Internal Migration, Remittance, and Contraceptive Use in India

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Introduction

In countries like India that are currently undergoing the fertility transition, the ways of fertility control may bear new meaning with migration and increased income aiding the diffusion of contraception. The pioneering work of Davis and Blake (1956) and Bongaarts (1978) has demonstrated the mechanisms by which proximate determinants influence fertility. The most notable is that of contraceptive use within the realm of marital fertility (Bongaarts 1978b; Davis and Blake 1956). However, distal determinants, or those that influence fertility only through direct interactions with proximate determinants of fertility, have received much less attention in the literature. The role of distal determinants such as socioeconomic and cultural factors is apparent only once the specific mediating mechanisms between distal and proximate determinants are closely studied. While postulating that economic development is requisite for fertility decline, Caldwell (1997) contends that the spread of the idea and means of fertility control are not sufficiently explained by economic change; instead it is only when social systems and consequence of these ideas are intertwined with economic change that contraceptive diffusion is fully explained (Caldwell and Caldwell 1997). It is that very theoretical assertion of the primary importance of social and economic system influence on fertility that forms the crux of this research. This study examines the mediating effect of migration and increased household income through remittances in influencing the adoption of contraception and subsequent fertility in India.

Migration from and within India has increased exponentially since 1991 (Census of India, 2011), with a significant amount of money being transferred from migrants to their households at their place of origin (World Bank, 2011). If migrant remittances are thought of as additional (non-labor) household income, then this economic bonus to a household and its use for healthcare- particularly reproductive health- can be meaningful for a country undergoing the fertility transition. Increased access to knowledge about fertility control and different contraceptive options has manifested itself in a fertility decline in India. Concomitant with this fertility decline is increased migration and remittances in the last decade. It is opportune to study the association between increased migration and subsequent remittances on fertility in the country, especially in informing the dynamics of family planning policy.

Globally, international migration has grown dramatically in recent years, becoming an increasingly important conduit for economic development via ideas from return migrants and

diaspora members living elsewhere (Kapur 2010). One of the major avenues in which international migration benefits sending countries is through the receipt of remittances or cash transfers to households from individuals that migrate. The World Bank estimates $440 billion in remittances were sent to home countries by migrants living abroad and that India is the world's top remittance receiving country (World Bank, 2011). Migration within India has also seen unprecedented gains, with domestic migrants constituting about 30% of the total population of the country in the 2001 Census- an increase of about 37% since the prior Census in 1991 (GOI, 2011). While urban employment has been the largest pull factor for migrants to move within and out of state, there has been recent evidence of increased rural-rural migration indicating the development of new employment zones and new domestic migration streams (GOI, 2011). There are no comparable official estimates of remittance flows within India as there are with international migration, but with increased migration within India, remittances may be an equally important consideration.

The impact of these remittances at the household and national levels have been shown to increase child education (Edwards et al. 2003), and expenditures on healthcare (Ponce et al. 2011). As the world's top remittance receiving country with a share of 12.5% of global remittance (World Bank, 2011), India has been a substantial receiver of remittances since the 1990s. The country has also seen a decline in the total fertility rate (TFR) from 3.4 children per woman in 1993 to 2.7 in 2006 (NFHS, 2006), and an increase in contraceptive use from 36.5% to 48.5% in the same period (NFHS, 2006). These changes have largely been attributed to increases in female education and employment (Drèze and Murthi 2001; Mari Bhat 2002). With the last decade seeing exponential increases in migration from and within India coinciding rapid fertility declines, it is particularly timely to investigate any potential associations between the two.

Literature Review and Theoretical Framework

The relationship between migration and fertility

Migration and fertility of migrants

Most studies on the relationship between migration and fertility have focused on the context of migrant fertility compared to the new host, and the majority of these studies have focused on international migration. Some prominent theories have emerged to explain the dynamics through which the act of relocation affects migrant fertility, with varying degrees of

support. The most salient of these theories are the socialization hypothesis, adaptation hypothesis and selection hypothesis. The socialization hypothesis postulates that migrants are socialized by their early childhood experiences, and post-migration fertility levels reflect those found in the country of origin, at least for the first generation. This theory was one of the earliest to be put forth to explain the relationship between migration and fertility, and ultimately found very limited support (Freedman & Slesinger, 1961). The adaptation hypothesis states that the impact of host country norms increases with the length of time in the new country, leading to a convergence of migrant fertility rates with those of the natives of host country (Kulu, 2005). This hypothesis has found substantial support in the literature, especially in studies of rural-urban domestic migration. Finally, the selection hypothesis finds that migrants are a specific group of people that already have norms about low fertility, a theory that has found very limited support (Chattopadhyay et al. 2006). Since the current paper delves into the issue of fertility of those at the place of origin rather than destination, I will not discuss these theories further, but refer to Kulu (2005) for an in-depth discussion.

Migration and fertility at place of origin

Migrants are believed to be the agents of familial and social change in their communities of origin (Kapur 2010), thus demographic behavior could be a potential feature of this change. However, the important aspect of migrant influence on fertility behavior in their place of origin has not been systematically studied for a number of reasons. First, for each area that sends migrants, convergence to a particular set of fertility or contraceptive behaviors will be different based on the selection of destination. Second, the measure of strength of the bond between the host and home area could be different, which makes drawing inferences on the impact of migration on fertility difficult. Finally, longitudinal data on the distribution of migrants in host areas as well as their fertility levels across time is unavailable for most countries and regions, thus obviating the possibility of investigating a causal relationship.

There are, however, a few studies which have looked at the association of fertility and migration. One of the few studies to first empirically test this relationship found that fertility levels of the home country are in fact affected by the choice of immigration destination. Fargues (2011) posits that migration from Morocco and Turkey to Western Europe is associated with declining fertility rates in those countries in concordance with low fertility levels in Western

Europe. However, migrants from Egypt tend to move to high fertility countries in the Persian Gulf, resulting in an increase in home country fertility (Fargues 2011). The author uses time-series data to document a negative correlation between remittances and births in Morocco and Turkey and a positive one in Egypt. While this approach is appealing in its conclusions, the simple bivariate analysis is not enough to explain the dynamics of migration and fertility because it does not account for any known mediating factors such as education or household income. Fargues (2011) does however attribute the transfer of behavioral norms from migrant receiving to sending countries in explaining the magnitude of fertility changes in Morocco, Egypt, and Turkey.

In a recent contribution, Beine *et al.* (2008) provide an analysis of 208 countries grouped into geographic regional categories. They find a unique channel of impact of migration on fertility in developing countries: migration raises adults' incentives to invest in their children's education which then reduces fertility in favor of fewer children- the Beckerian quantity/quality tradeoff. They find that a one percent increase in the fertility norm to which migrants are exposed to - that of lower fertility- reduces home country fertility by about 0.3 percent, providing evidence of an impact of migration on home country fertility based on length of time at new destination (Beine et al. 2009). This provides support in theory of a strong transfer of fertility norms from migrants to their home countries with education serving as an intermediate pathway. Likewise, De's study in Mexico that uses reduced form relationships between migration and family planning finds that women in migrant households are 75% more likely to use contraceptive pills and 36% more likely to use condoms with their partners than non-migrant counterparts (De 2010). The intersection of fertility and domestic migration has been given even less attention. In rural Guatemala, evidence suggests that moving to urban areas, having migrant kin in urban destinations, and living in a community where urban migration is common are all associated with greater contraceptive use. Ties with urban or international migrants are also associated with a greater likelihood of modern contraceptive use among married women in place of origin (Lindstrom and Munoz-Franco 2005). The authors do not provide a metric for social ties beyond visits and correspondence however, leading to inconclusive information about the diffusion of contraceptive knowledge.

The relationship between remittances and fertility

The studies reviewed above largely focus on the migration experience as an independent variable in itself, rather than examining *how* migration impacts fertility. There are other studies that use remittances as a method of studying the impact of migration, with two emergent schools of thought dominating the discourse: the sociological and the economic arguments. The sociological argument uses migrant remittances as a proxy for the strength of bond between sending and receiving countries, which spurs the diffusion of new ideas, including those of fertility control. The economic argument sees migrant remittances as non-labor income, and under the assumption of children as normal goods, this increase in income is posited to lead to an increase in fertility due to increased desire for more children, or a decrease in fertility in favor of a quality/quantity tradeoff. Both are discussed below.

Sociological Argument

Monetary transfers can be a proxy measure of social remittances- a concept that illustrates the flow of ideas and norms of behavior from destination to origin through migrants (Levitt 1998). Thus, it is hypothesized that the stronger the bond between migrants and place of origin, the larger the flow of social norms from the host to the home, and therefore the faster the convergence of fertility rates are between the two places (Naufal and Vargas-Silva 2009). Naufal and Vargas-Silva (2009) specifically use the flow of workers' remittances as a way to demonstrate the relationship between migration and fertility. Arguably, migrants with more attachment to the home country would be more inclined to remit money home. The authors find that remittances establish a reduction in fertility through two mechanisms: the adoption of lower fertility behaviors from migrant destinations in addition to increased socioeconomic status expressed through a quantity and quality tradeoff in numbers of children (Naufal & Vargas-Silva, 2009).

A recent study in Guatemala shows that following migration and subsequent remittances, there is an immediate reduction in fertility due to a change in fertility beliefs that allow for the adoption of modern contraceptive methods due to an increased access to contraceptives (Davis and Lopez-Carr 2010), garnering more evidence in support of the sociological argument. The authors also find a sustained fertility reduction due to notions of smaller family size diffused culturally from living abroad as well as from higher socio-economic status and improved access to quality education. This idea of social remittances has been shown to influence fertility decisions in a variety of settings. For example, Davis (2011) demonstrates

that in Costa Rica, Guatemala, and Nicaragua, simply the cumulative length of absence by the husband has no relationship to the odds that a birth will or will not occur in a given year. Instead, a rise in cumulative remittance leads to a decrease in the odds that a birth will occur in a given year controlling for migrant husband (Davis 2011), thus indicating an impact of remittances on reducing fertility at home through increased contraceptive use.

Economic Argument

In traditional economic discourse, non-labor income refers to income from all sources except employment. Under this definition, remittances represent a source of non-labor income for the household. If children are seen as normal goods, the increase in non-labor income may then result in an increase in the demand for children (Becker 1960). Easterlin and Crimmins (1985) see the demand for children as depending on the household's balancing of its subjective tastes for goods and children against externally determined constraints of price and income in a way that maximizes household satisfaction. Variations in the basic taste, price, and income determinants will cause differences in demand among households at a given time due to modernization. Ceteris paribus, the number of children desired would be expected to vary directly with household income. Thus, an increase in income would be expected to raise both the number of children and the standard of child quality, while a rise in the relative prices of inputs required for children would lead to substitution against both child numbers and child quality (Easterlin and Crimmins 1985). This economic explanation has found wide support in larger studies, but only limited support in the specific context of migrant remittances. Naufal and Vargas-Silva (2009) find that unlike increases in wage rate (especially the female wage rate) that increases the opportunity cost of forgoing labor and investing time in childbearing activities, remittances marginally encourage the demand for children (Naufal and Vargas-Silva 2009). However, they explain that remittances represent extra income that loosens the budget constraint of the household in *addition* to allowing the flow of social norms between the two countries- thus also finding some evidence for the transfer of fertility norms, pointing to inconclusive findings.

With conflicting viewpoints and differing support for either theory in various settings, it is difficult to propose a hypothesis for a country as diverse as India. The regions tend to be

distinct in terms of where migrants choose to relocate. For example, migrants from the North and South generally relocate to the West, those from the East go to the North, while migrants from the West go to the South (National Sample Survey, 2008). These different regions have varied levels of contraceptive use, as has been evident in recent years which was not apparent in 1983. South India has had the lowest fertility in India, for example Kerala is one of the few states in India with below replacement level fertility (NFHS, 2006). North India has typically had the lowest level of contraceptive use (40%), but one of the states in that region has the highest levels of contraceptive use in the country- Himachal Pradesh, at 80%. Thus, while different geographical regions are distinct in demographic behavior, they are by no means uniform, with some states in all regions falling well below or above regional patterns.

The geographical regions of India are distinct enough to be studied as individual countries- which is useful, since the best available data on remittances and migration finds that about 93% of all migration in India is domestic rather than international (See discussion in Data and Methods section below). In fact, since there is much variation in fertility and contraceptive use within regions, it is also important to separate analyses by fertility region by TFR (low, intermediate, high) in addition to geographical region in light of intra-regional variation in fertility discussed above. The hypothesis that forms the basis of this analysis is two-fold. First, the experience of migration will be associated with increased contraceptive use at the household of origin. Secondly, conditional on having a migrant, remittances- rather than acting as a proxy for transfer of lower fertility norms- will be seen as additional household income and will be associated with lower contraceptive use thus subsequently increased fertility.

Data and Methods

I use the India Human Development Survey (IHDS) as my primary data source. The IHDS is a nationally representative, multi-topic survey of 41,554 households that covers all 33 states and union territories of India between 2004 and 2005, collected by the National Council of Applied Economic Research in New Delhi and the University of Maryland (Desai, Reeve and NCAER 2009). Unlike the National Family Health Survey (NFHS) which is the Indian equivalent of the Demographic and Health Surveys (DHS), the IHDS contains detailed information on migration and remittances, thus making it a unique and appropriate dataset to study the relationship of interest. The main questionnaire was administered to the individual most knowledgeable about

income and expenditure, frequently the male head of the household. In the cases where the male head was absent, the female head- or spouse of the male head- was interviewed. The education and health questionnaire contained information on birth control and fertility history, and was administered to *any* married woman in the household between the ages of 15 and 49, largely the spouse of the male head. However, since it is not always the spouse of the migrant whose contraceptive use is affected- it could instead be a sister-in-law, daughter, or daughter-in-law- the unit of analysis is contraceptive use at the household in order to minimize ambiguity in the way the question was posed in the survey.

The IHDS does not contain information on the exact destination state of migrant, thus I use the National Sample Survey of India (NSS) as an auxiliary data source. The NSS is a nationally representative survey set up by the Government of India to collect data on various demographic and socio-economic aspects. These surveys are conducted in the form of rounds extending over a period of one year. The 64th round (July 2007-June 2008) includes data on employment and migration. The survey further provides state-wise distributions of migrant flows to other states in India, which I use to construct a variable that is the difference in contraceptive use between state of origin and primary domestic destination state. Additionally, I use the NFHS-3 (2005-2006) for the state-level TFR estimates in order to continue analysis by level of fertility in addition to geography. These levels of fertility are constructed as "low" if the states are at or below replacement level (below or equal to 2.1); "intermediate" if they are between replacement level and the national average TFR of 2.7, and "high" if they are above 2.7.

The IHDS is a stratified sample, and for present data analysis, I use the IHDS design weights ("SWEIGHT") to obtain nationally representative statistics in the descriptive and regression tables. Not all 41,554 households in the IHDS sample have a migrant. Here, a migrant is defined as a person who has lived away from the home in the 12 months preceding the survey. These households are considered in first stage analysis of the association between migration and contraceptive use. The second stage of analysis consists of just the sample of households that report a migrant in order to examine the differential association between remittance and contraceptive use, conditional on being a household with a migrant. Given that only 7% of the sample reports migrant living internationally, for the purposes of this present analysis, only internal or domestic migration is considered.

Key Dependent Variable:

The key dependent variable is contraceptive use in the household. As stated before, contraceptive use is considered as the unit of analysis of household since the question as posed in the survey is asked to *any* married woman aged 15-49 in the household, not necessarily the spouse of the migrant. The question on contraceptive use was phrased to a married woman in the household as, "Are you and your husband currently using any methods to delay or prevent pregnancy?", with 56% (N=17,335) reporting any modern contraceptive method use. However, only 73% of all women in the full sample responded to the contraceptive use question in the survey reducing the sample size from 41,554 to 30,783. Contraceptive method mix is not heterogeneous, with about 70% (N= 11,929) of contraceptive users reporting female sterilization as the dominant method. Contraceptive use in India is thus largely intended to limit fertility, rather than for spacing births.

Key Independent Variables:

There are two key independent variables in the analysis, both at the household level. The first is whether the household has a migrant living elsewhere in the country and the second is whether this migrant sends remittance. Instead of limiting the analysis to just the 4,651 households that have a migrant, the first step in analysis is to see the association of having a migrant at all with contraceptive use. In the sample, 88.7% (N=37,506) of households do not have any individual that is a migrant. Of the remaining 11.3% (N=4,651) of households that have a migrant, 48.3% (N=2,276) receive remittance. Thus, I create a household typology with the first type of household containing the analytic sample that does not report any migrant from the household, the second type reporting a migrant, but not receiving any remittance, and the third type reporting both a migrant and remittance. The pertinent question on remittance was asked to households that reported a migrant (N=4,651) as, "How much money has (migrant) sent the household in the past 12 months?" Due to unreliable monetary amounts[1], the response is coded as a categorical rather than a continuous variable with three categories: none, some (Rs[2]. 100- Rs. 10,000) and high (Rs. 10,000+). The Rs. 10,000 cut-off is chosen because it is the

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[1] The exact values differ greatly from those reported by the Reserve Bank of India, thus categorizing the variable is preferable to using reported values. Also, there is an issue with remittance receipt through formal versus informal channels, thus providing further reason to limit the analysis to the act of sending remittance rather than exact amounts.
[2] The rupee to dollar exchange rate is approximately 50 rupees to 1 USD in 2011 terms.

median remittance amount reported. About 51% of migrant households do not receive any remittance (N=2,383), 24% receive some (N=1,106) and 25% (N=1,170) receive high amounts.

Methodology

I use multivariate logistic regression analysis to explore the relationships between migration, remittance, and contraceptive use. First, a logistic regression at the household level using dummy variables for the four regions - North, East, West, South - is conducted to determine the association between contraceptive use and migration. Next, a separate logistic regression model is fitted, limiting the sample to households with a migrant to test the relationship between remittance and contraceptive use, also controlling for regional variation. Finally, the same analysis is repeated, however this time instead of relying on the geographic separation of regions, fertility regions are used to see how the associations of migration and remittance change by level of fertility at origin. These regions are defined using TFR estimates at the state level, which are available through the NFHS.

The control variables are rooted in prior empirical estimations on the subject. Naufal and Vargas-Silva (2009) construct a weighted average host fertility rate in their estimation in order to see the direction of influence of host country fertility on home country fertility (Naufal & Vargas-Silva, 2009). To assess change in contraceptive behavior by migration pattern, I create a variable which is the difference between contraceptive use at origin and destination for each state. Generally, those in the North and South predominantly migrate to the West; migrants from the East move to the North, while migrants from the West move to the South. There is regional variation in household contraceptive use (among women aged 15-49) in India, with North being the lowest at 41.6% and the West highest at 69.6%. In terms of change, migrants from the North to West have the highest magnitude of change in absolute difference in contraceptive use, with the West having much higher contraceptive prevalence than the North. Migrants moving from the East and West move to regions with lower contraceptive use, while those that move from the South to West move to a higher contracepting region.

Contraceptive use in rural areas is typically shown to be lower than that in urban areas (United Nations, 1986), which may have implications for the association between rural-urban migration and fertility. Thus, a district level control is included in all estimations in order to address the possible knowledge "spillover" of contraceptive use. This variable identifies the

migrant stock in the district as a percentage of that population. Households do not act in isolation, and new information they receive may be shared with their neighbors or social networks, thus increasing contraceptive use of the latter despite not having a migrant in their household. This variable has been used in previous analysis, and has a positive impact on household contraceptive use in areas with higher proportion of households with migrants even for households without migrants themselves (Lindstrom & Munoz-Franco, 2005; Naufal & Vargas-Silva, 2009).

Household level control variables are religion, exposure to media, income, highest level of male and female education, and migrant husband. Religion-specific patterns of contraceptive use and subsequent fertility have also been studied in India, with Muslim women using contraception at lower proportions than their Hindu counterparts (Moulasha and Rao 1999); household religion is thus included in the analysis to further explore this relationship. Exposure to media is constructed in this analysis as a dichotomous variable based on responses to the number of times in the past week the woman watches TV, reads the newspaper, or listens to the radio. Media exposure has been shown to be an important mode of the diffusion of information about family planning, especially with the Indian Government's recent push to include public health information on television, with an emphasis on family planning. In fact, media exposure has been shown to increase current and intended future contraceptive use in India (Retherford and Mishra 1997).

Higher household income typically leads to lower fertility rates, possibly due to a quantity/quality tradeoff (Naufal & Vargas-Silva, 2009). While the IHDS contains a wealth quintile variable modeled along the lines of the same in the DHS, it is an inappropriate variable for the purposes of this analysis. Since the constructed quintiles include income from remittance as well as household income, they are likely to be biased. Instead, I use the logarithm of household income *net* of remittance to give attention to the additional household income generated by remittance. As research on the relationship between remittance and contraceptive use has demonstrated, education is an important control and is included in the analysis (Beine, *et al.*, 2008). It is expected that the absence of husband would influence a woman's decision to use contraception, thus a control for migrant husband is essential in order to explore the relationship between remittance and contraceptive use without the influence of the absence of

husband. Other variables used in analysis are 1) total children ever born and 2) desire for more children, both are expected to influence contraceptive use in opposite ways.

Results

Descriptive Analyses

Given variation in contraceptive use by household typology in India, it is necessary to separate analyses into meaningful categories. Table 1 shows the main variables of interest by geographical and fertility region: households with a migrant, proportion of households receiving remittance, and contraceptive prevalence- the dependent variable of interest. As seen in Table 1, North India (N=19,438) has the largest share of the total sample at 47%. Interestingly, this region also has the lowest contraceptive prevalence at 42% and concurrently has the highest proportion of households with a migrant, with 15% of all households in the North reporting a migrant living elsewhere. Of migrant households, the South has the highest proportion of migrants sending remittance at 55%. The West has the highest contraceptive prevalence in the country, at about 70%, yet has the lowest proportion of households with a migrant. Once separated by level of fertility in a region, the results are not as intuitive. The low fertility region has the lowest contraceptive prevalence, while the high fertility region has the highest. This could reflect completed fertility due to female sterilization to limit fertility- the most common form of fertility control in India. It could also point to the lag between contraceptive use uptake and changes in total fertility- since the data for the TFR comes from the NFHS in 2005-2006, and the contraceptive use data comes from the IHDS in 2004-2005. Additionally, the high fertility region has the highest proportion of households with a migrant, at about 15%, and also the largest remittance receiving region, at 51%.

[TABLE 1 HERE]

Table 2 provides a more detailed view of a larger set of variables of interest for the total sample. These are categorized by household typology- broken down as households without a migrant and households with a migrant. The latter category is further subdivided into households that do not receive remittance, and those that do receive remittance. First, there is not much variation in contraceptive use between households with a migrant and households without a migrant. Among the households with a migrant, there is more of a difference- with

contraceptive use in remittance receiving households much lower than households that do not receive remittance. Columns 2 and 3 present overall comparison between households with a migrant and households without a migrant. Households with a migrant are more rural, and have slightly higher number of children ever born at 2.8 to 2.6 children per woman. Households with a migrant have a lower median income by Rs. 5,326 than households without a migrant, possibly owing to economic reasons being primary motivations for migration. About 31% of females in households without a migrant have primary education, while in households with a migrant, that proportion is slightly lower, at 27%. This distinction is not present at the secondary and higher levels of education, thus suggesting that migration could have a positive relationship with female education. Among households with a migrant, there are similar differences between remittance receiving and non-receiving households when it comes to type of place of residence. Households receiving remittance have a strikingly lower median income than households without remittance by Rs. 13,986. It is also important to note that among all households overall, those with a migrant but not receiving remittance have the highest median income. Females in migrant households that receive remittance have higher levels of secondary education than females in non-migrant households. Interestingly, remittance receiving households have a higher desire for more children, which is possibly reflected in lower contraceptive use compared to households that do not receive a remittance.

[TABLE 2 HERE]

Table 3 provides details on who the migrants are, categorized by their destination and remittance sending behaviors. Males constitute 82% of the total migrants. Their patterns of migration differ by destination and are heavily sequestered to those that leave the state of residence to move within India, or to those that move internationally. There is a difference in choice of destination that is reflected in remittance behaviors. About 67% of migrants who do not send any remittance are migrating within the state, compared to about 44% of those that do send a remittance. Educational attainment is highest among migrants who move to international destinations. Given that some of the migrants are students, the education category possibly underestimates educational attainment because students have yet to complete education. In the remittance non-sending category, there is a neat division of age groups by

destinations. Migrants in the age group of 15-29 make up the largest share of migrants who move within the state of origin and another state. International migrants are older, mostly within the 30-44 age range. In the remittance sending category, migrants that move within the state and international migrants are both older, in the 30-44 category.

[TABLE 3 HERE]

Results of the Regression Estimations

The logistic regression for household contraceptive use and migration is shown in Table 4, with all models including region-level controls for unobserved heterogeneity[3]. Bivariate analysis in Model 1 does not indicate a statistically significant association between migration and contraceptive use. The addition of income is significant however; households with a migrant are 16% more likely to use contraception, and a one percent increase in log income is associated with 21% increase in contraceptive use as seen in Model 2. The inclusion of other household controls notably type of place of residence, religion, and media exposure re-establish the association between migration and contraceptive use. This relationship becomes stronger in Model 4, with the odds of contraceptive use 31% higher for households with a migrant compared to households without a migrant. Women living in rural areas, those that have a higher desire for more children, and Muslim women are less likely to use contraception, while media exposure is associated with increased contraceptive use. Moving to regions with different contraceptive levels is associated with a 3% decrease in contraceptive use. Notably, female education does not seem to be significantly associated with contraceptive use, except at the level of tertiary education (OR=1.26).

[TABLE 4 HERE]

Table 5 provides logistic regression results for household contraceptive use and remittance. Here, the analytic sample is limited to households with a migrant. First level bivariate analysis in Model 1 suggests that households that receive some remittance are about 30% significantly *less* likely to use contraception compared to migrant households that do not receive remittance. This relationship does not hold when controlling for household income, although increased income is associated with increased contraceptive use. Model 3 includes household level controls, and the receipt of some remittance is significant again, with a 24%

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[3] Separate analysis by region had similar patterns as analysis using the full country sample with dummies, thus is not presented in this discussion.

lower contraceptive use than no remittance. The proportion of migrants in district, a variable added to look at the possible spillover effect of living in a community with a large proportion of migrants is not significant. The main relationship between remittance and contraceptive use is no longer significant in Model 4, when a control is added for the husband, or head of the household being the migrant. This shows that households where the husband is absent have about 34% lower odds of contraceptive use, implying that the absence of the male head is more indicative of lower contraceptive use than the effect of increased income by way of remittance.

[TABLE 5 HERE]

Logistic regressions for contraceptive use and migration by fertility region are shown in Table 6. Households in low and high fertility regions have a significant positive association between contraceptive use and the experience of migration. In fact, migrant households in high fertility regions have almost 50% higher odds of contraceptive use than non-migrant households (Table 6). Interestingly, the association between income and contraceptive use is significant only in the low fertility region. Rural women are less likely to use contraceptives in the low and intermediate fertility regions, while a significant association is not found in high fertility areas- indicating other mechanisms at work. Of all the regions, households in high fertility regions have a stronger negative association between migrant stock and contraceptive use, providing slight evidence for the spillover effect. Notably, while the effect of female education on contraceptive use is not significant in the regression by geographical region (Table 4), there is evidence for an association between female education and increased contraceptive use in the high fertility region.

[TABLE 6 HERE]

Logistic regressions for contraceptive use and remittance by fertility region are shown in Table 7. All models include controls for spousal absence, yet results are different from Table 5. In the low fertility region, some remittance (Rs. 100-10,000) is associated with a 67% lower contraceptive use, while in the intermediate fertility region, more remittance (Rs. 10,000+) is associated with 70% increase in contraceptive use (Table 7). These results are noteworthy because additional income by way of remittance does have an association (higher *and* lower) with contraceptive use despite controlling for spousal absence, contrary to the analysis by geographical region.

[TABLE 7 HERE]

Discussion

As has been noted before, a study of how migration and migrants influence fertility at their places of origin has not been conducted systematically, particularly in the South Asian setting. This study is the first to examine the relationship between migration and contraceptive use in India, with a further analytic step that examines the association between additional income by way of remittances and contraceptive use. Households with a migrant have significantly higher contraceptive use than households without a migrant after controlling for socio-demographic characteristics- whether analysis is separated by geographical or fertility region. This indicates that the act of migration is important in diffusing ideas of contraceptive use to households at origin, evidence of the sociological argument. There is no significant association between education and contraceptive use, which has previously been shown to be an important indicator of contraceptive use. One reason for the difference in this analysis could be due to the unit of analysis, which is household rather than individual. Beine *et al*. (2008) find that the fertility norm migrants are exposed to reduced home country fertility, which presumably is mirrored by increased contraceptive use. In the present analysis, contraceptive use is reduced by 3% as reflected by the contraceptive use differential, which suggests that migration to a region with different levels of contraceptive use actually is associated with a marginal decrease in contraceptive use at origin. This result is surprising, given that the decrease is evident regardless of whether contraceptive use at destination is higher or lower. Separate analysis that decomposes destinations that exhibit either higher or lower contraceptive use than origin is needed to understand the relationship better.

The introduction of additional income from remittance has a less straightforward interpretation. In the geographical region model, remittance is associated with lower contraceptive use- a relationship that is eliminated with the addition of migrant husband as a control. In the fertility region model, the degrees of remittance seem to be important. In the low fertility region, some remittance is associated with lower contraceptive use, while in the intermediate fertility region, higher remittance amount (greater than Rs. 10,000) is associated with increased contraceptive use. These results are unexpected, given the magnitude of change in either direction. The present analysis may provide some support for the original Beckerian hypothesis that assumes children are a normal good, which increases their quantity when the household receives some additional income- in the low fertility region. Easterlin and Crimmins

(1985) hypothesize that increased income would lead to an increased demand in children; while a rise in the relative prices of inputs required for children would lead to substitution against both child quantity and quality. While this study cannot situate the research in substitution effects, the first part of the hypothesis has some support since there is an association between additional income and decreased contraceptive use, thus increased demand for children. Naufal & Vargas-Silva (2009) find that remittances marginally increase the demand for children by loosening the budget constraint of the household in addition to allowing the flow of social norms between two countries. This is the pattern observed in the present study, although the inclusion of migrant husband as a control obviates the relationship in analysis by geographic region. The reasoning and pathways that explain how remittance has opposing associations with contraceptive use by fertility region are beyond the scope of this descriptive analysis, and best for future research.

The absence of husband however, is most indicative of contraceptive use in households. In the geographical region estimation, while the relationship between remittance and contraceptive use is still negative, it is not significant once the control for absence of husband is added, thus indicating that the income effect is no longer critical. The effect of additional income at the household level does seem to influence fertility in the way of the economic argument in the fertility region estimation. In the low fertility region, additional income is associated with decreased contraceptive use, thus increased fertility. This could be a result of prior fertility decisions linked to economics in this region; increased income might loosen the household budget constraint- which may have previously been the reason for low fertility. Now that there is additional income in the household, couples may take the decision to lower contraceptive use and increase fertility. In the intermediate fertility region, large sums of remittance are associated with increased contraceptive use, thus indicating the quantity/quality tradeoff. Another explanation for lower contraceptive use in the low fertility region could be the fact that since households already have low fertility, they use the additional income for purposes other than family planning, thus moving money they would have used for contraception to the purchase of other household goods. In the intermediate fertility region however, family planning is still seen as something that has priority over other goods, indicated by the positive association between contraceptive use and remittance.

In sum, while the experience of migration is indicative of contraceptive use and subsequent fertility decisions at the household level, additional income by way of remittances is also important. The sociological argument also has support in that the experience of migration exposes migrants to ideas about fertility norms in their new host destination- traditionally places with lower fertility and higher contraceptive use than migrant places of origin. In India, it has been shown that internal migration does not follow typical patterns of regions of high fertility (low contraceptive use) to regions of low fertility (high contraceptive use). Migration patterns in North India are the only ones where migrants go from low to high contracepting regions- from North to West India. This differential is positive, at 28% while in other patterns (E-N, W-S, S-W) show a negative differential (See Appendix). This could be an explanation for decreased contraceptive use in the total analytic sample for contraceptive differential. A further step in this should be to conduct separate regression analyses for each type of origin-destination flow.

Caldwell (1997) contends that the spread of the idea and means of fertility control are not sufficiently explained by economic change; instead it is only when social systems and consequence of these ideas are intertwined with economic change that contraceptive diffusion is fully explained. It can be said through this analysis that the act of migration and exposure to new fertility and contraceptive norms diffuse ideas of higher contraceptive use to households at origin. Economic change or additional income is a by-product of migration that has important implications on contraceptive use depending on level of fertility at origin.

Conclusion

The experience of migration itself is most indicative of increased contraceptive use- thus decreased demand for children, rather than additional household income in geographical analysis. This research also shows how the effect of migration on fertility is complex. Family planning programs targeted at increasing contraceptive use among women must thus consider the importance of migration and diffusion of ideas in influencing contraceptive decisions. Given that additional income may be associated with higher contraceptive use, there should also be a push to create income opportunities, particularly for women, to encourage more contraceptive use and reduce fertility. With increasing migration projected within and from India in the

coming years, contraceptive use may see more increases, associated with a further reduction in total fertility. Future studies should account for the potential influence of accumulated wealth, and how it manifests itself in family decisions regarding optimal family size. Further research is needed to ascertain the pathways that influence household economic decisions on the allocation of remittances, particularly with respect to family planning.

Table 1. Household Contraceptive Prevalence, Migration, and Remittance Patterns by Region of India

	N	Household contraceptive prevalence (%)	Households with a migrant (%)	Proportion of migrant households that receive remittance (%)
Geographical Region				
North	19,438	41.6	15.0	48.4
East	6,531	61.6	9.5	45.4
West	5,634	69.6	8.3	34.3
South	10,554	62.4	11.8	55.4
All India	*42,157*	*54.4*	*12.3*	*48.2*
Fertility Region				
Low	12,392	42.1	12.5	48.1
Intermediate	15823	46.2	9.7	44.2
High	12,942	53.0	14.8	50.6

Note: Geographical regions are divided as per the IHDS regional demarcations. North (Jammu & Kashmir, Himachal Pradesh, Uttarakhand, Punjab, Haryana, Delhi, Uttar Pradesh, Bihar, Jharkhand, Rajasthan, Chhattisgarh, Madhya Pradesh), East (Northeast, Assam, West Bengal, Orissa), West (Gujarat, Maharashtra, Goa), and South (Andhra Pradesh, Karnataka, Kerala, Tamil Nadu).

Source: IHDS 2004-2005, NFHS-3 2005-2006.

Table 2. Descriptive Statistics by Household Typology in India

	Household without a migrant	Household with a migrant	Household with a migrant, no remittance	Household with a migrant, with remittance
Household Characteristics				
Contraceptive Use	54.4	54.0	57.8	49.2
Rural	70.1	81.4	79.4	83.4
Muslim	11.2	11.7	10.8	12.7
Hindu	78.1	79.2	78.8	79.7
Exposure to media	63.9	61.8	62.0	61.5
Income (median)	27,547	22,221	28,480	14,494
Children ever born	2.6	2.8	2.9	2.7
Husband is migrant	0.0	26.4	15.7	37.8
Female characteristics				
Education				
None	47.0	49.8	50.6	48.7
Primary	31.0	27.8	28.9	26.5
Secondary	17.5	18.0	16.0	20.5
Higher	4.6	4.4	4.6	4.2
Desire for more children	14.2	11.8	10.7	13.1
Male characteristics				
Education				
None	24.8	23.8	20.9	27.8
Primary	31.1	28.6	28.0	29.4
Secondary	30.7	33.1	35.9	29.3
Higher	13.5	14.5	15.1	13.6
Desire for more children	14.1	11.7	10.5	13.0
Community characteristics				
Proportion of migrants in district	11.4	13.4	13.7	13.0
N	*37,506*	*4,761*	*2,459*	*2,302*

Source: IHDS 2004-2005.

Table 3. Migrant Characteristics by Migrant Household Typology and Migrant Destination

Migrant Characteristics (%)	Remittance non sending			Remittance sending		
	Same state	Another state	International	Same state	Another state	International
Proportion male	66.2	89.1	91.8	91.4	96.7	95.8
Destination of males	66.9	29.5	3.6	43.9	43.3	12.8
Education						
None	18.1	13.5	9.7	13.5	16.5	8.1
Primary	46.3	38.9	16.7	33.0	34.1	21.9
Secondary	25.2	35.4	44.3	37.3	40.6	51.2
Higher	10.4	12.2	29.3	16.3	8.7	18.8
Relationship to respondent						
Spouse	19.5	32.1	36.8	24.1	48.6	60.0
Child	62.1	57.8	62.4	60.3	44.8	36.2
Parent	16.7	5.8	0.9	8.3	2.2	0.7
Sibling	1.6	4.3	0.0	7.3	4.4	3.1
Age group						
0-14	32.1	9.5	7.7	2.0	1.2	0.0
15-29	40.5	57.7	36.4	41.7	52.8	27.2
30-44	17.2	22.4	51.2	38.2	35.6	57.6
45-59	5.6	7.3	4.7	13.6	9.2	14.6
60+	4.6	3.1	0.0	4.5	1.3	0.6
N	1,757	627	68	1,041	972	285

Source: IHDS 2004-20005

Table 4. Logistic Regression for Household Contraceptive Use in India and Migration

	Model 1	Model 2	Model 3	Model 4
Household Characteristics				
Household type (ref= No migrant)				
Migrant Household	1.11	1.16**	1.31***	1.31**
Log Income		1.21***	1.12***	1.10***
Contraceptive Difference			0.97***	0.97***
Rural			0.80***	0.76***
Muslim (ref= Hindu)			0.64***	0.58***
Media exposure			1.40***	1.42***
Proportion of migrants in district			0.53	0.58
Children ever born				1.15***
Female Characteristics				
Education (ref=none)				
Primary				1.06
Secondary				1.14
Higher				1.26*
Desire for more children				0.28***
Male Characteristics				
Education (ref=none)				
Primary				1.05
Secondary				0.98
Higher				1.10
Desire for more children				0.60***
N	*30,185*	*29,622*	*29,622*	*26,879*

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

Source: IHDS 2004-2005.

Table 5. Logistic Regression for Household Contraceptive Use in India and Remittance

	Model 1	Model 2	Model 3	Model 4
Household Characteristics				
Household type (ref= No remittance)				
Remittance (Rs. 100-10,000)	0.70**	0.80	0.76*	0.83
Remittance (Rs. 10,000+)	0.81	0.93	0.83	1.23
Log Income		1.21***	1.12*	1.08
Contraceptive Difference			0.98***	0.98**
Rural			0.80	0.75
Muslim (ref= Hindu)			0.39***	0.33***
Media exposure			1.50***	1.34*
Proportion of migrants in district			0.19	0.09
Children ever born				1.08
Female Characteristics				
Education (ref=none)				
Primary				1.08
Secondary				1.17
Higher				0.61
Desire for more children				0.32***
Male Characteristics				
Male education (ref=none)				
Primary				1.37
Secondary				1.14
Higher				1.71
Desire for more children				0.41*
Husband is migrant				0.66*
N	*3212*	*3012*	*3012*	*2439*

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

Table 6. Logistic Regression for Household Contraceptive Use and migration by Fertility Region in India

	Low Fertility Region	Intermediate Fertility Region	High Fertility Region
Household Characteristics			

	Low Fertility Region	Intermediate Fertility Region	High Fertility Region
Household type (ref= No Migrant)			
Migrant	1.28*	0.92	1.47***
Log Income	1.17***	1.03	0.96
Contraceptive Difference	0.97***	0.98***	0.98***
Rural	0.66***	0.69***	0.91
Muslim (ref= Hindu)	0.39***	0.55***	0.70***
Media exposure	1.66***	1.60***	1.95***
Proportion of migrants in district	0.003***	0.001***	0.025***
Children ever born	0.98	1.20***	1.00
Female Characteristics			
Education (ref=none)			
Primary	1.10	1.05	1.48***
Secondary	1.14	1.07	1.88***
Higher	1.41	1.39	1.54*
Desire for more children	0.20***	0.24***	0.30***
Male Characteristics			
Male education (ref=none)			
Primary	1.19	0.99	0.88
Secondary	1.02	0.82*	0.70**
Higher	0.97	1.00	067**
Desire for more children	0.39***	0.97	0.45***
N	*8278*	*10171*	*8430*

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

Table 7. Logistic Regression for Household Contraceptive Use and Remittance by Fertility Region in India

	Low Fertility Region	Intermediate Fertility Region	High Fertility Region
Household Characteristics			
Household type (ref= No remittance)			
Some (Rs. 100-10,000)	0.33***	1.56	1.31
High (Rs. 10,000+)	1.05	1.71*	0.88
Log Income	1.18	1.02	0.95

Contraceptive Difference	0.99	0.98***	0.98
Rural	0.44*	0.80	1.00
Muslim (ref= Hindu)	0.18***	0.66	0.33***
Media exposure	1.10	1.35	1.80**
Proportion of migrants in district	0.00	0.02	0.006*
Children ever born	0.93	1.30**	1.03
Female Characteristics			
Education (ref=none)			
Primary	0.96	1.54	1.46
Secondary	0.62	1.62	3.21**
Higher	0.63	1.34	0.73
Desire for more children	0.06***	0.48	0.80
Male Characteristics			
Male education (ref=none)			
Primary	1.09	1.92*	1.10
Secondary	1.08	0.90	0.88
Higher	1.33	1.25	1.19
Desire for more children	0.82	0.70	0.12**
Husband is migrant	0.42*	0.58	0.53*
N	*699*	*839*	*901*

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

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