduction

India, a country with over a billion people and geographically diverse levels of social and economic development, has achieved a medium-low level of fertility. Although fertility has declined remarkably in many states, it remains at a high-medium level in others: most notably, the states of Bihar, Madhya Pradesh, Rajasthan and Uttar Pradesh (UP), collectively known as BIMARU. Persistent, high fertility in BIMARU, especially Bihar and UP, threatens the progress made to date towards reducing population growth nationally, given that BIMARU is home to over 40% of India's population.

Throughout India, multiple challenges threaten progress made in population and reproductive health (RH), even in states where fertility has declined. Early childbearing, associated with the practice of early marriage, leads to adverse RH consequences. Short pregnancy intervals contribute to chronic, high infant and child mortality rates. Inequity in the utilization of RH/FP services, particularly in the northern states, keeps contraceptive prevalence low and fertility high. Finally, the population continues to grow due to population momentum brought about by the large population of youth as they reach reproductive age.

In this article, we describe a RH communication model that can help many states in India address the above challenges. The model was developed and tested by Pathfinder International in three districts of Bihar during 2002-2008 (Daniel et al. 2008; Pathfinder International 2009). The model, known as PRACHAR, provides RH information to adolescents and young couples, their parents, in-laws, and influential community members, creating an enabling social environment conducive to innovative ideas that improve health and quality of life. (The word "PRACHAR" in Hindi means: "to let people know" or "to disseminate.") While activities facilitate improved access to RH services, the model does not require direct RH service provision. Details of interventions and evaluation methodology related to PRACHAR are described elsewhere (Daniel et al. 2008 and Wilder et al. 2005). We begin with a brief background illustrating the above challenges, then describe the PRACHAR model and show some of its impact on selected RH indicators, based on our published results and continuing data analyses. We then project the population of Bihar and UP from 2005 to 2025 to assess the potential benefits of implementing PRACHAR interventions in addition to the government RH/FP programs presently in place. The projections show that Bihar state, with a population of 91 million in 2005, can be expected to have a population of about 144 million in 2025 with existing RH/FP programs. However, if the PRACHAR model is implemented, we project that the population would be 121 million in the year 2025—23 million *fewer*, the equivalent of an Indian state the size of Punjab. Similarly, UP, with a population of 187 million in 2005, could *avoid* an addition of 41 million people by the year 2025, a population the size of Orissa, another Indian state. Currently there are efforts to scale up the PRACHAR model in Bihar. Pathfinder is also using the PRACHAR approach to address adolescent and youth reproductive and sexual health (AYRSH) in Ethiopia and Nigeria, adapting the interventions to the respective societies.

Background

Fertility patterns are similar in most Indian states where fertility has declined to low levels. In these states, women begin childbearing at early ages--often the teen years--and complete childbearing in their mid-twenties with a family size of around two, at which point most women adopt a permanent method of contraception. For example, in West Bengal, where total fertility rate (TFR: Average number of births given by a woman during her life time) has been 2.3 births per woman since 1998-99, mean age of first cohabitation is below 18, one in two women have a pregnancy or a birth before age 20, and mean age at acceptance of female sterilization is 24.5 years (IIPS 2007, 2007c). This common fertility pattern is the result of a culture of early marriage combined with a health system that favors permanent contraceptive methods primarily female sterilization. Family planning programs in India favor permanent methods, probably because these methods have high use-effectiveness and can be delivered at low cost. Policymakers have focused on reduction of the total fertility rate, regardless of the timing and spacing of pregnancies. Family planning service delivery does not give substantial attention to delaying first pregnancy or facilitating spacing between subsequent pregnancies. Consequently, short-acting methods are not promoted and knowledge of short-acting methods is limited among both providers and couples. Myths, misconceptions, and mistrust about hormonal methods, which are most appropriate for delaying and spacing, are additional barriers to their more widespread use.

Early and repeated child bearing is common in traditional, peasant societies in rural northern India, including Bihar. Now, as in the past, parents and families in many rural communities want to ensure that their children marry and begin childbearing at an early age and have several children (Dommaraju 2009), especially several sons. Large numbers of children are a response to the potential need for labor on the farm (or other traditional work) as well as anticipated deaths during childhood. Early childbearing is a means of proving fertility but also a means of ensuring that a man has not only a sufficient number of surviving sons, but that those sons reach adulthood before the father retires from work or before his death (historically, early adult death was common). Although childhood and young adult mortality is declining in India rapidly, the perception of the mortality potential is probably diminishing relatively slowly, which has implications for the continuing practice of early childbearing.

Most marriages are arranged by parents, as is the decision about when a girl or a boy will marry. Marriage age is not increasing appreciably in the northern states of India although there is an official minimal age at marriage for both girls (18 years) and boys (21 years). The 2005-06 National Family Health Survey (NFHS) data indicate that 69% and 59% of women aged 20-24 were married by age 18 in Bihar and UP, respectively (IIPS 2007). Even if marriage does take place at an early age, childbearing can still be delayed by increasing the interval between marriage and the first birth. This is possible if contraceptive use by young couples is acceptable to families and to society at large.

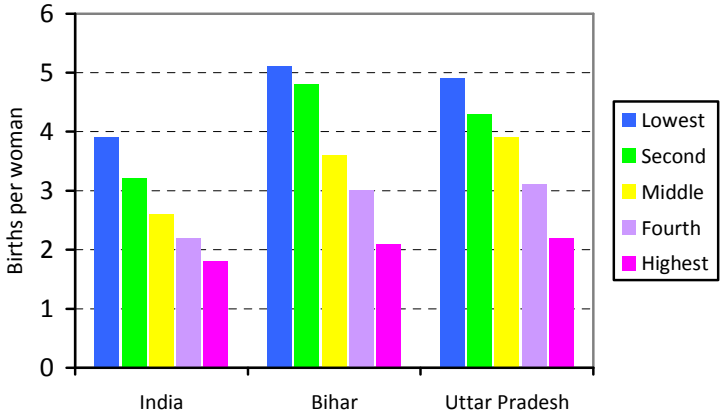
Early childbearing has social, health, and population growth consequences. Early marriage and childbearing limit women's opportunities for human capital and life skills development, with negative familial, social, and economic impact. A recent landmark study published in *The Lancet* documents the magnitude and RH consequences of child marriage

(Raj et al. 2009). A marriage is defined as *child marriage* if it occurs before the age of 18 and as *adult marriage* if it occurs afterwards. In India as a whole, about half (45%) of 20-24 year old women reported that they were married before age 18, about a quarter (23%) before age 16, and about 3% before age 13. Even when other demographic and socioeconomic characteristics remain the same between women married as children and women married as adults, those married as a child were significantly more likely to (a) not use contraception before the first pregnancy, (b) have three or more pregnancies, (c) have pregnancy intervals of less than 24 months, (d) have two or more unwanted pregnancies, and (e) have pregnancy termination, including abortion. Other studies in India and elsewhere also document that early and/or repeated childbearing is a risk factor for poor maternal and child health outcomes (Boerma and Bicego 1992; Conde-Agudelo and Belizan 2000; Conde-Agudelo and Belizan 2005; Gubhaju 1985; DaVanzo et al. 2008; Govindasamy et al. 1993; Pandey et al. 1998). Some studies show that children born at less than three-year intervals are at significantly higher risk of mortality. In India, 11 percent births occur within 17 months of the previous birth, 17 percent occur between 18 and 29 months of interval between two births, and more than 32 percent occur between 30 and 35 months. These statistics mean that 28 percent births occur within two years of interval and more than 60% of births occur within three years of each other (IIPS 2007). Widespread use of contraception appropriate for spacing can minimize the incidence of short birth intervals and thus help to improve child health.

Abortion is common in India. Despite the legalization of medical termination of pregnancy, the majority of abortions, especially in rural, northern India, are conducted in unsafe conditions. Unsafe abortion accounts for about one in 10 maternal deaths (Government of India 2003) and maternal mortality is unacceptably high in India, especially in BIMARU states—as high as 517 maternal deaths per 100,000 live births in Bihar and Jharkhand (Singh et al. 2009). Unsafe abortion also places an enormous burden on the health care system. Raj et al. 2009 showed that unwanted pregnancies, abortion and pregnancy termination among young women in India are related to child marriage and repeated pregnancies. Widespread use of spacing methods by young women could reduce the burden of unsafe abortion in India.

Socioeconomic inequalities in health care utilization are common in India, as in other developing countries, and lead to negative consequences for health and family wellbeing. In the context of fertility in India, couples of the top two wealth quintiles have already achieved the replacement-level fertility (TFR of 2.2 and 1.8), and those from the middle quintile is approaching the replacement level (TFR of 2.6) (IIPS 2007) (Figure 1). (A TFR of 2.2 births

Figure 1. Total fertility rate by wealth quintile: India, Bihar, and Uttar Pradesh, 2005-06



per woman is regarded as the replacement-level fertility in India.) Those in bottom two quintiles are far behind (TFR of 3.2 and 3.9) and as result the overall fertility level in India is still moderate. The inequity situation in the northern states like Bihar and Uttar Pradesh, for example, is worse. In these two states, women in the bottom two quintiles have 4.3 to 5.1 births, more than two times the replacement-level fertility of 2.2. Women in the top quintile have already achieved the replacement-level fertility. Fertility in the middle two quintiles is between 3.0 and 4, still a high level of fertility. All these high levels of excess fertility among the disadvantaged groups are a result of their low use of contraception (IIPS 2007, 2007a, and 2007b). The data above clearly indicate that the achievement of the replacement-level fertility in India can be accelerated by a health care service delivery structure that can facilitate an improved use of FP services by the disadvantaged groups in India in general and in the northern states in particular, where the problem is acute.

Finally and importantly, population momentum, a substantial contributor to the rapid and excess population growth in India, is strongly linked with early and repeated childbearing. The momentum effect in India can be explained as follows: because of India's recent high fertility, large numbers of young women have recently reached and will continue to reach childbearing age in the coming years, and the absolute number of births by these cohorts will be large even if the fertility rate reaches replacement level. Thus, despite the decreased level of fertility in India, population size will continue to grow for some years. The momentum effect can be lessened if age at first birth and spacing between subsequent births increase.

A World Bank study indicates that about 80% of population growth in India between 1990 and 2030 will be from growth momentum (Sanderson and Tan 1995). This implies that even if the country achieves replacement-level fertility in 2010 (2.2 births per woman), the country's total population will still increase by half a billion people by 2050. However, delaying first births and increasing spacing between first and second births can minimize the effect of population momentum. Following the model used by Bongaarts (1994) which explains the effect of delayed age at marriage, we find that PRACHAR's simple effect of increasing age at first birth by 2.5 years can lead to reduced momentum effect by about 20%.

The PRACHAR Model and its Impact on Reproductive Health

PRACHAR's mission is three-fold: Increase girls' age at marriage, delay the first birth after marriage until the age of 21, and ensure spacing of at least three years between the first and second births. PRACHAR interventions have been highly effective in significantly increasing contraceptive use both before and after a first birth among young couples in Bihar. They have also increased age at marriage and first birth. The principal vehicle of PRACHAR interventions is increased awareness, knowledge, and understanding of RH issues related to timing and spacing of pregnancies. PRACHAR's audience is unmarried adolescents, young couples, their guardians (parents and in-laws), and influential community members. Information is given to the above audiences through targeted channels but no direct services are provided. For example, adolescent girls and boys are given a three-day RH training that aims to increase knowledge and understanding of RH issues, the importance of delayed childbearing and spacing of pregnancies, and sources of services. They are also taught communication skills to negotiate with partners and guardians in order to achieve their reproductive goals. Newlywed couples are given "infotainment" parties; young married women are routinely visited by female workers who provide information on the benefits of delaying childbearing and spacing of pregnancies; and meetings are held with young married males, parents and in-laws, and influential community members. RH information is disseminated through wall paintings, street theater, posters, and leaflets. These community mobilization activities foster an enabling social environment conducive to the acceptance of innovative ideas about healthy and prosperous families, which are consistent with the marriage and pregnancy timing messages promoted by PRAHCAR.

PRACHAR has completed two phases of implementation. Phase 1, from 2002-2005, tested the full model (with all the elements of the intervention described above) in 19 blocks in Patna, Nalanda, and Nawada districts of Bihar. Phase 2, from 2005 to 2008, tested four different models, with varying elements of the interventions in an additional 10 blocks in the same districts, to find elements that produce best outcomes with minimal inputs. Phase 3 is currently scaling up the PRACHAR model in the government health system, with local NGO involvement, in an additional 10 blocks in Gaya, another district of Bihar.

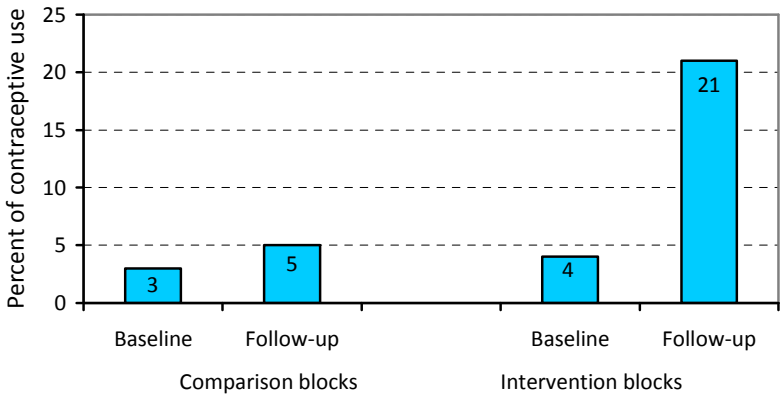
The impact of PRACHAR interventions has been assessed at both Phase 1 (2002-2005) and Phase 2 (2005-08) through baseline and follow-up surveys. Surveys of young couples (whose wives' ages are below 25) were conducted in intervention blocks and comparison blocks all in three districts of Bihar. For Phase 1, the baseline survey was conducted during 2002-03 and the follow-up was 21-27 months afterward. For Phase 2, the baseline was during early 2006 and the follow-up was about 24 months afterward. In addition, data were collected from a sample of 300 girls and 300 boys who attended a 3-day RH training course from PRACHAR as a part of Phase 1. Data collection occurred in 2008 after about five years of the training. At the same time, data were also collected from a similar number of age-comparable boys and girls from comparison blocks. This was done to assess the impact of PRACHAR on the age at marriage and first birth. Appropriate statistical methods and procedures were applied for sample selection (see Daniel et al. 2008, for Phase 1). Data analyses included comparisons of various indicators in the "before-after and intervention-comparison" framework. Logistic regression models were used to determine the

effects of interventions on demand for contraception, contraceptive use, and RH knowledge, after controlling for background characteristics of the respondents. Survival analysis and proportional hazards regression techniques were used to find the effects of interventions on age at marriage and first birth.

PRACHAR's effect on contraceptive use

As mentioned above, PRACHAR interventions were implemented in selected blocks of Bihar for a period of slightly over two years, between 2002 and 2005. Figure 2, reproduced from Daniel et al. 2008, shows that in the intervention blocks, contraceptive use increased significantly from four percent to 21% between the baseline and follow-up period while, in the comparison blocks, it only increased from three percent to five percent. Disaggregated by the number of children, contraceptive use for women with no children increased from less than four percent to 16% and that among women with one child increased from six percent to 25%. These increases, as well as increases in demand for contraception and indicators of knowledge and understanding of RH, were significantly greater in the intervention blocks than the comparison blocks (see Daniel et al. 2008 for detailed findings).

Figure 2. Contraceptive use among 15-24 years old women, by time of survey (baseline: 2002-03 and follow-up: 2004) and by area



PRACHAR's impact on delayed marriage and childbearing

As mentioned above, in late 2008, a study of 300 girls and 300 boys, selected from the list of trainees, was conducted to examine the impact of the PRACHAR RH training course for adolescents on age at marriage and age at first birth. The age of respondents was between 19 and 24 during the study. A control sample of 600 age-comparable females and males was selected for the study from the PRACHAR comparison blocks.

Results show that RH behavior among adolescent girls and boys who received training was significantly better than the comparison group. Age at marriage for trained girls was 1.5 years higher than for those girls who did not receive training (20.9 years vs. 19.4 years) (Figures 3a and 3b). For trained boys it was one year higher than comparison group (22.3

years vs. 21.3 years). Age at first birth among trained girls was 2.1 years higher than those who did not receive training (23.6 years vs. 21.5 years). Respondents who received training had significantly higher use of contraception before the first birth. The delay in first birth was thus achieved through delayed marriage and higher use of contraception by the trained respondents.

Overall, based on proportional hazards analysis results, women under 25 who received training or whose husbands received training had a 23% lower likelihood of having any birth than the comparison group. Women in Bihar, according to the current age specific fertility rate, have 2.0 births per woman before the age of 25 (IIPS 2007). The PRACHAR beneficiaries, having 23% fewer births, will thus have 1.5 births instead of 2.0, an impressive reduction in fertility among young women before they reach the age of 25.

Figure 3a. Girls' age at marriage and age at first birth, by area

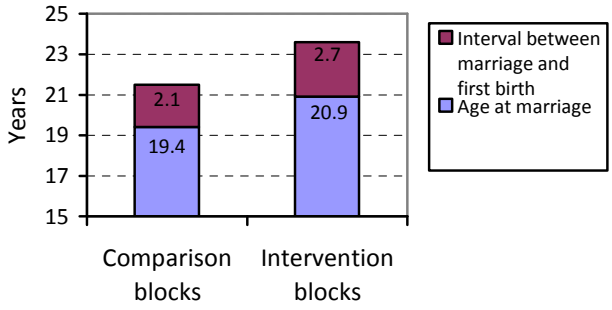
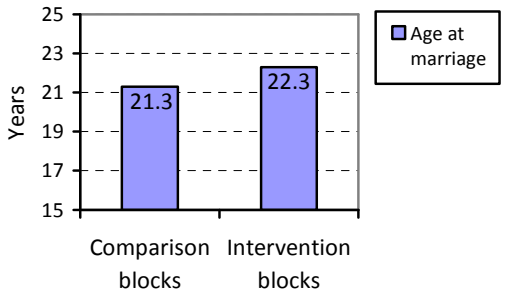


Figure 3b. Boys' age at marriage and age at first birth, by area



PRACHAR's impact on socioeconomically disadvantaged populations

PRACHAR interventions improve contraceptive service utilization for all socioeconomic groups, but the least advantaged benefit the most. We analyzed contraceptive-use data for three groups of respondents according to women's education.

Because no data on household wealth were collected in the baseline survey, we could not do the analysis for groups by wealth quintile. But education is a strong indicator of socioeconomic characteristics of people in relation to reproductive health or general health. We analyze data on women's education, collected at baseline of Phase 1 (2002-02) and follow-up of Phase 2 (2008) from the intervention and comparison areas. The respondents were divided into three groups: No education, 1-9 years of schooling, and 10 or more years of schooling. Ever-use rates of contraception are shown (Figures 4a and 4b) by education categories and by area. As expected, contraceptive use rates are positively associated with education in both areas during both baseline and follow-up surveys. In comparison areas without any interventions, contraceptive use increased slightly for groups with 1-9 years and 10 or more years of schooling between baseline and follow-up (Figure 4a). No increase is observed for the group that has no schooling. In intervention areas overall, contraceptive ever-use increased from 14% at baseline to 39% at follow-up, a 2.9 fold increase. The use increased for each education group by a percentage point between 21 and 34. The use increased by 6.2 times (from 4.7% to 29%) for the group without education, by 2.8 times (11.8% to 32.9%) for the group with 1-9 years of schooling, and 2.4 times (24.9% to 58.9%) for the group with 10 years of schooling (Figures 4b and 5) .

Figure 4a. Ever use of contraception, by women's education, and by survey time: Comparison areas

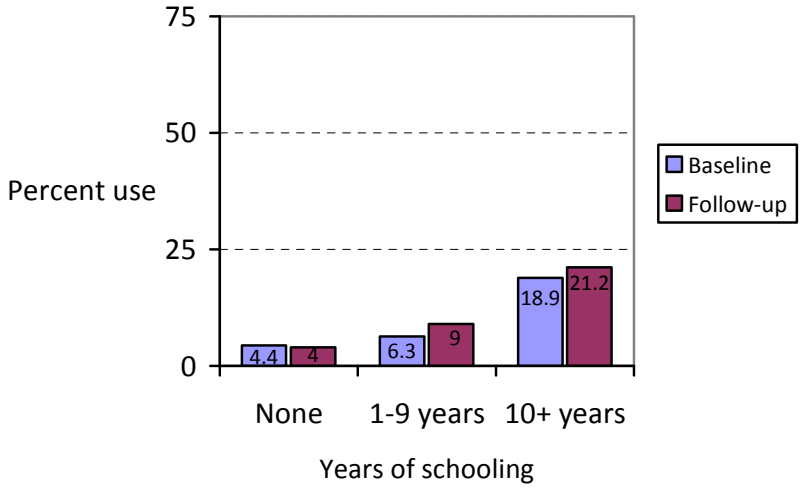


Figure 4b. Ever use of contraception, by women's education, and by survey time: Intervention areas

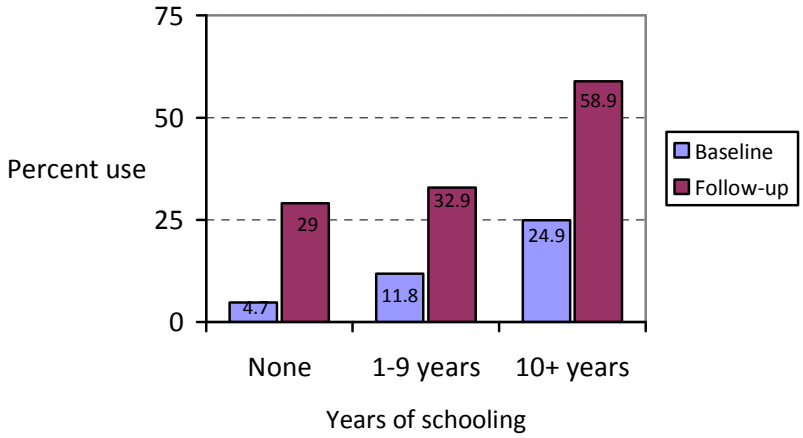
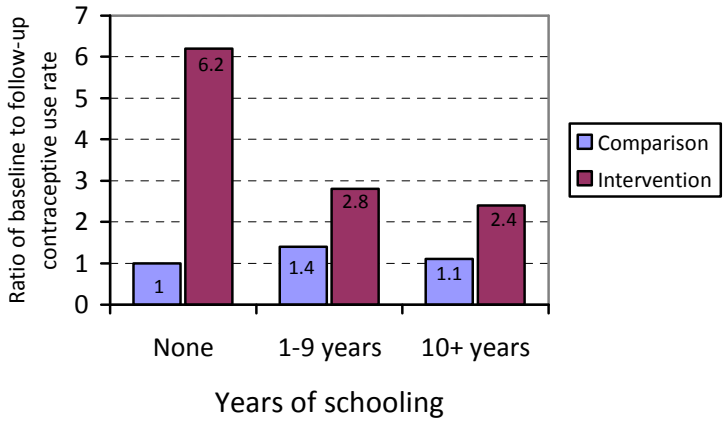


Figure 5 graphically shows the relative changes between the baseline and follow-up for each education group. In comparison areas, there was no noticeable change of contraceptive use in any of the education groups. In the intervention areas, the increase in contraceptive use was around 2.5 times for the groups with 1-9 years of schooling and 10 or more years of schooling. In sharp contrast, the increase was over six times for those who had no schooling. The differential change of contraceptive use by education was statistically significant.

Figure 5. Relative change of contraceptive use between baseline and follow-up surveys, by women's education, and by area



As mentioned above, PRACHAR provides RH communication interventions but no direct services. The purpose of PRACHAR is to improve awareness of the benefits of using contraceptives and knowledge about RH/FP services and their sources, which will lead to increased demand for and utilization of services. The results show that information provision

is extremely powerful in increasing contraceptive use across socioeconomic groups but the least advantaged benefit more from the information as the relative increase of contraceptive use is much higher among them than among others.

PRACHAR's Potential Impact on Population Growth: Examples from Bihar and Uttar Pradesh

As we learn above, implementation of PRACHAR interventions will lead to delayed marriage and increased contraceptive use among young couples resulting in the reduction of fertility. Fertility reduction will eventually lower population growth and thus reduce population size in the future. In this section we want to show what difference PRACHAR interventions can make in population size. We do an exercise of population projection in three scenarios for the period between 2005 and 2025 for Bihar and UP states.

How the projection works

The projection was done using a computer program known as SPECTRUM, developed by Futures Group International. The methods and procedures of the projection, including the underlying demographic models, are available online, along with the software (www.futuresinstitute.org). Briefly, SPECTRUM considers two fertility parameters, TFR and age-pattern of fertility (age-profile or shape of fertility), to change over the period under projection. These parameters are largely functions of four proximate determinants of fertility: marriage, contraceptive use, abortion, and infecundability due to breastfeeding. It is possible to project the above fertility parameters over time by changing the four proximate determinants, if data are available, but a simplified way of doing population projection is by varying the level and shape of fertility. We did the projection by changing the fertility parameters—level and shape. In Scenarios I and II, we simply changed the fertility level, keeping the fertility shape as of 2005 (Figure 6 and Figure 7a). For Scenario III, we changed the fertility rate for women aged 15-19, which yielded a changed shape of fertility over the years (Figure 7b).

Other assumptions implicit in SPECTRUM are (i) age pattern and level of mortality, (ii) sex ratio at birth, and (iii) net migration. We followed assumptions specified by Stover (2009): women's life expectancy will increase from 65 years in 2005 to 71 years in 2025 according to the Coale-Demeny model life table (West); sex ratio at birth of 108 males per 100 females and unchanged over time; and the net value of in- and out-migration will remain as zero over time.

Projection Scenarios

The projections are done in three scenarios:

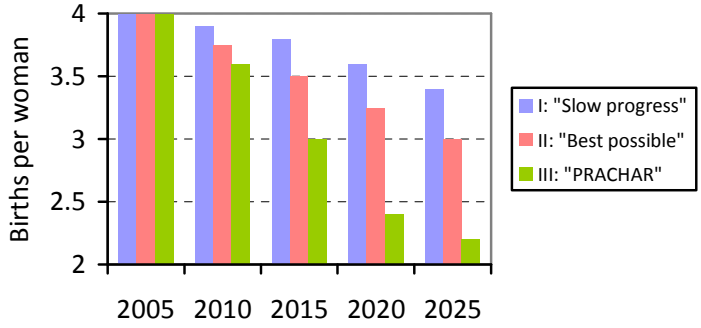
- Scenario I assumes that the TFR will decline from 4.0 in 2005 to 3.4 in 2025 (Figure 6). This is the most likely scenario of fertility reduction both in Bihar and UP given the past trend, which is a slow pace of fertility reduction. In Bihar, total fertility remained at around 4.0 for 14 years, between 1992 and 2006. In UP, although there was reduction in the TFR by about one birth during the above period, the TFR is currently 4.0. It is well known that

the pace of fertility decline slows down during the transition from a medium level of fertility (we treat a TFR of 4.0 as medium) to a low level, 3.0 or below. Concerted and sustained program efforts are required at this level of fertility to bring down the TFR to a low level. We will refer this as the "slow progress" scenario.

- Scenario II assumes that the TFR will decline from 4.0 to 3.0 during the same period. This level of fertility can only be achieved by the state governments' RH/FP programs if serious efforts are made to improve programs in the coming years, which will need innovative planning, effective implementation, and careful supervision. We will refer to this as the "best possible government program" or "best possible" scenario. In Madhya Pradesh, the TFR declined from 3.9 during the period 1990-92 to 3.1 during the period 2005-06 (IIPS 2007). During the same time period, Haryana's TFR declined from 4.0 to 2.7, an even better fertility achievement (IIPS 2007).

- Scenario III assumes that the TFR will decline from 4.0 to 2.2, the replacement level of fertility. Apparently this looks like an ambitious scenario, but we believe, based on the PRACHAR experience, that this is achievable if the RH communication interventions are culturally appropriate, enabling social environments are created, and access to RH/FP services is facilitated. We will refer this as the "PRACHAR" scenario. A sharp increase in contraceptive use among young couples and delay in marriage and first birth with 2-3 years during the PRACHAR project is an indication that this fertility level is achievable. As mentioned above, it has been made possible by a strong government program in Haryana to reduce the TFR from 4.0 to 2.7 in about a 15-year period. The PRACHAR-scenario goal of reducing the TFR from 4.0 to 2.2 is only one half of a birth more than Haryana's achievement.

Figure 6. Total fertility rate by calendar year

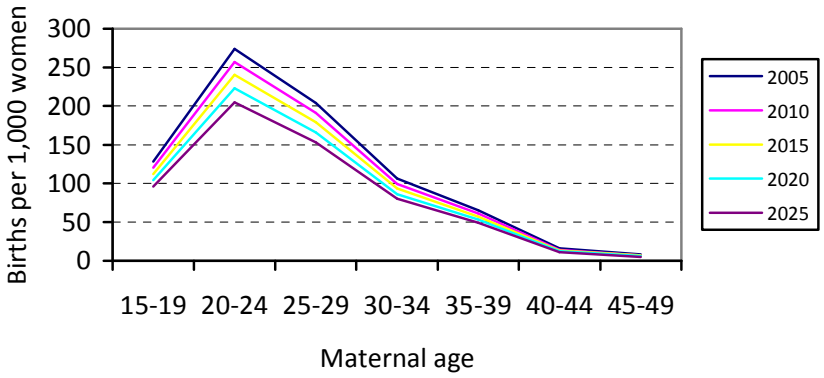


As seen above, all the scenarios involve fertility reduction or a decrease in couples' achieved family size. There is an important element, age-pattern or age-profile of fertility (or fertility shape), that usually changes with fertility reduction over time. We make two assumptions about the changes in age-profile:

- The age-profile or fertility shape will remain unchanged with the decline of fertility or achieved family size in Scenarios I and II.

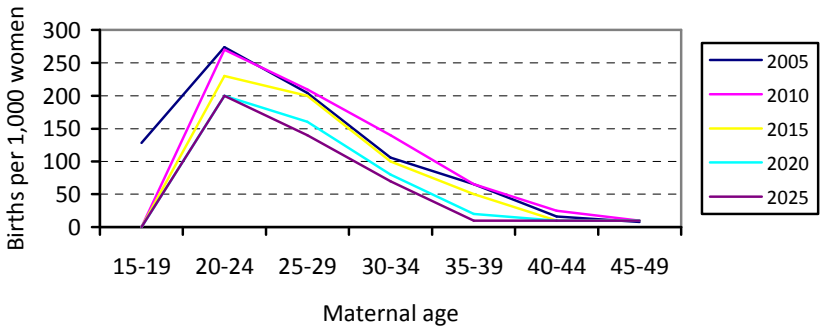
- The fertility shape will change in Scenario III, that is, childbearing will be delayed along with the decline of fertility

Figure 7a. Age specific fertility rate, by calendar year, Scenario II: "Best possible"



The existing age-profile in the two states, and in India as a whole, is of the following nature: women begin childbearing early, quite substantially before the age of 20, with repeated pregnancies in their 20s and continue to have children in their 30s, as well as in their 40s, but with much less frequency. For example, according to the curve for 2005 (shown in Figure 7), the age-specific fertility rates are12.8%, 27.4%, 20.4%, 10.6%, 6.5%, 1.6%, and 0.8% for women aged 15-19, 20-24, 25-29, 30-34, 35-39, 40-44, and 45-49, respectively. In Scenario II, the TFR declines by 25% from 4.0 in 2005 to 3.0 in 2025 (Figure 6). Each of the age-specific fertility rates is reduced by about 25% between 2005 and 2025. The reductions in age-specific rates in other years are also proportional.

Figure 7b. Age specific fertility rate, by calendar year, Scenario III: "PRACHAR"



In Scenario III, it is assumed that beginning in 2010, childbearing will begin at age 20 or afterward. No women will bear children before age 20. The TFR will decline by 45%, from 4.0 in 2005 to 2.2 in 2025, but the decline in the various age-specific fertility rates will be different than 45% (Figure 6). For example, the reduction in fertility rate between 2005 and

2025 will be 100%, 27%, and 37%, respectively, for the age groups 15-19, 20-24, and 30-34 (Figure 6). Similarly, for other age groups the fertility reduction will be different from 45%.

One implication of the parallel fertility decline and nearly proportional decline of age-specific fertility rates is that there will be an increase in birth intervals, true for all three scenarios. Since the childbearing remains spread over the entire reproductive age period between 15 and 49 (Figure 7a) but the intensity is lowered gradually because of fewer births, there has to be an increase in birth intervals. In Scenario III, the reproductive span is assumed to be between 20 and 49 (Figure 7b), or shorter by five years, and therefore the average birth interval will be little shorter than in Scenarios I and II for the same TFR. But we assume in Scenario III a much lower TFR than in Scenarios I and II, and, thus average the birth interval will still be long. The median birth interval in Bihar was 30 months and the TFR was 4.0 during the period 2005-06 while in West Bengal it was 35 months and the TFR was 2.3 (IIPS 2007). (In Tripura, which has a similar TFR as West Bengal, the median birth interval was even higher, 39 months (IIPS 2007)). The longer birth intervals in the states with low fertility were possible because fewer births were spread over the entire reproductive span of life.

Projection parameters for PRACHAR scenario

One challenge with the population projection exercise associated with PRACHAR has to be underlined. PRACHAR works with adolescents and young couples under 25 for delaying and spacing of pregnancies but the projection involves fertility of all women. One way of tackling this would be to hybridize the projection work by combining data from PRACHAR and other sources under certain assumptions. Such a combination of work is likely to be complex, with added challenges.

Although PRACHAR targets adolescents and young couples for delaying first birth and spacing between the first and second births, it is highly likely that it influences reproductive lives afterward. This is mainly because PRACHAR emphasizes the benefits of small families and concentrating resources among fewer children, and provides information on how to achieve a small family size. Thus, PRACHAR communications should have a lasting effect. It is found that contraceptive use is significantly higher among couples with two children in intervention areas than in comparison areas although these couples are not a target group as such. This happens through two ways: lasting effect and diffusion effect. Some of the two-child parents were beneficiaries of PRACHAR while they had fewer than two children. Some of them were not part of a target group but received the RH information through diffusion as they live in the same community. Another indicator of a lasting effect is that contraceptive use of couples with one or two children is higher among those who used contraception in their previous parity than their counterpart who did not use contraception in the previous parity. This means that the couples retain their better reproductive behavior even if they are no longer a part of the intervention. International experience suggests that once the small-family norm is established in the community and demand for contraception is generated, contraceptive use increases to a high level through government's supply of methods at the door-step. Contraceptive use does not decline when the door-step services is withdrawn; users shift their sources of methods or switch to other methods that are available at the private sectors (Mercer et al. 2004). Ideational change and demand for services seem to be the keys which keep couples motivated for achieving their desired family size and pattern.

We assume that because of the combination of PRACHAR's direct effect on delaying and spacing of births among women under 25, lasting effect, and diffusion effect, the level and shape of fertility will be achieved as specified in Scenario III. It should be mentioned that desired family size among couples with no children or with one child was between 2.2 and 2.4 children in Bihar and UP, according the 2005-06 NFHS (IIPS 2007a and 2007b). The idea of small family size is shared among the young couples; those who will contribute to the future population growth during the projection period. It is possible to achieve the assumed TFR or family size of 2.2 following the PRACHAR interventions.

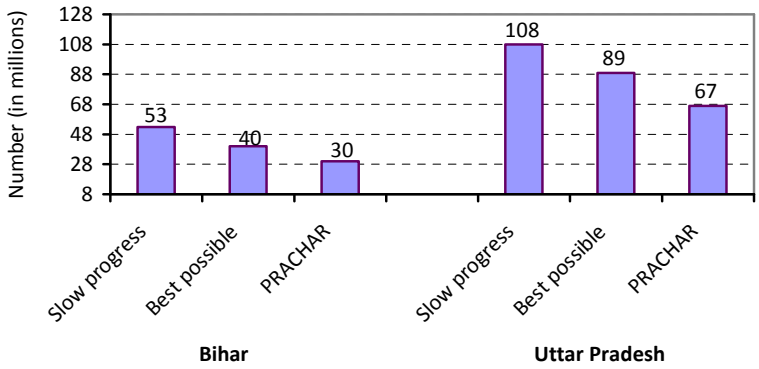
Projection results

According to Scenario I ("slow progress"), Bihar population will grow by 53 million (or by 58%) from 91 million in 2005 to 144 million in 2025 (Table 1 and Figure 8). According to Scenarios II ("best possible") and III ("PRACHAR"), it will grow by 40 (44%) and 30 million (33%), respectively. Thus in the PRACHAR scenario, Bihar could have avoided adding a population of 23 million, or a 25-percent lower increase. Similarly, UP state could have avoided adding a population of 41 million, or a 22-percent lower increase. The potential impact according to the PRACHAR scenario is remarkable: the 2025 population size will be smaller by even 10 and 21 million in Bihar and UP compared to that in the ambitious "best possible" scenario, although this scenario is highly unlikely to be achieved by the government programs.

Table 1. Projection results: Population size (in millions), by scenario, Bihar and Uttar Pradesh

Scenarios	Bihar				Uttar Pradesh			
	2005	2025	Difference	% diff.	2005	2025	Difference	% diff.
I: "Slow progress"	91	144	53	58%	187	295	108	58%
II: "Best possible"	91	131	40	44%	187	276	89	48%
III: "PRACHAR"	91	121	30	33%	187	254	67	36%
Difference between Scenarios I and II	-	-	13	14%	-	-	19	10%
Difference between Scenarios I and III	-	-	23	25%	-	-	41	22%
Difference between Scenarios II and III	-	-	10	11%	-	-	22	12%

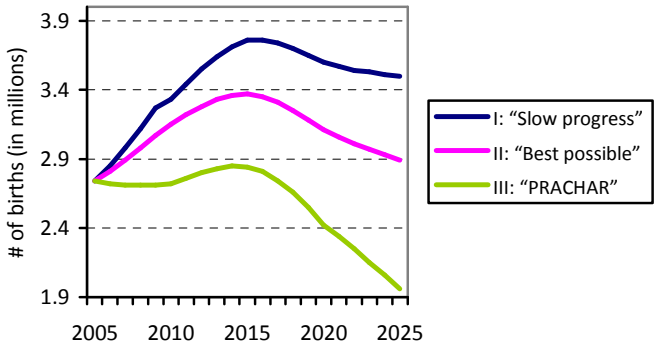
Figure 8. Increase in population size between 2005 and 2025, by scenario



We show the annual number of births for Bihar (Figure 9a) and UP (Figure 9b). Figures 9a and 9b show two important characteristics in terms of number of births and trend in the increase of the number of births. As expected, the number of births is directly related to the assumed level of fertility, that is, the lower the TFR, the lower the number of births. In 2025, for example, the PRACHAR scenario will have over one and half million (or 44%) fewer births than in the "slow progress" scenario and one million (or 32%) fewer births than in the "best possible" scenario. In UP, there would be three and two million (41% and 30%) fewer births in the PARACHAR scenario than in the "slow progress" and "best possible" scenarios, respectively.

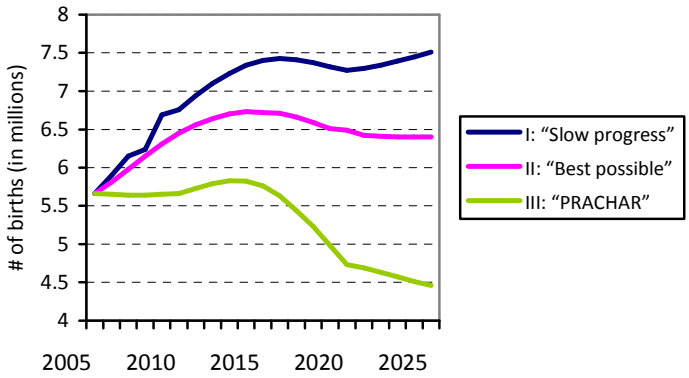
The pattern of growth over time is markedly different for the PRACHAR scenario than others. In the "slow progress" and "best possible" scenarios, the number of births sharply increases with time until around 2015 and then gradually declines. In the PRACHAR scenario, the number of births increases only marginally between 2005 and 2015 and then sharply declines. This is a result of delaying fertility; beginning in 2010, it is assumed that no women give birth before age 20.

Figure 9a. Projected annual number of births, by scenario, Bihar



Therefore, the rapid reduction in the annual number of births in the PRACHAR scenario is due to the combined effects of delayed childbearing and reduced fertility. This shows a beneficial effect of delayed childbearing, spacing of births, and fertility reduction on population momentum, meaning that as childbearing is delayed and fertility is reduced, fewer newborns are added in the population.

Figure 9b. Projected annual number of births, by scenario, Uttar Pradesh



The increase in the number of children aged 0-4 follows a pattern reflecting the number of births (Table 2a). In Bihar, in a given calendar year, there would be about seven million (41%) fewer under-five children in the PRACHAR scenario than that in the "slow progress" scenario (Figure 9a). In UP, there would be 14 million (39%) fewer under-five children. This means that health programs will need fewer resources for child health care or, given the availability of resources, those programs can improve accessibility and quality of health care because there will be substantially fewer recipients. Similarly, the increase in the number of school-going children (estimated as those ages 5-14) will sharply decline under the PRACHAR scenario, whereas that number continues to increase under the "slow progress" scenario until 2020, after which there is a slight decline. On average, in a given year under the PRACHAR scenario, there will be about 10 million (29%) fewer children ages 5-14 in Bihar (Figure 10b and Table 2b). In UP, there will be 18 million (26%) fewer such children (Figure 10b and Table 2b).

Table 2a. Projection results: Number of 0-4 year old children, by scenario, by state

Scenarios	Bihar				Uttar Pradesh			
	2005	2025	Difference	% diff.	2005	2025	Difference	% diff.
I: "Slow progress"	9	17	8	89%	24	36	12	50%
II: "Best possible"	9	14	5	56%	24	31	7	29%
III: "PRACHAR"	9	10	1	11%	24	22	-2	-8%
Difference between Scenarios I and II	-	-	3	33%	-	-	5	21%
Difference between Scenarios I and III	-	-	7	78%	-	-	14	59%
Difference between Scenarios II and III	-	-	3	45%	-	-	9	37%

Table 2b. Projection results: Number of 5-14 year old children, by scenario, by state

Scenarios	Bihar				Uttar Pradesh			
	2005	2025	Difference	% diff.	2005	2025	Difference	% diff.
I: "Slow progress"	24	35	11	46%	46	69	23	50%
II: "Best possible"	24	30	6	25%	46	62	16	35%
III: "PRACHAR"	24	25	1	4%	46	51	5	11%
Difference between Scenarios I and II	-	-	5	21%	-	-	7	15%
Difference between Scenarios I and III	-	-	10	42%	-	-	18	39%
Difference between Scenarios II and III	-	-	5	21%	-	-	11	24%

Figure 10a. Increase in the number of under-five children between 2005 and 2025, by scenario

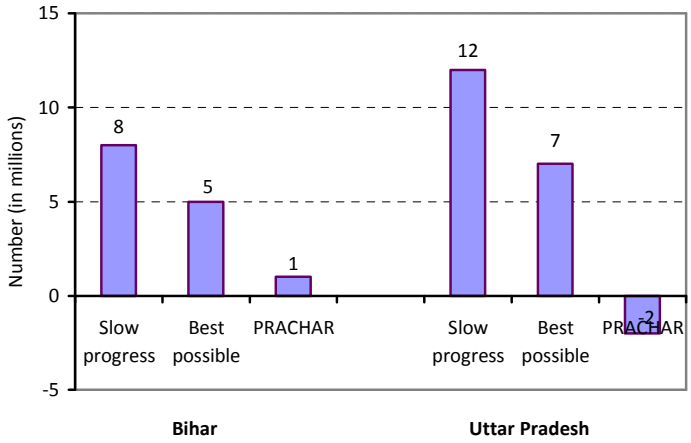
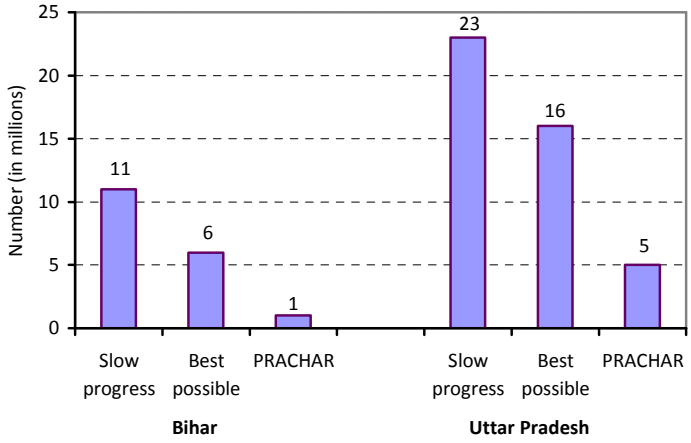


Figure 10b. Increase in the number of 5-14 year old children between 2005 and 2025, by scenario



Discussion and Conclusions

In this paper we deal with issues of early childbearing that has adverse consequences on women's life, their families, their children's health and wellbeing as well as on national population growth. We show that PRACHAR, an RH communication model, helps delay age at marriage and increase contraceptive use for further delaying childbearing and reducing repeated pregnancies at young ages. Based on a population projection exercise, we show a substantial reduction of future population size with possible PRACHAR interventions in Bihar

and Uttar Pradesh. We observe an immediate slow growth of newborns, an effect of delayed childbearing, which helps weaken the force of population momentum, a serious population growth concern in India. We also show that the socioeconomically disadvantaged sections of the population are most benefited from communication interventions. In several northern states, one cause of almost stagnant and high fertility is the low use of contraception by the disadvantaged sections, and thus increasing contraceptive use among them will significantly accelerate the Indian fertility transition.

One important feature of the powerful PRACHAR model is that it does not require service provision. It creates demand for RH/FP services among the target population, enables the social environment to acquire healthy reproductive behavior, and facilitates the existing service delivery systems in the public and private sectors that help increase service utilization. Its strong effects on reproductive behavior are no surprise. Other studies have also shown the impact of effective information provision on health care utilization. In Uttar Pradesh, India, information provision through a community approach was a powerful means of generating demand for and utilization of health and social services (Pandey et al. 2008).

The power of PRACHAR lies in its ability to address range of issues that are crucial to reduction in population growth and improvement in maternal and child health and family wellbeing, including improvement of reproductive lives of the disadvantaged. Among them, early marriage and childbearing and repeated pregnancies are widespread in most states in India, even where fertility has declined to low or replacement levels. Early and repeated childbearing have adverse health and social consequences for women and their children. Several states in India with large populations have both unacceptably high population growth and substandard health, which hinders the effective and rapid population decline needed nationally. Young couples should be the primary target in addressing this huge problem, especially as adolescents and young couples presently lack information on RH. Unfortunately, current family planning programs do not meet the needs of young people, who require appropriate information and contraceptive services to allow them to delay and space their births. Instead, existing programs are designed for limiting births after achieving desired family size, usually at around the age of 25 years, predominantly because of onset of early childbearing and subsequent repeated short-interval pregnancies.

Another power of PRACHAR is its lasting intervention effect, whereby beneficiaries continue good RH practices beyond the intervention period, well into adulthood.

Efforts are being made to find a simpler model with minimal interventions which would require fewer resources. In Phase 2, it was found that minimal interventions of PRACHAR are provision of RH education to adolescents through a three-day training workshop and provision of RH information to young couples through bimonthly home visits. These two interventions lead to increased age at marriage and first birth and higher use of short-acting contraceptive methods appropriate for delaying and spacing births. These will be further tested in Phase 3 to see if they are still effective when the activities on social environment building and service-delivery facilitation are excluded from the package of interventions.

Targeting adolescents and young couples with RH information is an extraordinary social investment with profound short- and long-term benefits to participants, to their children's health and wellbeing, and to their economic and family wellbeing. As discussed above, maternal and child health outcomes will be improved by avoiding early and/or

repeated childbearing. There would be fewer children in the future, thus requiring fewer resources to provide adequate health and education, leading to higher per capita investment. This will enable the nation or states to build the next generation with better health and education.

In order to make an effective and rapid reduction in fertility, and thus population growth, in India, interventions must impact socioeconomically disadvantaged populations, increasing their use of services in order to reduce fertility and population momentum. PRACHAR demonstrates impact on these groups especially.

In sum, PRACHAR offers a solution to many crucial reproductive health and associated population problems in India and shows the power of simple information provision. State governments in India should consider this model of reproductive health communication to adopt in their health and family welfare programs.

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