

LINKAGES AMONG FERTILITY, MIGRATION, AND AGING IN INDIA

Apoorva Jadhav

A DISSERTATION

in

Demography

Presented to the Faculties of the University of Pennsylvania

in

Partial Fulfillment of the Requirements for the

Degree of Doctor of Philosophy

2014

Supervisor of Dissertation

Dr. Jere Behrman

William R. Kenan, Jr. Professor of Economics

Graduate Group Chairperson

Dr. Michel Guillot

Associate Professor of Sociology

Dissertation Committee

Dr. Jere Behrman, William R. Kenan, Jr. Professor of Economics

Dr. Michel Guillot, Associate Professor of Sociology

Dr. Devesh Kapur, Madan Lal Sobti Associate Professor for the Study of Contemporary India, Director,
Center for the Advanced Study of India

Dr. Emilio Parrado, Professor and Chair, Department of Sociology

LINKAGES AMONG FERTILITY, MIGRATION, AND AGING IN INDIA

COPYRIGHT

2014

Apoorva Narendra Jadhav

This work is licensed under the
Creative Commons Attribution-
NonCommercial-ShareAlike 3.0
License

To view a copy of this license, visit

<http://creativecommons.org/licenses/by-nc-sa/2.0/>

ACKNOWLEDGEMENTS

There are a number of individuals whose encouragement and support were central to the dissertation process and my general well-being. First, I would like to thank my incredibly supportive dissertation committee: Jere Behrman, Devesh Kapur, Michel Guillot, and Emilio Parrado for their thoughtful feedback on research ideas, guidance on methods, and reading drafts of each chapter. Special thanks to Devesh Kapur for always pushing me to answer the “So what?” question and keeping an eye on policy implications of my work in India. I am eternally grateful to the Center for the Advanced Study of India for fostering an incredibly rich intellectual and creative environment to work, particularly due to Juliana DiGuistini, Tanya Carey, Georgette Chryssanthakopoulos, Aparna Wilder, and Prakirti Nangia. I am grateful to Claudia Vallengia and the Population Aging Research Center at Penn for providing financial support to enable me to conduct my qualitative fieldwork in India. Staff at the Population Studies Center: Dawn Ryan, Yuni Thornton, and Tanya Yang helped me navigate administrative tasks, and I am thankful for them. The Demography Club was a wonderful outlet to engage with students across cohorts, discuss research, and share excitement about demography.

Thanks to an accidental summer internship at the United Nations Population Fund, I was able to begin what I hope will be a long-term engagement with aging research in India, and I am fortunate to call KM Sathyanarayana, Sanjay Kumar, and KS James as colleagues and friends. None of this work would be as critical or relevant without the continuous collaboration, friendship, and exhaustive attention to detail of Jamaica Corker and Emily Vala-Haynes. The rest of the 2010 Cohort: Abhijit Visaria, Li-Chung Hu, Daniela Marshall, Collin Payne, and Julio Romero helped make studying

for exams and celebrating successes easy. Special thanks to Ekim Cem Muyan for being a sounding board and my best critic on every single idea I sprouted.

I gratefully acknowledge the financial support of the University of Pennsylvania and the Center for the Advanced Study of India. My work has greatly benefited from the helpful comments of demographers at the Population Studies Center, and from conferences where I presented earlier drafts of my work at the 2011, 2012, 2013 annual meetings of the Population Association of America, 2012 meeting of the Asian Population Association in Bangkok, Thailand, and the 2013 meeting of the International Union for the Scientific Study of Population in Busan, Korea. Lastly, I am grateful to the institutions that collect, clean, and house the data I have used for my research: The India Human Development Survey at the University of Maryland, National Center for Applied Economic Research (New Delhi), United Nations Population Fund, Institute for Economic Growth (New Delhi), Tata Institute for Social Science (Mumbai), and Institute for Social and Economic Change (Bangalore).

Above all, the constant support, love, and reality checks provided by my family made this entire 4 year process go by incredibly quickly. To Narendra, Vasundhara, Tanmoy, Kejal, and Agastya Jadhav: Thank You.

ABSTRACT

LINKAGES AMONG FERTILITY, MIGRATION, AND AGING IN INDIA

Apoorva Jadhav

Dr. Jere Behrman

Rapid fertility declines in India have been occurring concurrently with economic growth, changing family dynamics, and a rise in the older population- consistent with the demographic transition. This dissertation explores these relationships using the India Human Development Survey (2005-06), Building a Knowledge Base on Population Aging in India (2011), and a qualitative study. First, I investigate the relationship between increased female autonomy in partner choice and length to first birth interval, and find two important mechanisms: Women with more educational attainment are more likely choose their own partner, delay marriage, “catch-up” with others and have their first child soon after marriage. Then, unsafe premarital sexual intercourse among unmarried women either during the period between engagement and marriage, or otherwise, that results in pregnancy can mean even shorter birth intervals. Second, I explore the relationship between internal migration, remittances, and contraceptive use. I find that households with a migrant have significantly higher contraceptive use than households without a migrant, but this relationship turns negative for women whose husbands are migrants, the “absence effect”. Remittances are associated with a decrease in contraceptive use, providing evidence for the “income/ideas effect”. Finally, I study various aspects of aging in India: living arrangements, health status, access to healthcare and pensions. I find that vulnerability of widows in old-age is a reflection of an accumulation of disadvantage that begins in early childhood, the urban poor are isolated in terms of living arrangements and

pension receipt, and that chronic diseases and disability are related to living arrangements and interaction with family. There are three noteworthy conclusions. First: Instead of interventions focusing solely on increasing age at marriage among women, the focus should also be on the timing of first birth. Second: Family planning programs targeted at increasing contraceptive use must consider the importance of migration, diffusion of ideas, and additional income in influencing decisions. Third: Integrating health and financial needs of elderly into existing national frameworks are essential for a segment of the population that is will continue to grow in the next 100 years.

TABLE OF CONTENTS

ACKNOWLEDGEMENTS	iii
ABSTRACT.....	v
LIST OF TABLES	viii
LIST OF ILLUSTRATIONS	x
INTRODUCTION	xi
CHAPTER 1: <i>Marriage Choice and Length to First-birth Interval in India: The Roles of Female Educational Attainment, Age at Marriage, and Premarital Sexual Intercourse</i>	1
Introduction.....	3
Background.....	4
Data and Methods	8
Results.....	14
Discussion.....	20
Conclusion	24
CHAPTER 2: <i>Internal Migration, Remittance, and Contraceptive Use in India</i>	35
Introduction.....	37
Literature Review and Theoretical Framework	39
Data and Methods	46
Results.....	53
Discussion.....	60
Conclusion	64
CHAPTER 3: <i>Living Arrangements, Health Status, and Pensions among the Elderly in India: A Mixed- Methods Study</i>	76
Introduction.....	77
Literature Review.....	79
Data and Methods	84
Results.....	91
Discussion.....	103
Implications	108
REFERENCES	128

LIST OF TABLES

Introduction

Table 1: Key Indicators for India from 1950 Projected Forward to 2100

Chapter 1

Table 1: Basic Indicators by Marriage Cohort at the Time of Survey

Table 2: Birth Interval Percentiles by Marriage Cohort and Marriage Choice

Table 3: Percentage Distribution of Basic Indicators by Marriage choice

Table 4: Multinomial Logistic Regression Results for the Determinants of Love and Joint Marriage Compared to Arranged Marriage

Table 5: Logistic Regression Results for the Determinants of Premarital Conceptions

Table 6: Cox Proportional Hazards model for Timing of First Birth

Chapter 2

Table 1: Migration Flows, Geographic and Fertility Regions, and TFR Differences (from NSS 64th Round, Table 24.1)

Table 2: Contraceptive Prevalence, Migration, and Remittances by Region of India

Table 3: Descriptive Statistics by Household Type

Table 4: Characteristics of Migrant by Remittance Sending Behavior

Table 5: The Absence Effect: Multinomial Logistic Regression and Multilevel Model for Contraceptive Use in India

Table 6: The Income/Ideas Effect: Multinomial Logistic Regression and Multilevel Model for Contraceptive Use in India

Table 7: Multinomial Logistic Regression for Migration by Low, Medium, and High Fertility Region by Type of Contraceptive Use

Table 8: Multinomial Logistic Regression for Remittance by Low, Medium, and High Fertility Region by Type of Contraceptive Use

Chapter 3

Table 1: Indian Population Trends from 1950-2100

Table 2: Mean Age at Marriage, Life Expectancy at Birth, and Literacy in India from 1901 to 2011

Table 3: Proportion of Population above Age 60 by State, Census of India 2011

Table 4: Mean Years of Education, Age at Marriage, and Age at Widowhood for Quantitative and Qualitative sample

Table 5: Percentage Distribution of Elderly by Type of Living Arrangement According to Residence and Sex

Table 6: Percentage Distribution of Elderly by Type of Living Arrangement and Background Characteristics

Table 7: Multinomial Logistic Regression for Odds of Living Alone or with Spouse Only

Table 8: Top 10 Chronic Morbidity Indicators (per 1,000) by Living Arrangement and Sex

Table 9: Monetary Transfers between Non Co-residing Child and Elderly by Living Arrangement

Table 10: Logistic Regression for Frequent Interaction from Children to Elderly

Table 11: Logistic Regression for Frequent Interaction from Elderly to Children

LIST OF ILLUSTRATIONS

Introduction

Figure 1: Population by Age Groups and Sex 1950-2100

Chapter 1

Figure 1: Kaplan-Meier Survival Curves for First-Birth Intervals by Marriage Choice and Marriage Cohort (<1979-2004)

Chapter 2:

Figure 1: Migration and Remittances Analytic Sample Flowchart

Chapter 3:

Figure 1: Main Reason for Living Alone or with Spouse Only

Figure 2: Mean ADL and IADL by Sex and Age Group

Figure 3: Source of Payment for Treatment of Chronic Morbidity by Living Arrangement

INTRODUCTION

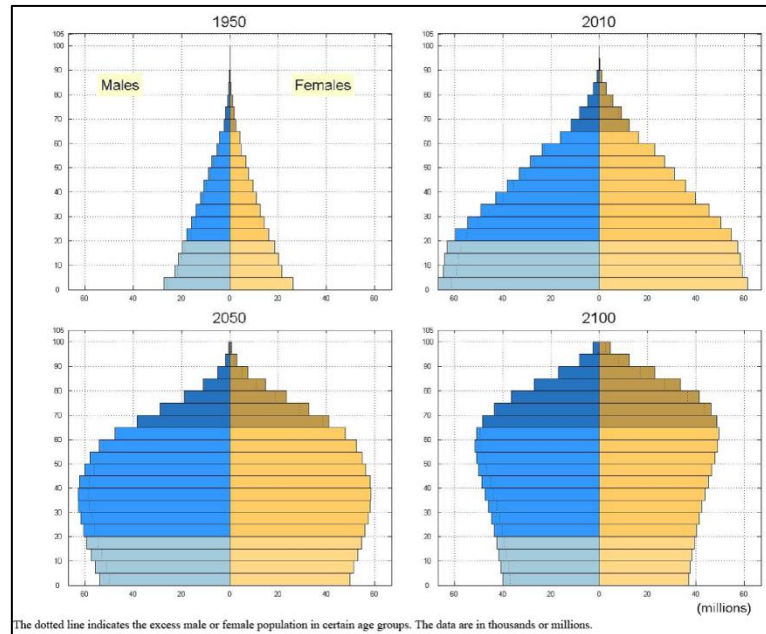
In the year 2011, the world added its 7 billionth inhabitant. That India holds the distinction of being the second most populous country in the world and is expected to overtake China for first position by the year 2025 is not new. The remarkable pace of fertility and mortality decline in recent decades however, is noteworthy. Demographers contend that India is now in the third phase of the demographic transition, with its birth rate fast approaching replacement level fertility of 2.1 children per woman (Haub & Gribble, 2011). It is important at this juncture to review key driving factors behind this transition and identify new population issues that will arise in order to match interventions that best address India's demographic challenges for the future.

Infant and child mortality declines have been the result of direct and indirect interventions that complement economic development. Direct public health interventions and governmental policies such as immunizations, access to clean sources of drinking water, improved breastfeeding practices, home-based treatment of diarrhea, and the introduction of supplementary foods have been critical in reducing the death rate (Claeson, Bos, Mawji, & Pathmanathan, 2000). Fertility declines have largely been due to effective public delivery of family planning services- particularly that of female sterilization. Promotion of reversible contraceptive methods is seen to be critical in determining birth spacing in the future, in order to further reduce fertility (James, 2011). Effective implementation of these direct interventions is contingent on indirect determinants of mortality and fertility decline. Particularly: female education, age at marriage, and household socioeconomic conditions. The confluence of direct and indirect determinants results in demographic change.

This dissertation builds on the idea that the linkage between indirect factors- increased female autonomy in partner choice, and increased migration and subsequent remittances- and direct factors- contraceptive use- are an under-studied yet important aspect of fertility decline. The major consequence of this fertility decline is population aging, and will continue to be an enormous public health and economic challenge in India in the next 100 years. I use increasing female autonomy in partner choice as a manifestation of changing social behavior and gender norms, and investigate the association with subsequent fertility in Chapter 1. Additionally, demographic changes taking place across the country's heterogeneous regions and states are often accompanied by heterogeneous socioeconomic changes (James, 2011). The increase of migration from high to low fertility regions within India brings with it remittances that improves the socioeconomic condition of the household. I investigate whether these remittances can be used as a proxy for the flow of lower fertility norms from migrant receiving to migrant sending regions of the country, and its subsequent reduction in fertility in Chapter 2. The last part of my dissertation focuses on population aging, which is the key demographic issue in India in the coming years. Figure 1 shows population pyramids for the years 1950 to 2100. It is evident that by the year 2050, while India will continue to boast a substantial demographic dividend, the population above age 60 is not negligible. In fact, India's population pyramid of 2100 looks remarkably similar to Europe's in 2010 (not shown), where issues of pensions, social security and healthcare among the elderly drove significant policy attention and debate. The study of population aging in India is currently is a nascent and exciting stage, given that relatively little is known about the current population above age 60, and policies targeted toward them are largely insufficient. In Chapter 3 I investigate living arrangements, health status, access to pensions and healthcare of

the elderly, and patterns of intergenerational transfers, using a mixed-methods approach.

Figure 1: Population by Age Groups and Sex 1950-2100



*Source: United Nations Department of Economic and Social Affairs/Population Division
World Population Prospects: The 2010, Volume II: Demographic Profiles*

In the section that follows, I briefly expand on each of my three proposed chapters and detail how they tie in to the larger narrative of India's demographic transition. For Chapters 1 and 2 I use data from the India Human Development Survey (2005-06) conducted by the University of Maryland and National Council for Applied Economic Research, New Delhi. For Chapter 3 I use data from the Building a Knowledge Base on Population Aging in India survey conducted by the United Nations Population Fund, India (2011) and a qualitative survey that I conducted in the summer of 2013.

Chapter 1: Marriage Choice and Length to First-birth Interval in India: The Roles of Female Educational Attainment, Age at Marriage, and Premarital Sexual Intercourse

The role of autonomy in partner choice is an important factor in the recent shortening of first-birth intervals in India. I use data from the India Human Development Survey (2004-05) to examine the linkages between female education, age at marriage, and premarital sexual intercourse. I find there are two mechanisms that potentially dictate the length of first-birth interval: First, women with more educational attainment are more likely to have a say in partner choice, delay age at marriage, and “catch-up” with other women and have their first child soon after marriage. Second, unsafe premarital sexual intercourse among unmarried women either during the period between engagement and marriage, or otherwise, that results in pregnancy can mean marrying that partner and having a first-birth sooner. This finding, a first for India, means that instead of interventions focusing solely on increasing the age at marriage among women in India, the focus should also be on the timing of first birth.

Chapter 2: Internal Migration, Remittances, and Contraceptive Use in India

This study examines the association between internal migration and contraceptive use of households at origin, and the mediating contribution of increased household income through remittances. The India Human Development Survey (2004-2005) is used to ascertain patterns of contraceptive use in households with and without migrants. Households with a migrant have significantly higher contraceptive use than households without a migrant, but this relationship turns negative for women whose husbands are migrants, consistent with the “absence effect”. Additional income is

important: In the full sample, additional income is associated with a decrease in contraceptive use, this providing evidence for the “income/ideas effect”. However, in low fertility regions (TFR at or less than 2.1), some remittances are associated with lower contraceptive use, while in intermediate fertility regions (TFR between 2.1 and 2.7), high remittances are associated with increased contraceptive use despite controlling for spousal absence, thus indicating an opposing “income/ideas effect” than seen above. Family planning programs targeted at increasing contraceptive use among women must consider the importance of migration and diffusion of ideas in influencing contraceptive decisions. Future studies should account for potential influence of additional income, and how it manifests itself in family decisions regarding optimal family size.

Chapter 3: Living Arrangements, Health Status, Access to Healthcare and Pensions, and Intergenerational Relations among the Elderly in India: A Mixed-Methods Study

Older individuals, women, widowers, those with no or female children, those that are highly functional and educated and who faced any abuse in old age are more likely to live alone or with their spouse only compared to co-residential arrangements. Those that are economically disadvantaged are more likely to live alone, thus indicating that financial status is strongly related to living arrangement in old age. There is a dual burden of disease among the elderly in India, with chronic and infectious diseases causing ill-health with private health clinics the most popular source of treatment, despite high cost. Access to healthcare and pensions is limited due to bureaucratic delays as well as familial impediments, an interesting finding given policy focus only on the institutional delays in accessing services. Women are dependent on their

caretakers for basic tasks such as visiting the doctor or getting a pension, and thus continue the cycle of financial dependence on their sons after being dependent for years on their husbands. Finally, there are major implications for healthcare overhaul for the elderly, particularly for mental health issues that continue to be heavily stigmatized.

Through these three chapters of my dissertation, I hope to demonstrate how changing social dynamics, migration, and fertility are linked. Additionally, while India continues to have other pressing demographic challenges, I hope to bring aging to the forefront in order spark creative debate on planning for the elderly as an aging dividend, rather than conceiving of them as a demographic burden.

Table 1: Key Indicators for India from 1950 Projected Forward to 2100

Key Indicators	1950-1955	1960-1965	1980-1985	2000-2005	2005-2010	2010-2015	2015-2020	2020-2025	2040-2045	2060-2065	2080-2085	2095-2100
Mortality												
Life expectancy at birth (years)	37.9	44.1	56.2	62.5	64.2	66.0	67.4	68.7	72.9	75.8	78.0	79.5
Male life expectancy at birth (years)	38.7	44.9	56.2	61.4	62.8	64.4	65.8	67.0	71.0	73.9	76.2	77.6
Female life expectancy at birth (years)	37.1	43.2	56.2	63.7	65.7	67.6	69.2	70.6	74.9	77.8	80.1	81.5
Life expectancy at age 15 (years)	39.0	43.8	51.4	54.0	54.9	56.1	57.2	58.1	61.1	63.3	65.1	66.3
Life expectancy at age 65 (years)	9.8	10.6	11.9	13.1	13.6	14.0	14.4	14.7	16.1	17.4	18.6	19.4
Fertility												
Total Fertility Rate	5.9	5.8	4.5	3.0	2.7	2.5	2.4	2.3	1.9	1.8	1.8	1.9
Mean age at childbearing (years)	29.3	29.3	27.1	25.5	25.3	25.5	25.7	25.8	26.1	26.2	26.2	26.2
Aging												
Child dependency ratio ¹	97.0	105.9	107.2	88.5	81.1	73.9	67.4	62.3	46.8	39.4	37.1	37.8
Old-age dependency ratio ²	6.4	6.4	7.6	8.3	8.7	9.0	9.5	10.9	17.3	28.0	38.8	47.0
Total dependency ratio ³	103.4	112.3	114.8	96.8	89.8	83.0	77.0	73.2	64.1	67.4	75.9	84.8
Median age (years)	21.3	20.1	20.1	22.7	23.9	25.2	26.6	28.1	34.3	39.9	43.9	45.8
Migration												
Net number of migrants (thousands)	-4	-86	362	-1923	-3000	-1315	-1306	-1310	-1088	-811	-344	0
Net migration rate (per 1,000)	0.0	0.0	0.1	-0.4	-0.5	-0.2	-0.2	-0.2	-0.1	-0.1	0.0	0.0

Source: United Nations Department of Economic and Social Affairs/Population Division- World Population Prospects: The 2010, Volume II: Demographic Profiles

¹ The child dependency ratio is the ratio of the population aged 0-19 to the population aged 20-64. They are presented as number of dependents per 100 persons of working age (20-64).

² The old-age dependency ratio is the ratio of the population aged 65+ to the population aged 20-64. They are presented as number of dependents per 100 persons of working age (20-64).

³ The total dependency ratio is the ratio of the population aged 0-19 and 65+ to the population aged 20-64. They are presented as number of dependents per 100 persons of working age (20-64)

CHAPTER 1: *Marriage Choice and Length to First-birth Interval in India: The Roles of Female Educational Attainment, Age at Marriage, and Premarital Sexual Intercourse*

Abstract

The role of autonomy in partner choice is an important factor in the recent shortening of first-birth intervals in India. I use data from the India Human Development Survey (2004-05) to examine the linkages between female education, age at marriage, and premarital sexual intercourse. I find there are two mechanisms that potentially dictate the length of first-birth interval: First, women with more educational attainment are more likely to have a say in partner choice, delay age at marriage, and “catch-up” with other women and have their first child soon after marriage. Second, unsafe premarital sexual intercourse among unmarried women either during the period between engagement and marriage, or otherwise, that results in pregnancy can mean marrying that partner and having a first-birth sooner. This finding, a first for India, means that instead of interventions focusing solely on increasing the age at marriage among women in India, the focus should also be on the timing of first birth.

Introduction

Traditional family-arranged marriages in India with limited female autonomy in partner choice are making way for more romantic unions, where women have a say in who they marry. This change coincides with increasing enrolment of youth in higher education, better nutrition, improved access to media and new technology, and exposure to new ideas about their roles and rights as individuals (Alexander, Garda, Kanade, Jejeebhoy, & Ganatra, 2006). These elements of modernization potentially include higher autonomy for women on many dimensions, including in choosing their spouses. As per the demographic transition theory, modernization, coupled with information campaigns, and expansion of family planning programs, is linked to a decrease in fertility (Coale in Eatwell, Milgate, & Newman, 1990). However, marital choice may actually inflate fertility estimates in the short term with couples in love marriages experiencing first birth sooner than those in arranged marriages (Rindfuss & Morgan, 1983). This “fertility squeeze” soon after marriage may have consequences for long-term fertility estimates in India.

In the context of this rapid transformation, I seek to update knowledge and analysis about decision-making regarding marriage and timing of first births. There are three important factors that are associated with the first-birth interval: age at marriage, female educational attainment, and frequency of intercourse. It is clear that all three are intertwined and exert influences on one another, leading to implications for the timing of first birth. India has experienced significant fertility decline (TFR 3.4 to 2.7) and postponement of marriage (age 16.7 to 17.2) between 1992 and 2005 alone (NFHS-32006). These changes have taken place while the institution of marriage is being redefined as more women are receiving an education and entering the labor

force. Examining these areas together is important to understanding future differences in fertility.

I explore the length from marriage to first birth stratified by marital choice. I define this choice not as a continuum, but as a triad of increasing autonomy: arranged, joint, and love. Since there has been a trend of increasing age at marriage, and increasing education across cohorts, I analyze these factors by marriage cohorts from 1962-2004. I find that women in love marriages face a greater risk of faster first birth after marriage, providing evidence for the “fertility squeeze” noted above. Age at marriage is important, but premarital sexual intercourse and female education compound marital choice and seem to be driving shorter first-birth intervals. This is the first study to the author’s knowledge that systematically documents the relationship between premarital sexual intercourse and the shortening of first-birth interval in India.

Background

There have been many academic discussions surrounding partner choice and fertility in Asia since the early 1990’s. Rindfuss and Morgan attribute increased autonomy in partner selection to increased frequency of sexual intercourse and premarital conceptions in Taiwan, Korea, and Malaysia (Rindfuss, Bumpass, & John, 1980), Hong (2006) demonstrates that increasing age at marriage combined with “free-choice” marriages were responsible for short first-birth intervals in China (Hong, 2006), while Malhotra attributes female education for increased freedom in partner selection and subsequent fertility behavior in Indonesia (Malhotra, 1991). It is worth revisiting the topic at this juncture with better, nationally representative data in order to see what this relationship looks like in India, which is undergoing the very change

now that other Asian countries were in the later part of the last century. That measure in itself can be seen as a proxy measure of changing gender relations within a society.

Age at marriage

Maintaining caste hierarchy was traditionally the reason for arranging marriages at young ages for women. In order to prevent any serious opposition, the youngest were married early enough to ensure that they could not acquire any resources with which to oppose adult decisions (Goode, 1970). Although the legal age for female marriage in India is 18, about half of all women get married before that age (NFHS-32006). Recently, Santhya *et al.* (2010) find that nearly 63 per cent of women in India had married before the age of 18 (Santhya *et al.*, 2010). Women who marry early tend to forego higher education, and this coincides with early childbearing (Blossfeld & Huinink, 1991; Rindfuss *et al.*, 1980). These women are also less likely to have been consulted on the timing of marriage and choice of spouse, as well as to have had an opportunity to get to know their spouse before marriage compared to women that married later than age 18 (Santhya *et al.*, 2010).

Empirical evidence for the link between age at marriage and first-birth interval shows an inverse relationship. Higher age at marriage and early marital fertility are shown to be linked (Hirschman, 1985), since women who postpone marriage might experience a “catch-up” effect, thus resulting in more conceptions early in marriage rather than seen for younger women. Hong (2006) argues that while age at marriage is important, it is not the central factor behind the shortening of the first-birth interval in Taiwan, instead demonstrating that the marital choice transition is the primary driving force (Hong, 2006).

Female educational attainment

Female education is inextricably linked to age at marriage. Additionally, women who have higher levels of educational attainment may be more likely to join the labor force compared to those with low education, thus postponing marriage further. Institutions of higher education and the workplace can also open up more opportunities to meet members of the opposite sex, and increase the likelihood and acceptability of choosing one's own partner. For instance, Hirschman (1985) proposed that women in modern sector employment and higher education have shorter first-birth intervals. This thesis supports Rindfuss and Morgan's hypothesis that highly educated women are more likely to enter romantic marriages than parentally arranged marriages (Rindfuss & Morgan, 1983). Female education has been shown to influence first-birth intervals in opposite ways. The negative relationship between education and fertility has been well established: women with higher education have longer first-birth intervals than women with lesser years of education (Zhenzhen, 2000). The ability to space birth intervals is also related to education due to increased access and knowledge about effective contraception. There has been some evidence however, that suggests increased age at marriage and female education lead to a catch-up effect in the timing of first births in India, where childbearing and marriage remain universal (Bhat & Halli, 1999a).

Postnuptial residence

The proximate determinants of fertility framework includes frequency of intercourse as an intermediate variable that links to fertility (Bongaarts, 1978a). Goode (1970) contends that this is an important, yet often overlooked variable. He suggests that in societies where wider kin interests dominate, arranged marriage and structural factors in the marital household work against the quick formation of intimate ties between young couples. Conversely, in societies characterized by individual interests, spouses'

prior knowledge of each other and their entry into marriages based on mutual attraction are likely to result in more emotional attachment. The results would be that in societies with the latter types of marriage- lack familial impediments to intercourse such as living with extended family, disapproval of expression of affection between young couples- and lead to faster births post marriage (Goode, 1970). Rindfuss and Morgan (1983) attribute greater frequency of intercourse to the “quiet sexual revolution in Asia” to suggest that the transition from arranged to romantically arranged marriages is responsible for increased coital frequency, which is linked to postnuptial residence away from either spouse’s parents in Taiwan and Korea (Rindfuss & Morgan, 1983). They also point out that not all modernizing forces lead to a decrease in fertility; a transition from arranged to love marriages increases sexual frequency and thus fertility in the short term at the very least. They conclude that marriage has been used empirically to construct measures of marital duration and fertility without any consideration of the important dimension of marriage that has bearing on fertility, which is frequency of sexual intercourse.

Premarital sexual intercourse

There is a high level of reproduction early on in marriage, which is a traditional way to prove one’s fertility or cement social status as a mother in India. From the time of marriage, a woman faces severe pronatalist pressure, thus contraceptive use is low (Desai & Andrist, 2010). Additionally, there is a relatively long interregnum between engagement and marriage in the country regardless of marital choice, which could foster close ties between the couple, and possibly prompt an even shorter birth interval. However, premarital sexual intercourse is still a taboo subject in India, and most surveys are not designed to capture sexual behavior outside of marriage. In a localized study in New Delhi, authors find that 6 per cent of adolescent girls and 32

per cent of adolescent boys report having had premarital sexual intercourse (Jaya & Hindin, 2009). The National Family Health Survey (NFHS) III included a sample of unmarried men and women for the first time in the history of the survey. From that, Subaiya (2008) finds that premarital sexual intercourse as reported in surveys is fairly low among women at 1.8 per cent. A comparison of the age at intercourse and the age at marriage for married women reveals that the majority of women who had premarital sexual intercourse report the start of sexual activity to have taken place in the year before marriage, confirming that it is likely that sexual activity takes place during the transition from engagement to marriage (Subaiya, 2008). Studies in China point to premarital sexual intercourse as a major transformative player in patterns of sexual and reproductive behavior since 1970 (Feng & Quanhe, 1996), coupled with an expansion in formal education for women. It is thus very possible that in a similarly traditional country that places an emphasis on female chastity, premarital sexual intercourse- particularly with one's fiancée- is gaining tacit social acceptance and is leading to shorter first-birth intervals.

Research Question

What are the determinants of different marriage types (love, joint, arranged) and premarital conceptions in India, and how are they associated with shorter or longer first-birth intervals?

Data and Methods

Data

The India Human Development Survey (IHDS) is a nationally representative sample of 41,554 households spread over 33 states and union territories interviewed between 2004 and 2005 (Desai *et al.*, 2009). The survey was designed to complement existing surveys in India by integrating social and economic indicators for analyses. It contains

detailed modules on women's birth history, marriage practices, and gender relations in India on 33,483 ever-married women. The median age at marriage for these women is 17; about 19% married before the age of 14, 37% married between 15 and 17, and 44% married past the legal age of 18. For purposes of this analysis, all women are considered regardless of age at marriage so as to capture the implications of early marriage. Of the 33,483 women interviewed, 31,062 had a first birth while 2,421 did not at the time of the interview. Not all women answered the question on marriage choice however, thus reducing the sample size. The final sample consists of 32,404 women who answered the question on marital choice, specifically, 1,857 (5.7 per cent) who did not have a first birth and 30,547 (94.3 per cent) who had a first birth at the time of interview.

Dependent variable: I construct the length to first-birth interval from the date of marriage and date of first birth. These dates were imputed values created by the IHDS investigators. Notably, 7.5 per cent of all women had a first birth between 0 and 8 months of marriage- which seems high even for pre-term births. Thus, the importance of investigating premarital sexual intercourse- is warranted.

Independent variable: I construct the main independent variable of marriage choice using responses to the question, "who chose your husband?" For respondents who chose "respondent herself", I code those as "love marriages", for others who chose "respondent and parents together", I code as "joint marriages", and for "parents alone" as "arranged marriages". In India, marital decisions are mainly within the purview of the family. However, this does not indicate that women have no say in one of the biggest decisions of their lives, thus should be examined as a continuum rather than a dichotomy. Mothers-in-law and older sisters-in-law are often asked to ascertain

the wishes of the young women since they will be the ones who incorporate the newest member into their fold (Desai & Andrist, 2010).

The main control variables as discussed in the section above are female educational attainment, age at marriage, and frequency of sexual intercourse. Female educational attainment is coded as none, primary (1-6), secondary (7-10), upper secondary (11-12) and higher (13+ years). Given that marriages tend to occur at very young ages, age at marriage is used as a continuous variable. I use postnuptial residence as a proxy to capture frequency of sexual intercourse since that is not directly asked in the survey, and is a measure that has been used before to determine intimacy (Hong, 2006). I categorize this variable as “alone” if the couple lives independently of the husband’s parents, with co-residence typically being the norm. Additionally, marriage cohorts are an important analytic variable that will hopefully capture time trends from 1955, and are in 5 year groups.

Other control variables used are caste and religion, spousal age difference, and dowry during marriage. Caste and religion are categorized as upper caste Hindu, lower caste Hindu (other backward class, *Dalit*), *Adivasi* (tribal), Muslim, and Other (Sikh, Christian). Spousal age difference is classified as between 0-2 years, 3-5 years, and 6+ years. Dowry is an interesting aspect of Indian marriages, which continues even today albeit being deemed illegal. I use principle component analysis to create a measure of low, medium, or high dowry exchange during marriage. I assign a weight or factor score for each dowry asset for which information is collected. I then standardize the resulting asset scores in relation to a standard normal distribution with a mean of zero and standard deviation of one. These standardized scores are then used to create the break points that define dowry tertiles. The variables I use to create this measure are the responses to the question “generally in your community for a family like yours, is

“X” given as a gift at the time of the daughter’s marriage?” These gifts included gold, silver, land, car, scooter, television, refrigerator, furniture, pressure cooker, utensils, mixer/grinder, bedding, watch, bicycle, sewing machine, livestock, tractor, or cash. Since spousal age difference and dowry may be determined simultaneously with the main variables of interest (marriage choice, age at marriage, educational attainment), the regression results include models with and without them as controls to see whether the main results remain robust since dowry decisions can be endogenous to marriage choice.

Controlling for geographical region is paramount, due to distinct cultural differences between the north and the south of India particularly when it comes to marital customs. Dyson & Moore’s (1983) seminal regional analysis typifies north Indian society as one where marriage is largely exogamous. The act of marriage in the north is preceded by a search for inter-group alliances, and women usually have no choice in the matter. The “wife givers” are socially and ritually inferior to the “wife takers”, and dowry is the main marriage transaction. South Indian society on the other hand is more endogamous, with the ideal marriage occurring between cross-cousins. Women are much more likely to be married to known persons from familiar households near their natal home. Dowry is not important, however bride wealth is- and contributions to the expenses of the marriage ceremony are likely to be more equally shared by the kin groups of the bride and groom compared to their counterparts in the north (Dyson & Moore, 1983). In a study in south India, women who marry young (less than 18) are less likely to have been involved in any decision-making surrounding partner choice (Bloom & Reddy, 1986). This could be related to the more traditional family backgrounds of women who marry early and the difficulties these women encounter in asserting themselves when important decisions are being made, such as marriage

(Santhya, *et al.*, 2010). India is a religiously pluralistic society, and studies find that Muslim women tend to get married earlier than Hindu women, while caste differences are negligible (Caldwell, Reddy, & Caldwell, 1983). In this analysis, the regional breakdown by state corresponds to IHDS demarcations: North: Jammu and Kashmir, Himachal Pradesh, Uttarakhand, Punjab, Haryana, Delhi, and Uttar Pradesh; Central: Madhya Pradesh, Chhattisgarh, and Orissa; East: Bihar, Jharkhand, West Bengal, Assam, and Northeast states; West: Rajasthan, Gujarat, Maharashtra, and Goa; South: Kerala, Karnataka, Tamil Nadu, and Andhra Pradesh.

Methods

There are two main steps for the analysis. First, it is necessary to understand the basic determinants of different marriage types. I use a multinomial logistic regression approach to examine determinants of love and joint marriage, using arranged marriage as the base reference category. This method allows the modelling of complete information using multiple outcomes (love, joint, and arranged marriage) in a single analysis. This is preferable compared to logistic regression analysis that combines multiple binary outcomes into a single categorical outcome and can mask important relationships between outcomes and predictors (Lu & Yang, 2012). Additionally, I conduct a logistic regression analysis to analyze the determinants of having a premarital conception (at or before month 8 post-marriage). This helps further tease out the mechanisms that are associated with fast first-birth intervals.

After establishing the relevant predictors for each marriage type and premarital conceptions, first I use survival analysis to determine the length to first-birth interval since the main outcome of interest is the time to the occurrence of an event rather than whether or not the event has occurred. Women are right censored if

they have not experienced a first birth (“failure”) by the time of the survey in 2004-2005. Survival analysis is appropriate for these women whose failure times are unobserved, assuming that censored cases do not differ from those that remain under observation, and that survival experiences do not change over the course of the study. This is likely to be true, given that age at marriage has remained relatively constant over the decades under consideration. I begin with Kaplan-Meier estimates using nonparametric analysis to estimate the probability of survival (or the event of birth) past a certain time and compare the survival experiences by marriage choice and marriage cohort. I make no assumptions about the distribution of the failure times or how the covariates serve to change the survival experience. I formally test the equality of survival functions across marriage choices using the Wilcoxon rank test, which places more weight to earlier failure times when more subjects are at risk, rather than for failures later in the distribution (Cleves, Gutierrez, Gould, & Marchenko, 2010).

Second, I use semi-parametric Cox proportional hazards models to estimate the timing of first birth. The advantage of using this method is that the baseline hazard is not parameterized in a specific way and can be left unestimated, and makes no assumptions about the shape of the hazard over time (Cleves *et al.*, 2010). In order to test the assumption of proportional hazards, I include robustness tests using Schoenfeld residuals. After which, based on the recommendation of Cleves *et al.* (2010), I interact certain variables with duration of time (months) as a method to deal with variables with nonproportional hazards. Additionally, I also include key interaction terms in the models based on literature: education and age at marriage, education and year of marriage.

Results

It is clear that female education, age at marriage, postnuptial residence and premarital sexual intercourse are important predictors of marital choice. In order to examine these trends and how they relate to the first-birth interval, it is informative to separate these by marriage cohorts, or 5 year marriage groups to investigate change over time (Table 1).

First-birth interval and marriage choice

From the marriage cohorts spanning pre-1979 to 2004, the median first-birth interval has decreased dramatically, from 42 months to 18 months respectively. It is important to note that the most recent marriage cohort (2000-04) includes about 31 per cent of women who did not have a birth by the time of the interview. That is not to say that these women will not have a first birth, it is just that the timing of birth occurs after the survey. Survival analysis has been shown to be the best way to deal with these censored cases (Nath 1993; Hong 2006). Similarly, the proportion of women choosing their own partners has also seen an increase, from 3.2 per cent in the earliest marriage cohort, to 7.4 per cent by 2000-04. The proportion of arranged marriages has dropped six percentage points from 65.8 per cent before 1979 to 58.5 in the 2000-04 marriage cohort. It is evident then, that a new indicator of fertility may be important to consider, that of partner choice.

Age at marriage, education, premarital sexual intercourse, and postnuptial residence

First, median age at marriage has increased, from age 15 in the first marriage cohort to age 19 in the most recent. Second, female education has seen dramatic improvement, with early cohorts reporting none to low median education levels, rising to secondary education (8 years) by later marriage cohorts. Third, there has not

been much change in levels of postnuptial residence, if anything; recent cohorts show a decline in independent living. This can be a bit misleading however, because those that report independent living could actually be living very close, if not next door to the husband's and/or wife's parents. For example, the mean distance to woman's natal family is 3.5 kilometers and has not changed over cohorts (not shown), thus signaling residential clustering among families. Finally, there has been a slight uptick of births occurring within 8 months of marriage, defined here as premarital conceptions. From 3.7 per cent in the earlier marriage cohorts, reaching a high of 6.9 per cent in the 1995-99 marriage cohort. Given what we know about socially sanctioned sexual relations after a formal engagement, this could be a contributing factor to premarital conceptions, or it could signal premarital conceptions leading to forced or "shotgun" marriage.

[TABLE 1 ABOUT HERE]

Trends over time and marriage choice

Indeed, there has been an appreciable shortening of the first-birth interval over time, and more so by marriage choice. For the entire sample, a quarter of all women had a first birth by month 21 in earlier birth cohorts, while it was month 13 in 1995-1999 (Table 2). Similarly, 75% of all women in earlier birth cohorts had a first birth by year 7 of marriage, or month 84, compared to year 3, or month 38 in later marriage cohorts. This trend is amplified once examined by marriage choice. For example, a quarter of women in earlier marriage cohorts reported a first birth by month 17 for love marriages, compared to month 23 for those in an arranged marriage in the same time period. Compare this to recent marriage cohorts, and the pattern remains: a quarter of women reported a first birth by month 11 for those who had a love married

in 1995-1999 compared to month 14 for those who had an arranged marriage then. Two things are thus apparent- overall, birth intervals have shortened, but women in love or joint marriages still have shorter birth intervals in comparable time periods compared to women in arranged marriages.

[TABLE 2 ABOUT HERE]

Figure 1 shows three central nuances emergent from Kaplan Meier estimates shown here until month 60 after marriage: First, length to first birth has shortened incrementally between cohorts. Second, couples in love marriages across marriage cohorts have shorter first-birth intervals, followed by those in joint marriages, and then, arranged marriages. Finally, the gap between the three has closed dramatically over time within cohorts. By the eighth month of marriage, 9 per cent of women in love marriages have had a first birth, while 6 per cent of those in arranged marriages experienced the same. At exactly 9 months of marriage, these proportions have increased, with 12 per cent in love marriages and 8 per cent in arranged marriages having a first birth. By the first year of marriage, 26 per cent of women in love marriages have had a child compared to 18 per cent of those in arranged marriages. This difference expands at the end of 2 years of marriage, with the proportions at 62 per cent and 47 per cent respectively. It is also evident from the overlapping curves that the proportional hazards assumption is violated. I thus interact these variables with duration of time in order to correct for it as recommended (Cleves *et al.*, 2010) for multivariate analysis.

[FIGURE 1 ABOUT HERE]

Table 3 shows descriptive statistics of key indicators by marriage choice. Age at marriage does not seem to differ greatly by marriage choice: women in love marriages

marry one year after those in arranged or joint marriages on average, at age 18 compared to age 17. There are some differences by education level: 38 per cent of women in love marriages are uneducated compared to half of those in arranged marriages. Postnuptial residential differences by marriage choice are even starker- 15 per cent of those in love marriages live independently of the husband's parents compared to 9 per cent in joint marriages and 4 per cent in arranged marriages. Women in love marriages are slightly less rural, at 71 per cent compared to 74 per cent in arranged marriages. The proportion of women reporting premarital conceptions is also higher for those in love marriages at 8 per cent, followed by 7 per cent of those in joint and 5 per cent in arranged marriages. There does not seem to be a noticeable difference in spousal age gap or caste/religion and marriage choice, save for *Adivasis* reporting higher proportions of love marriages while Muslims report lower levels of love marriages. By wealth quintile, there seem to be minor differences, with affluent women reporting higher levels of love marriage, while arranged marriages are slightly higher among women belonging to lower wealth quintiles. Interestingly, the number of dowry items is different across marriage choice. About 35 per cent of women in love marriages report a low dowry level compared to 39 per cent in joint, and 30 per cent in arranged marriages. Surprisingly, among love marriages, 44 per cent report medium dowry compared to 35 per cent joint and 37 per cent arranged marriage. This is certainly an interesting finding, and could point to higher dowry demands for couples that go against their parents' wishes and choose their partners themselves. Marriage choices are different by geographical region as well, with 30 per cent of women in the south reporting love marriages compared to only 9 per cent in the north.

[TABLE 3 ABOUT HERE]

Regression results

In order to determine the validity of differing birth intervals by marriage choice, it is important to first examine important determinants of the different marriage types. Using multinomial logistic regression with arranged marriage as the base outcome, I find that there do seem to be noticeable differences in who chooses a love or joint marriage compared to arranged marriage. Higher levels of education and age at marriage, and experiencing a premarital conception are positively associated with love or joint marriages even after controlling for marriage cohort groups. In fact, levels of education and marital age groups follow a gradient pattern, thus showing that increasing levels show a higher likelihood of marriage types other than arranged marriage. Additionally, women who belong to lower castes (*Dalits*), or tribals (*Adivasis*) are significantly more likely to have love marriages. Interestingly, women in the “other” category for religion which includes Sikhs and Christians are significantly more likely to have a joint marriage compared to upper caste Hindus. There seems to be no significant relationship between wealth quintile and marriage choice, which is likely due to income measures taken only at the time of survey, and not at the time of marriage. Belonging to a rural area does not seem to have a significant association with either marriage group. This is potentially due to the fact that the measure is current place of residence rather than residence at the time of marriage.

[TABLE 4 ABOUT HERE]

There are specific determinants of premarital conceptions (0-8 months), as shown in Table 5. Women who have love or joint marriages have a higher odds of premarital conceptions compared to women in arranged marriages. Other variables that are

associated with a higher likelihood are increasing age at marriage, and being in more recent marriage cohorts. On the other hand, women in the highest educational attainment category, rural women, and those in the lower castes have a lower likelihood of premarital conceptions.

[TABLE 5 ABOUT HERE]

Cox proportional hazards modelling for a first birth after marriage show just how much faster women in different marriage choices have their first birth. Compared to arranged marriages, those in love marriages have a significantly faster hazard of having a first birth as shown in Table 6. A negative coefficient means a lower hazard of having a first-birth, which implies a longer first-birth interval. Model 1 shows that increased education and age at marriage are significantly associated with short birth intervals. Year of marriage is included in the analysis to control for any long-term trend in the data, which spans close to 50 years, and shows that every additional year is associated with a 2 per cent greater hazard of first birth. Once demographic controls are added, this relationship attenuates for education, but remains strong for age at marriage (Model 2). For example, with every increased year of postponement of marriage, the hazard of having a shorter first-birth interval increases by 39 per cent. Similarly, the hazard of having a shorter birth interval is higher for women who have primary or secondary education compared to women with no education. Women in rural areas or who live alone have longer birth intervals compared to their counterparts in urban areas or who live with the spouse's parents after marriage. Additionally, higher spousal age difference is associated with a faster hazard to first birth compared to low spousal age difference (0 to 2 years). Religion and caste seem to be important- Muslim and Sikh/Christian women have much shorter birth intervals than upper caste Hindu women. There is a gradient for the relationship between

wealth quintile and length to first-birth interval, with richer women experiencing shorter birth intervals. The only interactions that are significant are education and year of marriage, and education and age at marriage and are included in Model 3. Interestingly, increasing education and marriage cohort show lengthening of birth intervals over time, while increasing levels of education and age at marriage interact to create shorter birth intervals. Model 4 includes interaction with duration to correct for variables that violated the proportional hazards assumption (See methods section). At the time of marriage, women in love marriages have a 30 per cent faster hazard of first birth than women in arranged marriages. Over time, these women have a slightly (1 per cent) lower hazard of first birth. Model 5 does not include spousal age difference and dowry as controls to see whether the relationship between marriage choice, educational attainment, and age at marriage and first birth hold even after these variables are removed. The results remain robust to their omission.

[TABLE 6 ABOUT HERE]

Discussion

In sum, women who have love marriages, are more educated, are older at the time of marriage, are Muslim, have large spousal age difference, and are richer have shorter first-birth intervals, while rural women and couples who live alone postnuptially have longer first-birth intervals. There is an additive relationship for marriage year and education as well as education and age at marriage, but surprisingly not for love marriage and education or love marriage and age at marriage.

The study of first-birth intervals is important for studying subsequent fertility, fertility decline, and overall population growth (Nath, Singh, Land, & Talukdar, 1993). The length of first-birth intervals is said to influence future spacing and

unwanted childbearing, which plays a major role in total fertility of populations (Trussell & Menken, 1978). Theoretically then, populations that have longer first-birth intervals would experience the most reduction in fertility. What we are seeing here instead is *shorter* birth intervals even though total fertility is decreasing. In fact, first-birth intervals appear to be shortening over time for all women, irrespective of their marital choice, but even more so for women who have a say in who they marry. This is counter to theories, and needs further research to ascertain whether pronatalist pressure still exists, and is higher for women who postpone marriage as a potential compromise. I find that increasing autonomy in partner choice along with higher levels of educational attainment and delayed age at marriage are the most important factors that explain that paradoxical phenomenon.

In India, there exists severe pronatalist pressure from the family to have a child soon after marriage (Malhotra, Vanneman, & Kishor, 1995), resulting in low contraceptive use in that period. There appears to be a shortening of the first-birth interval over time, and is explained in large part by the change in the frequency of sexual intercourse. Earlier, it was understood that after marriage, a woman would visit her natal family and relatives for an extended period of time, and that social customs such as mandatory abstinence on full moon days would be followed, resulting in long first-birth intervals (Nath *et al.*, 1993). These customs seem to be more relaxed now, which may help explain the shortening of birth intervals over time simply due to increased time spent together by the couples. Basu (1993) concludes just that, and finds that age at marriage is a poor index for differences in age at first birth, and that exposure to sexual intercourse within the first years of marriage explains differences in the length of birth interval in different regions of India (Basu, 1993). In fact, the author convincingly proposes that this variable should be an important proximate

determinant of fertility when looking at cultures like India that have undergone drastic changes in values and behavior like an increase in romantically arranged marriages. Rindfuss and Morgan (1983) argue that the increase in premarital sexual intercourse and love marriages are responsible for the shortening of the birth interval in East Asia (Rindfuss & Morgan, 1983), and I propose that the same mechanism is at work in India, the first time this has been empirically demonstrated in the country. The positive relationship found between premarital conceptions and love and joint marriages rather than in arranged marriage supports this theory.

There is interplay with education and age at marriage that results in even shorter first-birth intervals for women who exercise some level of autonomy in marital choice. There are two potential mechanisms that could explain this in a country where marriage and childbearing continue to be universal: First, women who are more educated tend to delay marriage, and are more likely to choose their own partners. Due to the fact that they have delayed marriage, there is a “catch-up” effect where they have their first child soon after marriage. There is much support for this theory, largely coming from Asia (Hong, 2006; Rindfuss & Morgan, 1983; Zhenzhen, 2000) with an emphasis on the role of increased autonomy in partner choice as the driving force. What makes India unique is that age at marriage has increased somewhat over time, while the age at first birth has not. Bhat and Halli (1999) propose that while marriages of women are delayed, childbearing occurs at an accelerated pace once marriage occurs (Bhat & Halli, 1999b). Second, unmarried women who are sexually active and get pregnant may be forced to marry their partner rather than get an abortion. There is evidence that shows that reported premarital sexual intercourse is on the rise, and that much of this is unprotected (Abraham & Kumar, 1999), which could indicate support for the second proposed mechanism. The

main nationally representative surveys in India do not capture sexual activity of unmarried women, but hopefully will be something that will be rectified in the future in light of this change in social attitudes. The role of autonomy in partner choice seems to be an overlooked factor that seems to explain the two mechanisms mentioned above. Decision-making as it relates to partner choice could be a proxy for increased female autonomy in other spheres, and thus a measure of social change.

The postnuptial residence finding in this paper is counter to other Asian countries. It is said that independent postnuptial residence is related to shorter birth intervals due to the purported ability to have closer ties and increased frequency of sexual intercourse without parental control (Rindfuss and Morgan 1983). In India, this does not seem to be the case, with couples living alone actually showing longer birth intervals than those who live with the husband's parents. This does not seem far-fetched due to the dynamic of co-residential structures in India post-marriage. Typically, parents in India expect their married sons to live with them and defer to parental authority in various decisions, including those related to fertility (Das Gupta *et al.*, 2003; Das Gupta, 1996). It is not surprising then, that navigating these hierarchical structures can result in longer first-birth intervals for couples since they escape the everyday familial pressure to have a child soon after marriage. Additionally, living with parents ensures in-built childcare and a support system that may ease the decision to have a child early in the marital process.

There is evidence that religion plays a role in the length to first-birth intervals, with Muslim, Sikh, and Christian women demonstrating shorter first-birth intervals than their Hindu counterparts. There has been much discussion on the Hindu-Muslim differentials in fertility, with the reasoning that Muslim women have much lower levels of contraceptive use than Hindu women (Dharmalingam & Morgan, 2004;

Morgan, Stash, Smith, & Mason, 2002) and that Muslim women prefer temporary methods of family planning versus sterilization, which is the preferred method by the Indian government's national policy (Mishra, 2004). These results support other findings that suggest that families with a higher level of income have shorter birth intervals. The explanation is that these families prefer smaller families, largely since they do not have to depend on their children for economic or social support in their old age. Additionally, higher economic status can also influence fertility level by reducing infant mortality (Nath, Land, & Goswami, 1999).

There are several limitations to this study that must be noted. First, several socioeconomic determinants of marriage choice are measured at the time of survey, rather than at the time of marriage. These include place of residence and wealth quintile, but are not expected to influence results greatly, since they are unlikely to change appreciably over the life course. Second, we do not have a measure of female employment at the time of marriage, which could increase estimates of the proportion of women who have a say in partner choice. In fact, the only female employment measure that exists is also inadequate to understand work history- it asks whether the respondent worked more or less than 10 days in the last 12 months preceding the survey. Finally, we do not have a measure of the frequency of sexual intercourse, or premarital sexual intercourse since this is not asked in Indian surveys, but I construct a measure of premarital conceptions and use postnuptial residence indicator as best proxies for each.

Conclusion

In sum, marital choice is an important consideration when examining the length to first-birth interval. The critical pathway seems to be how marital choice works in conjunction with female education in shortening the interval. Increasing age at

marriage is also important, and works to shorten the timing of first birth. Given that the increasing proportion of births before month 8 has increased between marriage cohorts for all marriage choice types, the role of premarital sexual intercourse- or at least from the time of engagement rather than marriage- seems to be important, and warrants further research. Current national family planning policies in India are focused on increasing the legal age at marriage. This paper shows that the focus instead should be on: introducing sexual education in schools to advocate safe sexual intercourse, increasing the acceptability of contraceptive use early in marriage, and on the timing of first birth.

Table 1: Basic Indicators by Marriage Cohort at the Time of Survey

	<1979	1980-1984	1985-1989	1990-1994	1995-1999	2000-2004	Total
No birth by time of interview (%)	1.3	1.2	1.7	1.7	4.1	31.1	5.8
Premarital conceptions (birth within 8 months of marriage)	3.7	6.1	5.9	6.6	6.9	5.3	5.8
Birth Interval (median)	42.0	29.0	25.0	23.0	22.0	18.0	25.0
Age at marriage (median)	15.0	16.0	17.0	17.0	18.0	19.0	17.0
Female education (median)	0.0	0.0	2.0	5.0	6.0	8.0	4.0
Postnuptial residence (% alone)	6.4	6.9	6.6	6.3	5.9	5.6	6.3
Spousal age difference (median)	5.0	5.0	5.0	5.0	5.0	4.0	5.0
Love marriage (%)	3.4	5.0	4.0	4.7	6.3	6.8	4.9
Joint marriage (%)	30.9	34.1	36.6	34.0	35.3	34.8	34.4
Arranged marriage (%)	65.8	60.9	59.4	61.4	58.4	58.5	60.7
N	4,849	5,477	6,097	6,066	5,572	4,343	32,404

Table 2: Birth Interval Percentiles by Marriage Cohort and Marriage Choice

All marriage types						
Percentiles	<1979	1980-1984	1985-1989	1990-1994	1995-1999	2000-2004
25%	21	15	15	13	13	11
50%	42	29	25	23	22	18
75%	84	57	48	42	38	28
N	4,849	5,477	6,097	6,066	5,572	4,343
Love marriage						
Percentiles	<1979	1980-1984	1985-1989	1990-1994	1995-1999	2000-2004
25%	17	14	14	13	11	12
50%	33	24	21	21	18	19
75%	80	44	37	36	29	31
N	158	244	248	278	345	299
Joint marriage						
Percentiles	<1979	1980-1984	1985-1989	1990-1994	1995-1999	2000-2004
25%	18	15	14	12	13	13
50%	37	27	25	21	21	21
75%	77	54	48	39	37	35
N	1,693	2,058	2,339	2,224	2,118	1,650
Arranged marriage						
Percentiles	<1979	1980-1984	1985-1989	1990-1994	1995-1999	2000-2004
25%	23	16	15	14	14	13
50%	45	31	26	24	23	22
75%	86	59	49	45	40	36
N	2,985	3,148	3,480	3,532	3,086	2,367

Table 3: Percentage distribution of Basic Indicators by Marriage Choice

		Love	Joint	Arranged	Total
Age at marriage	Median	18.0	17.0	17.0	17.0
Education (female)	None	37.6	42.6	52.1	48.1
	Primary (1-6)	19.7	18.8	18.5	18.7
	Secondary (7-10)	29.6	27.0	22.4	24.3
	Higher secondary (11-12)	6.3	6.0	3.6	4.6
	Higher (13+)	6.9	5.6	3.4	4.3
Live independently of spouse's parents		14.7	9.2	4.0	6.3
Rural		71.2	67.2	74.3	71.7
Premarital conceptions		8.0	6.9	5.0	5.8
Spousal age difference	0-2 years	22.0	19.6	21.0	20.6
	3-5 years	43.9	40.8	44.5	43.2
	6+ years	34.1	39.7	34.5	36.3
Caste/Religion	Upper Caste Hindu	19.7	20.9	20.3	20.4
	Lower Caste Hindu	54.4	56.5	59.4	58.2
	Adivasi/Tribal	15.5	8.1	6.3	7.4
	Muslim	7.8	11.0	12.1	11.5
	Other	2.7	3.6	2.0	2.6
Wealth Quintile	Lowest	19.5	18.3	20.3	19.6
	Second	19.0	19.5	20.3	20.0
	Middle	19.0	19.4	20.9	20.3
	Fourth	20.4	20.1	20.4	20.3
	Highest	22.0	22.7	18.1	19.8
Dowry	Low	35.4	38.6	30.5	33.5
	Medium	44.4	35.6	37.1	37.0
	High	20.2	25.9	32.4	29.6
Birth cohort	<1964	17.6	19.2	19.0	19.0
	1965-1969	16.5	20.2	19.2	19.4
	1970-1974	18.9	20.3	19.2	19.6
	1975-1979	22.1	20.5	20.2	20.4
	1980+	24.9	19.8	22.5	21.7
Marriage cohort group	<1979	10.8	14.2	17.1	15.8
	1980-1984	16.8	16.4	16.6	16.5
	1985-1989	15.4	20.5	18.8	19.2
	1990-1994	17.4	18.2	18.6	18.4
	1995-1999	21.7	17.5	16.4	17.0
	2000-2004	17.9	13.3	12.6	13.1
Geographical region	North	9.1	15.1	25.5	21.1
	Central	6.0	12.4	11.7	11.7
	East/Northeast	35.1	15.5	24.7	22.1
	West	19.4	24.8	18.2	20.6
	South	30.3	32.2	19.9	24.6
N		1,582	12,148	18,674	32,404

Table 4: Multinomial Logistic Regression Results for the Determinants of Love and Joint Marriage Compared to Arranged Marriage

	Love marriage		Joint marriage	
	RRR	SE	RRR	SE
Education (ref: none)				
Primary (1-6)	1.41*	0.19	1.15**	0.05
Secondary (7-10)	1.52***	0.16	1.20**	0.06
Higher secondary (11-12)	1.83***	0.25	1.49***	0.14
Higher (13+)	1.88***	0.26	1.25*	0.13
Age at marriage	1.09***	0.01	1.06***	0.01
Premarital conception (ref: no)	1.45**	0.15	1.27***	0.06
Rural (ref: urban)	1.10	0.12	0.86	0.06
Religion (ref: Upper caste Hindu)				
Lower Caste Hindu	1.13	0.11	1.06	0.07
Adivasi/Tribal	3.43***	0.53	1.57***	0.15
Muslim	0.88	0.15	1.07	0.11
Other	0.94	0.21	1.37*	0.16
Wealth Quintile (ref: Lowest)				
Second	0.96	0.12	1.03	0.07
Middle	0.90	0.14	0.94	0.04
Fourth	0.94	0.10	0.92	0.07
Highest	0.97	0.10	1.04	0.05
Marriage cohort (ref: <1979)				
1980-1984	1.39*	0.22	1.06	0.05
1985-1989	1.04	0.14	1.12	0.09
1990-1994	1.11	0.14	0.95	0.07
1995-1999	1.43*	0.22	0.98	0.06
2000-2004	1.36*	0.22	0.89	0.09
Geographical region (ref: North)				
Central	1.14	0.25	1.81***	0.12
East/Northeast	3.47***	0.41	1.06	0.09
West	2.46**	0.59	2.19***	0.26
South	3.74***	0.85	2.60***	0.35
Constant	0.004		0.086	

Note: Levels significant at *10 per cent, **5 per cent, and ***1 per cent.

Table 5: Logistic Regression Results for the Determinants of Premarital Conceptions

	Odds Ratio	SE
Arranged Marriage (ref)		
Love	1.45***	0.15
Joint	1.27***	0.06
Education (ref: None)		
Primary (1-6)	1.06	0.15
Secondary (7-10)	0.87	0.10
Higher secondary (11-12)	0.72	0.15
Higher (13+)	0.48***	0.08
Age at marriage	1.08***	0.01
Rural	0.88*	0.05
Religion (ref: Upper caste Hindu)		
Lower Caste Hindu	0.83**	0.05
Adivasi/Tribal	1.01	0.17
Muslim	1.05	0.12
Other	0.82	0.11
Marriage Cohort (ref: <1979)		
1980-84	1.48**	0.17
1985-89	1.40**	0.17
1990-94	1.56**	0.22
1995-99	1.55**	0.23
2000-04	1.11	0.19
Wealth Quintile (ref: Lowest)		
Second	0.87	0.11
Middle	1.06	0.10
Fourth	0.95	0.13
Highest	1.07	0.15
Geographical Region (ref: North)		
Central	0.91	0.06
East/Northeast	0.95	0.07
West	1.00	0.08
South	1.31*	0.15

Note: Levels significant at *10 per cent, **5 per cent, and ***1 per cent

Table 6: Cox Proportional Hazards Model for Timing of First Birth

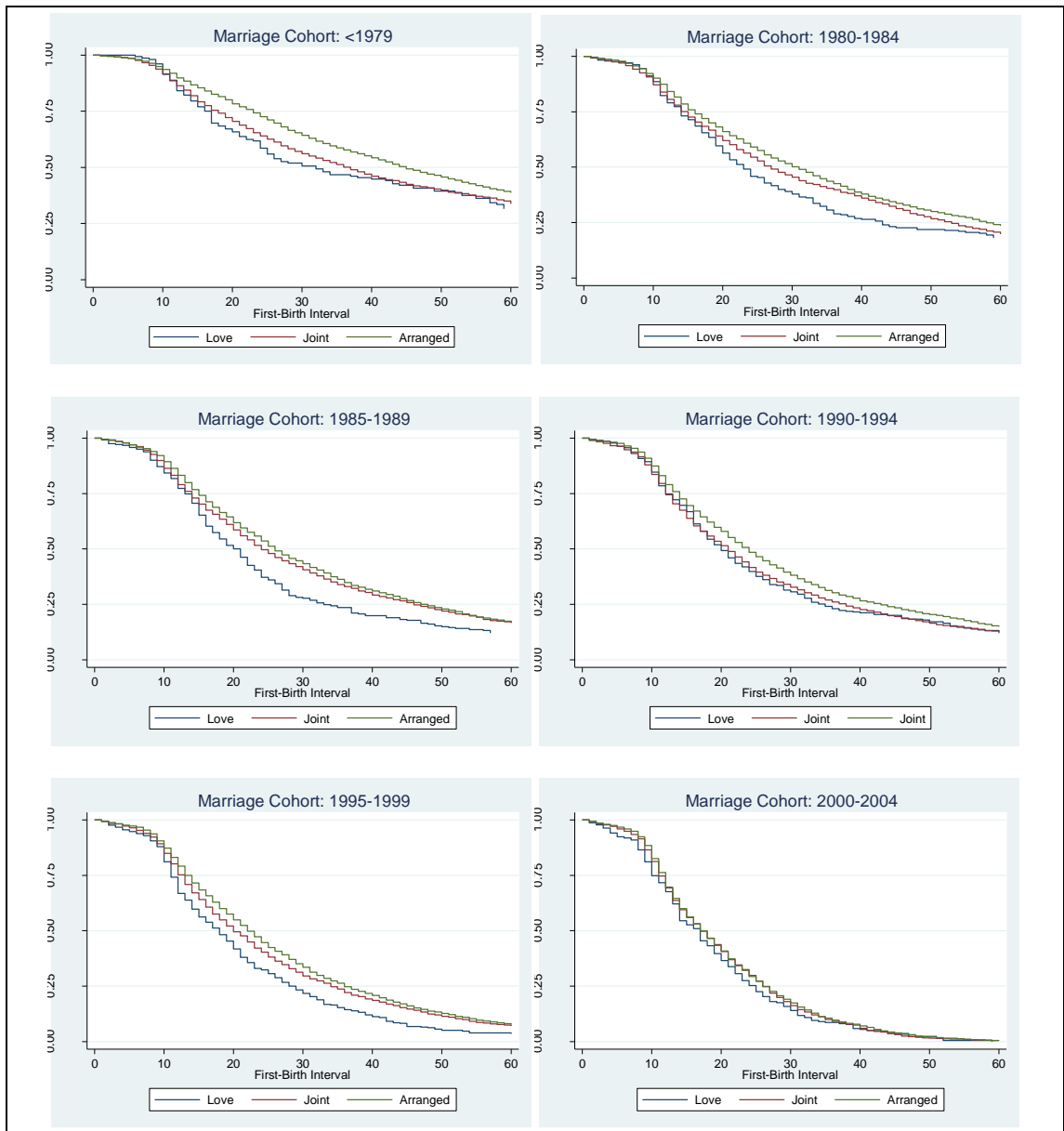
	Model 1		Model 2		Model 3		Model 4		Model 5	
	Coefficient	Robust SE	Coefficient	Robust SE	Coefficient	Robust SE	Coefficient	Robust SE	Coefficient	Robust SE
Love	0.087**	0.032	0.097**	0.033	0.095**	0.034	0.258***	0.040	0.254***	0.039
Joint	-0.005	0.013	-0.004	0.014	-0.003	0.014	-0.011	0.013	-0.008	0.012
Education (ref: none)										
Primary (1-6)	0.100***	0.017	0.065***	0.018	5.670	4.137	10.675*	4.201	11.857**	4.001
Secondary (7-10)	0.148***	0.016	0.070***	0.018	12.377**	3.787	20.661***	3.805	19.269***	3.651
Higher secondary (11-12)	0.080**	0.031	-0.030	0.034	-13.915	8.763	7.226	7.714	5.726	7.277
Higher (13+)	0.101**	0.033	-0.033	0.037	15.707	8.387	36.943***	7.245	34.488***	6.976
Age at marriage	0.338***	0.011	0.333***	0.012	0.362***	0.013	0.637***	0.016	0.646***	0.016
Age at marriage squared	-0.008***	0.000	-0.008***	0.000	-0.009***	0.000	-0.014***	0.000	-0.014***	0.000
Marriage year	0.018***	0.001	0.020***	0.001	0.022***	0.001	0.025***	0.002	0.024***	0.001
Rural			-0.041***	0.015	-0.040**	0.015	-0.063**	0.020	-0.081***	0.019
Live alone			-0.091***	0.026	-0.089**	0.026	-0.088***	0.024	-0.072**	0.023
Religion (ref: Upper caste Hindu)										
Lower Caste Hindu			0.009	0.017	0.010	0.017	0.005	0.016	-0.005	0.015
Adivasi/Tribal			0.005	0.029	0.003	0.029	0.002	0.028	0.006	0.026
Muslim			0.128***	0.024	0.128***	0.024	0.129***	0.023	0.122***	0.022
Other (Sikh,			0.249***	0.043	0.244***	0.043	0.220***	0.037	0.187***	0.036

Christian)								
Wealth Quintile (ref: Lowest)								
Second	0.014	0.021	0.015	0.021	0.015	0.021	0.032**	0.019
Middle	0.076***	0.021	0.079***	0.021	0.078***	0.021	0.082***	0.020
Fourth	0.092***	0.022	0.096***	0.022	0.096***	0.021	0.104***	0.020
Highest	0.152***	0.023	0.152***	0.023	0.139***	0.022	0.153***	0.020
Spousal age difference (ref: 0-2 years)								
3-5 years	0.027	0.016	0.030	0.016	0.031*	0.015		
6+ years	0.165***	0.018	0.170***	0.018	0.185***	0.017		
Dowry (ref: Low)								
Medium	-0.006	0.016	-0.007	0.016	-0.004	0.015		
High	0.024	0.017	0.024	0.017	0.025	0.017		
Interactions								
<i>Education x year of marriage</i>								
Primary			-0.002	0.002	-0.005*	0.002	-0.006**	0.002
Secondary			-0.006**	0.002	-0.010***	0.002	-0.010***	0.002
Upper Secondary			0.006	0.005	-0.004	0.004	-0.003	0.004
Higher			-0.010*	0.004	-0.019***	0.004	-0.018***	0.004
<i>Education x age at marriage</i>								
Primary			-0.009	0.006	-0.017**	0.006	-0.014**	0.006
Secondary			0.001	0.006	-0.008**	0.006	-0.011*	0.005
Upper Secondary			0.030**	0.012	0.029*	0.010	0.023*	0.010
Higher			0.065***	0.012	0.078*	0.010	0.069***	0.010

Interaction with duration				
Love	-0.005**	0.001	-0.005***	0.001
Rural	0.000***	0.000	0.001	0.000
Education	0.000***	0.000	0.000	0.000
Age at marriage	-0.002***	0.000	-0.002***	0.000

Note: All models include controls for geographic region.
Levels significant at *10 per cent, **5 per cent, and ***1 per cent

Figure 1: Kaplan-Meier Survival Curves for First-Birth Intervals by Marriage Choice and Marriage Cohort (<1979- 2004)



CHAPTER 2: *Internal Migration, Remittance, and Contraceptive Use in India*

Abstract

This study examines the association between internal migration and contraceptive use of households at origin, and the mediating contribution of increased household income through remittances. The India Human Development Survey (2004-2005) is used to ascertain patterns of contraceptive use in households with and without migrants. Households with a migrant have significantly higher contraceptive use than households without a migrant, but this relationship turns negative for women whose husbands are migrants, consistent with the “absence effect”. Additional income is important: In the full sample, additional income is associated with a decrease in contraceptive use, thus providing evidence for the “income/ideas effect”. However, in low fertility regions (TFR at or less than 2.1), some remittances are associated with lower contraceptive use, while in intermediate fertility regions (TFR between 2.1 and 2.7), high remittances are associated with increased contraceptive use despite controlling for spousal absence, thus indicating an opposing “income/ideas effect” than seen above. Family planning programs targeted at increasing contraceptive use among women must consider the importance of migration and diffusion of ideas in influencing contraceptive decisions. Future studies should account for potential contribution of additional income, and how it manifests itself in family decisions regarding optimal family size.

Introduction

In India and other countries 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) 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; K. Davis & 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 clear 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 and Caldwell (1997) contend 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 is that very theoretical assertion of the importance of social and economic system linkage with fertility that forms the crux of this research question. This study examines the association of migration and increased household income through remittances in the adoption of contraception and subsequent fertility in India.

Migration from and within India has increased substantially 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 household income, then this economic bonus to a household and its use for healthcare 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 family planning policy dynamics.

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 per cent of the total population of the country in the 2001 Census¹- an increase of about 37 per cent since the prior Census in 1991 (GOI, 2011). While urban employment has been the largest pull factor for male migrants and marriage for female 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, internal remittances may be an equally important consideration.

¹ The latest available estimates at the time of writing are for the 2001 Census. Equivalent data from the 2011 Census were not available on the Government of India's website.

The impact of these remittances at the household and national levels have been shown to increase child education (Edwards, Cox, & Ureta, 2003), and expenditures on healthcare (Ponce, Olivie, & Onofa, 2011). As the top remittance receiving country with a share of 12.5 per cent of global remittance (World Bank, 2011), India has seen a sizeable remittance recipient 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 per cent to 48.5 per cent in the same period (NFHS, 2006). These changes have largely been attributed to increases in female education and employment (Drèze & Murthi, 2001; Mari Bhat, 2002). With the last decade seeing substantial increases in migration from and within India coinciding with 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 migrant fertility compared to the new host, and a 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, White, & Debpuur, 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, since migrant influence on fertility behavior in their place of origin is largely limited to two-country comparisons, an overarching theory for this relationship across countries is difficult to propose. 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 overall 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 in origins 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. The authors note that 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 per cent increase in the fertility norm to which migrants are exposed to - that of lower fertility- reduces home country fertility by about 0.3 per cent, providing evidence of an impact of migration on home country fertility based on length of time at new destination (Beine, Docquier, & Schiff, 2009). This provides support of a strong transfer of fertility norms from migrants to their home countries with concomitant investments in child education. Likewise, De's study in Mexico

finds that women in migrant households are 75 per cent more likely to use contraceptive pills and 36 per cent 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 & 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 & 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 ethnographic study in Guatemala shows that following migration and subsequent remittances, there is an immediate reduction in fertility; the authors attribute this to a change in fertility beliefs that allow for the adoption of modern contraceptive methods due to an increased access to contraceptives (J. Davis & 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 (J. 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 is expected to vary directly with household income. Thus, an increase in income is 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 & Crimmins, 1985). This economic explanation has found wide support in studies on fertility determination, 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 & 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. 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 per cent), but one of the states in that region has the highest levels of contraceptive use in the country- Himachal Pradesh, at 80 per cent. 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 find that about 93 per cent of all migration in India is domestic rather than international. In fact, since there is much variation in fertility and contraceptive use within regions, it is also important to separate analyses by fertility region defined by TFR in addition to geographical region in light of intra-regional variation in fertility discussed above. Refer to Table 1 to see migration flows and the categorization of geographical region (North, South, East, West), and fertility region (Low, Intermediate, High). The hypothesis that forms the basis of this analysis is two-fold.

First, the experience of migration is associated with increased contraceptive use at the household of origin, but will be negatively associated if husband of the respondent is the migrant. Secondly, conditional on having a migrant, remittances will be a proxy for the transfer of lower fertility norms, thus will be associated with increased contraceptive use at households of origin.

[TABLE 1 HERE]

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 an 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 randomly selected woman in the household who met the criteria of being currently married, and between the ages of 15 and 49. However, since it is not always the spouse of the migrant who is the respondent- it could instead be a sister-in-law, daughter, or daughter-in-law- in the first stage, the first unit of analysis is contraceptive use at the household level in order to minimize ambiguity in the way the question was posed in the survey. In the second

stage, I restrict the sample to husband-wife dyads, where the husband of the respondent is the migrant. Of the total sample of 41,554 respondent households, 4,651 are households that report a migrant living elsewhere. Out of these, a majority are male, 3,810 (82 per cent). Out of these males, 1,170 are the husbands of the respondents, and will be a sub-focus of the subsequent regression analysis. Refer to Figure 1 for a flowchart of the analytic sample.

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.

Key Dependent Variable:

The key dependent variable is contraceptive use. As stated before, contraceptive use is considered as the unit of analysis of household in some models since the question in the survey is asked to *any* married woman aged 15-49 in the household, not necessarily the spouse of the migrant. For other models, I construct husband-wife dyads where the male migrant is the husband of the female respondent. 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 per cent (N=17,335) reporting any modern contraceptive method use. However, only 73 per cent 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 65 per cent (N=11,929) of contraceptive users reporting female sterilization as the dominant method. The rest of the contraceptive use hierarchy is condom/*nirodh* (33 per cent), pill (22 per cent), Copper T/IUD (13 per cent), and other. Contraceptive use in India is thus largely intended to limit fertility, rather than for spacing births, but method mix is an important consideration in this analysis. I construct the main dependent variable with three levels as: No contraception, female sterilization, and other modern method (condom, pill, Copper T/IUD).

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 remittances. 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 per cent (N=37,506) of households do not have any individual that is a migrant. Of the remaining 11.3 per cent (N=4,651) of households that have a migrant, 48.3 per cent (N=2,276) receive remittances. Thus, I create household type with the first type 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 remittances 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 amounts², the response is coded as a categorical rather than a continuous variable with three categories: none, some (Rs³. 100- Rs. 10,000) and high (Rs. 10,000+). The Rs. 10,000 cut-off is chosen because it is the median remittance amount reported. About 51 per cent of migrant households do not receive any remittance (N=2,383), 24 per cent receive some (N=1,106) and 25 per cent (N=1,170) receive high amounts.

Methodology

There are two “effects” I hope to disentangle, although these are not causal effects per se, due to the data being cross-sectional and non-experimental. For each analysis, I

² 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.

³ The rupee to dollar exchange rate is approximately 50 rupees to 1 USD in 2011 terms.

include results for the full sample, as well as a restricted husband migrant- respondent wife sample.

a) Absence effect

The first is the “absence effect”, where I simply explore contraceptive use when households report a migrant living elsewhere, and if it is the husband that is away. For this, I use a multivariate logistic regression model (contraceptive use Y/N), multinomial logistic regression (type of contraceptive use), and a multi-level model (contraceptive use Y/N). I use a multi-level modeling strategy to account for the hierarchical structure of the IHDS data (Rabe-Hesketh & Skrondal, 2012). Women are clustered within districts and geographical regions. Thus, the odds of women adopting contraception are not independent as women share exposure to common region and district-level characteristics. The use of multi-level models allows the identification of clustering of outcomes at different levels, known as random intercept (geographical region and district), representing the extent to which the outcome of interest varies between each higher-order unit after controlling for variables entered in the model. I fit a multi-level logistic model for the binary outcome of contraception (0= no contraception, 1= contraception). The model takes the form of a three-level model with women (level 1), district (level 2), and geographical region (level 3). The model is specified as:

$$\log it(p_{ijk}) = x_{ijk}\beta + u_{jk} + v_k$$

Where P_{ijk} is the probability of contraceptive use for the i th woman in the j th region in the k th district, x_{ijk} is a vector of covariates corresponding to the i th woman in the j th region in the k th district, β is a vector of unknown parameters, u_{jk} is the random intercept at the region, and v_k is the random intercept at the district level. The

distribution of the random intercept is assumed to be normal, with mean zero and variance s_u^2 . When $s_u=0$ the model reduces to a logistic regression model, indicating that there is no significant correlation in the risk of contraceptive use between regions or districts. The testing of the null hypothesis $s_u=0$ against the alternative hypothesis $s_u>0$ was used for testing the significance of random intercept terms, using a modified likelihood ratio test.

b) Income/Ideas effect

The “income/ideas effect” explores whether remittances can be considered a proxy for the transfer of ideas of low fertility norms in addition to economic resources, based on the social remittance theory. I analyze this by amount of remittance received at the household level (none, low, high). I use the same three modeling strategies described above, but with remittance receipt from any migrant as the first model (controlling for covariates), and with remittance received by husband as the second model (controlling for covariates).

Additionally, I also study the relationship between migration, remittance, and contraceptive use by level of fertility in the country. 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 (see categorization in Data section). For each of these specifications, I also run multinomial logistic regression models to analyze these relationships to different types of contraception, in light of the dominance of female sterilization.

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 (NSS, 2008). There is regional variation in household contraceptive use (among women aged 15-49) in India, with north being the lowest at 41.6 per cent and the west highest at 69.6 per cent. 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.

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, and is used as a control. Additionally, households do not act in isolation- 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. Thus, I add a district level control 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 and has been used in previous analyses, showing 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, and female education. 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 & Rao, 1999); 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 & 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 remittances as well as household income, they are likely to be biased as a measure of non-remittance income. 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).

Results

Descriptive Analyses

Given variation in contraceptive use by household type 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 2, north India (N=19,438) has the largest share of the total sample at 47 per cent. Interestingly, this region also has the lowest contraceptive prevalence at 42 per cent and concurrently has the highest proportion of households with a migrant, with 15 per cent of all households in the north reporting a migrant living elsewhere. Of migrant households, the south has the highest proportion of migrants sending remittances at 55 per cent. The west has the highest contraceptive prevalence in the country, at about 70 per cent, 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 per cent, and also the largest remittance receiving region, at 51 per cent.

[TABLE 2 HERE]

Table 3 provides a more detailed view of a larger set of variables of interest for the total sample. These are categorized by household type- broken down as households without a migrant and households with a migrant. The latter category is further subdivided into households that do or do not receive remittances. First, there is

not much variation in contraceptive use between households with a migrant and households without a migrant: female sterilization is the preferred method, if at all. Among the households with a migrant, there is more distinction- with contraceptive use in remittance receiving households much lower than households that do not receive remittance. Columns 1 and 2 present an overall comparison between households with a migrant and households without a migrant. Women in households with a migrant are slightly older (by 1.35 years) and more educated (0.2 years of additional schooling) on average. Households with a migrant have a median household income that is higher than that of households without a migrant; however, income net of remittances is naturally greater in the latter, by about Rs. 6,870.

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. Women in households that receive remittance are slightly more rural, have more years of schooling (0.66 additional years of schooling) than women in households that do not receive remittance. Households receiving remittances have a strikingly lower median income than households without remittance by Rs. 17,763. It is also important to note that among all households overall, those with a migrant and receiving remittances have the highest median income. 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 remittances.

[TABLE 3 HERE]

Table 4 provides details on the migrant categorized by their sex, and remittance sending behaviors. The dominant relationship between migrant and respondent is that of a son or daughter, followed by a spouse. Since families in India are multi-generational, and the survey is asked to the head of the household, it is likely to be the case that a parent responds. About a third of all respondents are husband-wife dyads.

Male migrants have about 2.55 additional years of schooling compared to female migrants. Of these, migrants who send remittances have more education compared to migrants who do not- which could potentially reflect occupation or destination. About 60 per cent of the migrants in this sample live in the same state as the respondent, 36 per cent live outside the state, while the rest are abroad.

[TABLE 4 HERE]

Results of Regression Analyses

The Absence Effect

Table 5 shows the comparison of different models used to explore the “absence effect”. The first panel (any contraceptive use) is a multivariate logistic regression analysis (base outcome= no contraceptive use). The second and third panels are the multinomial logistic regression results that disentangle by type of contraceptive used (base outcome for each = no contraceptive use), and the third and fourth panels show results for a multilevel model. Multivariate logistic regression analysis shows that households with a migrant have 17 per cent higher odds of contraceptive use compared to households without a migrant. Other variables that have a positive relationship with contraceptive use are log income, media exposure, and female age. Being rural or Muslim is associated with lower odds of contraceptive

use. Interestingly, moving to a destination with a different fertility regime is associated with a 3 per cent reduction in contraceptive use at origin. However, if the migrant is the respondent's husband, there is a 40 per cent lower likelihood of contraceptive use, indicating that absence may be the driving factor. Next, the multinomial logistic regression results. Higher levels of female education are associated with lower odds of being sterilized, while older age is associated with increased odds of female sterilization. Interestingly, a higher proportion of migrants in the district are associated with substantially lower odds of female sterilization. For the migrant husband-wife respondent dyads, there is a 45 per cent lower likelihood of sterilization. These patterns are repeated for other modern method category, with a 40 per cent lower likelihood of using modern contraceptive methods for women whose husband is a migrant, thus providing evidence for the absence effect. Additionally, high female education and older respondent age are associated with higher usage of methods other than female sterilization. Finally, the multilevel models show there does not seem to be an association with migration and contraceptive use, but there does seem to be a significant negative association between migrant husband and contraceptive use of the wife (OR 0.62). Significant random intercept terms were found at both region and district levels. These random intercept terms were significant after controlling for individual, household, and contextual factors entered in the models.

[TABLE 5 HERE]

The Income/Ideas effect

Table 6 compares different models used to explore the “income/ideas effect”. Here, the analytic sample is limited to households with a migrant (N=4,651) and husband-wife dyads (N=1,170). The first panel of logistic regression analysis suggests that households that receive some remittances are 25 per cent significantly *less* likely to use contraception compared to migrant households that do not receive remittances, however these are not significant for husband-wife dyads. When parsed out by contraceptive use type, this relationship holds only for women who are sterilized, and is also significant for those who receive high remittance amount. Women whose husbands are migrants are about 40 per cent less likely to be sterilized, and more likely to use other contraceptive methods. Other key indicators that are associated with reduced contraceptive use are being Muslim, rural. Additionally, 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 also negatively associated with contraceptive use, as is moving to a different fertility regime. Education is positively associated with other modern contraceptive use. Finally, the multilevel models confirm that there is a negative relationship between remittance and contraceptive use in the full sample, but this does not hold for the sample limited to husband-wife dyads. Overall, the results imply there is some evidence for decreased contraceptive use by way of increased income due to remittances.

[TABLE 6 HERE]

The multinomial logistic regressions for contraceptive use and migration by fertility region are shown in Table 7. The top panel is for the entire sample, while the lower panel is limited to the sample for husband-wife dyads. The top panel shows that having a migrant husband is associated with 17 per cent higher odds of being sterilized in low fertility regions. No other significant relationships in the other

fertility regions exist. On the lower panel of Table 7 (husband-wife dyads), it is clear that having a husband who is a migrant is associated with lower odds of female sterilization in low and high fertility regions, and lower odds of other contraceptive use in intermediate fertility regions. High income is associated with increased odds of other contraceptive use in intermediate fertility regions. Living in rural areas, being Muslim, and higher female education are associated with lower odds of female sterilization, while higher age and media exposure are related to increased odds of female sterilization. Higher educated women are more likely to use other modern methods of contraception across all fertility regimes.

[TABLE 7 HERE]

Multinomial logistic regressions for contraceptive use and remittance by fertility region are shown in Table 8. Women in households with low remittance amount have a lower likelihood of being sterilized, while those in intermediate fertility regions have a high likelihood of using other modern methods. Interestingly, this holds when the analysis is limited to husband-wife dyads: women whose husbands send low or high remittance amount are associated with lower odds of being sterilized, while those in medium fertility regions have significantly higher odds of using other modern methods, even if their husbands are migrants. The other important finding is that in low fertility regions, increased female age is associated with a 5 per cent higher likelihood of using a modern method other than female sterilization, which is not seen in the other models. Overall, 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 8 HERE]

Discussion

As has been noted before, there are no systematic studies of how migration and migrants influence fertility at their places of origin, 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.

It is important to parse out the analysis not only by whether contraceptives are used or not, but also the method mix. Studies show that the adoption of sterilization in India often marks the first use of family planning, and is the preferred method by far, regardless of age (de Oliveira, Dias, & Padmadas, 2014; Stephenson, 2006). The Government of India's push from the launch of the National Family Planning Program has been sterilization, with cash incentives to attract sterilization acceptors in 1967 and beyond (Singh, Ogollah, Ram, & Pallikadavath, 2012). While sterilization has been prevalent in older cohorts, it is also the preferred method among younger women, particularly in southern states (Stephenson, 2006). Contraceptive method choice has ties to knowledge about and access to method mix, and is thus tied to socioeconomic variables. In this analysis, I explore method mix in order to illuminate these variables as best as I can with the IHDS data.

In sum, the experience of migration is important, but largely for when the migrant is the husband of the respondent, providing strong evidence for the "absence effect". This is the case regardless of contraceptive methods- female sterilization, or

other modern method. Receipt of remittance is negatively associated with contraceptive use for low and high amounts at the household level, with this relationship significant for female sterilization and migrant husband, indicating evidence for the “income/ideas effect” against the original hypothesis of remittances as a proxy for the flow of lower fertility norms; instead, remittance seems to act simply as additional household income. In the fertility region analysis (Low, Intermediate, High), having a migrant from the household is associated with increased contraceptive use in high fertility regions, but is negative for the sample restricted to husband-wife dyads. This is reflected in contraceptive method choice as well; having a migrant husband is associated with decreased contraceptive use in low, intermediate, and high regions. When analyzed by remittance receipt, the answers are less intuitive. In low fertility regions, low remittance is associated with a decrease in contraceptive use, and holds for if the husband is the migrant. This relationship is largely driven by female sterilization, where the base is no contraceptive use. In intermediate fertility regions, receiving low remittance amount is associated with increased modern method contraceptive use, and holds even for the sample restricting the relationships to husband-wife dyads. This is noteworthy, and shows that there could be “income/ideas effect” at play that is in line with the transfer of fertility norms.

Other relationships of note are those between contraceptive use and education, and proportion of migrants in the district. There is a relationship between education and contraceptive use when parsed out by method mix, with women with more schooling opting for modern contraceptive methods. 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 per cent 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. Additionally, the proportion of migrants in the district does not seem to be an important indicator of contraceptive use; thus there is no clear evidence of any knowledge spillover effect.

The introduction of additional income from remittance has a less straightforward interpretation. Overall, 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. 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 and income/ideas effects seem to both be indicative of contraceptive use. The relationship between remittance and contraceptive use is negative, and is highly significant for women who use sterilization as their method of contraception. 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 may be an important concern, indicated by the positive association between contraceptive use and remittance.

Caldwell and Caldwell (1997) contend 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 by husband, and additional income are associated with a reduction in contraceptive use at 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.

As with all studies, there are limitations to this as well. First, the IHDS does not contain specific information on destinations of the migrant, thus relying on proxies from other sources may be inaccurate, but the best option. Next, this analysis only includes primary domestic migration destination in the calculation of contraceptive difference between origin and destination- next steps should include a weighted average of the difference, with the weights being the proportion of migrants from each state. Finally, fertility decisions like female sterilization could have taken place before the act of migration, thus associations between the two may not actually be relevant. Given the cross-structural nature of the data however, this would be impossible to tease out.

Conclusion

The absence and income/ideas effects are both indicative of decreased contraceptive use in the full sample, regardless of method, while the “income/ideas effect” leading to increased contraceptive use is supported depending on level of fertility at origin. Clearly, this research shows how the relationship between migration and 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 with varied method mix 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 income, 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.

Figure 1: Migration and Remittances Analytic Sample Flowchart

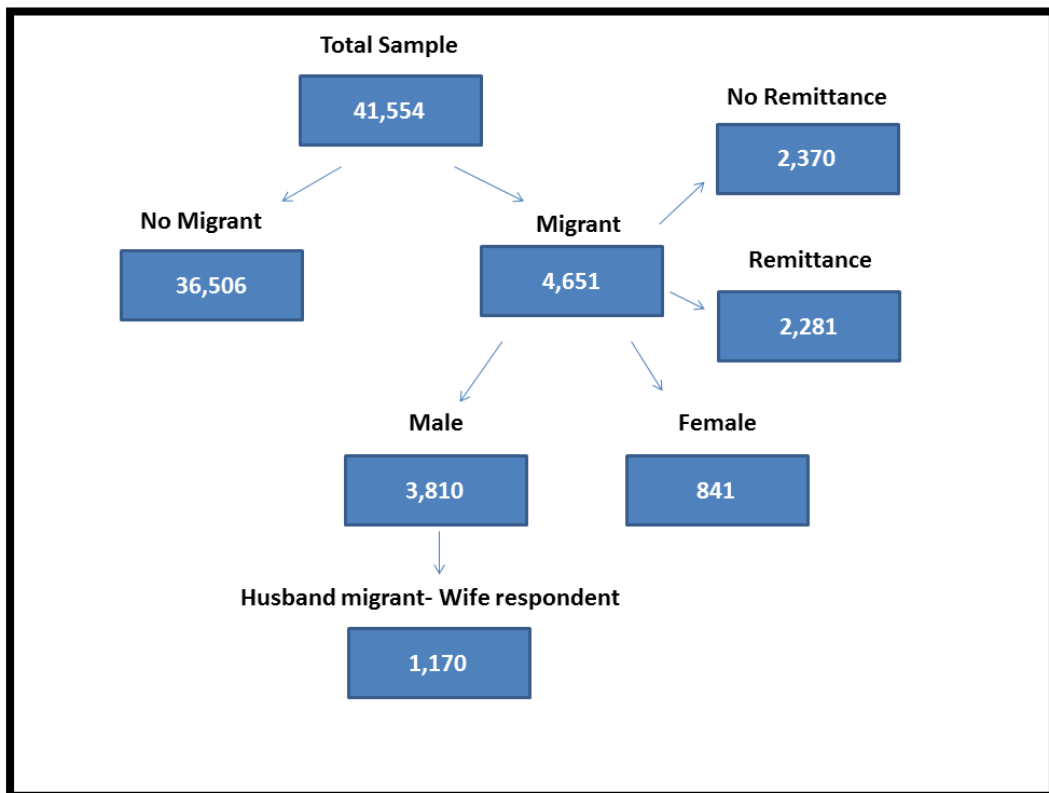


Table 1: Migration Flows, Geographic and Fertility Regions, and TFR Differences (from the NSS 64th Round, Table 24.1).

Origin	Destination	TFR (O)	TFR Level (O)	TFR (D)	TFR Level (D)	Difference (D-O)
Delhi	Uttar Pradesh	2.1	Low	3.8	High	1.7
Punjab	Haryana	2.0	Low	2.7	High	0.7
Maharashtra	Gujarat	2.1	Low	2.4	Intermediate	0.3
Andhra Pradesh	Karnataka	1.8	Low	2.1	Low	0.3
Himachal Pradesh	Punjab	1.9	Low	2.0	Low	0.1
Karnataka	Maharashtra	2.1	Low	2.1	Low	0.0
Kerala	Tamil Nadu	1.9	Low	1.8	Low	-0.1
Tamil Nadu	Karnataka	1.8	Low	2.1	Low	0.3
Uttarakhand	Uttar Pradesh	2.6	Intermediate	3.8	High	1.2
Assam	West Bengal	2.4	Intermediate	2.3	Intermediate	-0.1
Orissa	Chhattisgarh	2.4	Intermediate	2.6	Intermediate	0.2
Chhattisgarh	Maharashtra	2.6	Intermediate	2.1	Low	-0.5
Gujarat	Maharashtra	2.4	Intermediate	2.1	Low	-0.3
Jammu & Kashmir	Punjab	2.4	Intermediate	2.0	Low	-0.4
West Bengal	Maharashtra	2.3	Intermediate	2.1	Low	-0.2
Haryana	Rajasthan	2.7	High	3.2	High	0.5
Jharkhand	Bihar	3.3	High	4.0	High	0.7
Madhya Pradesh	Uttar Pradesh	3.1	High	3.8	High	0.7
Rajasthan	Haryana	3.2	High	2.7	High	-0.5
Bihar	Delhi	4.0	High	2.1	Low	-1.9
Uttar Pradesh	Delhi	3.8	High	2.1	Low	-1.7

Table 2: Contraceptive Prevalence, Migration, and Remittances by Region of India

Geographical Region	Number of respondents	Contraceptive prevalence (%)	Households with a migrant (%)	Proportion of migrant households that receive remittance (%)
North	19,137	41.59	15.04	48.36
East	6,461	61.64	9.48	45.37
West	5,566	69.62	8.31	34.30
South	10,390	62.41	11.79	55.41
<i>All India</i>	<i>41,554</i>	<i>54.36</i>	<i>12.30</i>	<i>48.24</i>
Fertility Region				
Low	12,205	42.05	12.50	48.13
Intermediate	15,628	46.17	9.70	44.23
High	12,721	52.96	14.80	50.57

Note: Geographical regions are divided as per the IHDS regional classifications. 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).

Table 3: Descriptive Statistics by Household Type

	Household without a migrant	Household with a migrant	Household with a migrant, no remittance	Household with a migrant, with remittance
Contraceptive Use				
None	0.57	0.59	0.52	0.67
Female Sterilization	0.29	0.26	0.33	0.19
Other (Pill, IUD, Condom, Injectable)	0.15	0.15	0.15	0.14
Female education (mean)	4.56	4.75	4.45	5.11
Female age (mean)	32.89	34.24	34.56	33.87
Media exposure	0.64	0.62	0.62	0.62
Rural	0.70	0.81	0.79	0.83
Religion				
Hindu	0.79	0.79	0.79	0.80
Muslim	0.11	0.12	0.11	0.13
Other (Sikh, Christian)	0.10	0.09	0.10	0.08
Total children ever born	2.56	2.79	2.88	2.68
Desire for more children (female)	14.18	11.84	10.68	13.09
Wealth Quintile				
Poorest	0.20	0.21	0.21	0.22
Second	0.20	0.18	0.18	0.19
Middle	0.20	0.20	0.22	0.18
Fourth	0.20	0.20	0.20	0.20
Affluent	0.19	0.20	0.19	0.22
Household total income (median)	30,896	32,522	30,950	34,800
Income net of remittances (median)	30,870	24,000	30,907	17,037
Proportion of migrants in district (%)	11.18	12.74	12.80	12.68
Contraceptive difference (mean)	-2.53	-1.10	-1.78	-0.37
N	36,506	4,651	2,370	2,281

Table 4: Migrant Characteristics by Remittance Sending Behavior

	<u>Remittance non-sending</u>			<u>Remittance sending</u>			<u>All Migrant Sample</u>		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Relationship to respondent									
Spouse	0.23	0.25	0.23	0.40	0.15	0.39	0.32	0.23	0.31
Son/Daughter	0.62	0.57	0.61	0.51	0.49	0.51	0.56	0.56	0.56
Other	0.16	0.18	0.16	0.09	0.36	0.11	0.12	0.21	0.14
Destination									
Same state	0.66	0.89	0.72	0.43	0.66	0.44	0.53	0.85	0.59
Different State	0.32	0.10	0.26	0.48	0.27	0.47	0.41	0.13	0.36
Abroad	0.02	0.01	0.02	0.10	0.07	0.09	0.06	0.02	0.05
Education (mean)									
	7.75	5.35	7.06	8.59	7.07	8.49	8.22	5.67	7.76
Age (mean)									
	26.10	21.55	24.79	32.63	33.83	32.71	29.74	23.82	28.67
N	1,685	685	2,370	2,125	156	2,281	3,810	841	4,651

Table 5: The Absence Effect: Multinomial Logistic Regression and Multilevel Model for Contraceptive Use in India

	Logistic regression		Multinomial logistic regression				Multilevel logistic regression			
	Any Contraception		Female Sterilization		Other Modern Method		Full sample		Husband is migrant	
	Full Sample	Husband is migrant	Full Sample	Husband is migrant	Full Sample	Husband is migrant	Odds Ratio	SE	Odds Ratio	SE
Migrant	1.17*	0.60*	1.19	0.55***	1.08	0.60***	1.07	0.05	0.62***	0.06
Log Income	1.09***	1.08	1.12**	1.14**	1.09**	1.00	1.08***	0.02	1.06	0.04
Rural	0.82***	0.86	0.92	0.89	0.82*	0.61***	0.75***	0.03	0.64***	0.07
Religion (ref: Hindu)										
Muslim	0.68***	0.45***	0.55***	0.31***	1.01	0.65**	0.63***	0.03	0.40***	0.06
Other	0.76***	0.74	0.83*	0.78	0.89***	0.75	0.78***	0.04	0.73*	0.11
Media exposure	1.40***	1.53	1.58**	1.59***	1.28***	1.24	1.30***	0.04	1.29*	0.13
Female education	1.00	1.01	0.97***	0.95***	1.06***	1.05***	1.00	0.00	1.00	0.01
Female age	1.05***	1.05***	1.08***	1.07***	1.02***	1.03***	1.05***	0.00	1.05***	0.01
Proportion of migrants in the district	0.25	0.19	0.22*	0.33	0.88	5.15	0.27	0.26	0.20	0.28
Contraceptive difference between destinations	0.97***	0.98***	0.96***	0.96***	0.98***	0.98**	0.97***	0.00	0.98***	0.00
Constant							0.14***	0.04	0.31*	0.18
N	41,157	4,651	41,157	4,651	41,157	4,651	41,554		4,651	
Variance component							Beta	SE	Beta	SE
Random intercept terms										
Level One: Geographical region							0.186*	0.138	0.118*	0.100
Level Two: District							0.352*	0.047	0.412*	0.096

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, Multinomial models include controls for region

Table 6: The Income/Ideas Effect: Multinomial Logistic Regression and Multilevel Model for Contraceptive Use in India

	Logistic regression		Multinomial Logistic Regression				Multilevel Logistic Regression			
	Any Contraception		Female Sterilization		Other Modern Method		Migrant sample		Husband is migrant	
	Full Sample	Husband is migrant	Full Sample	Husband is migrant	Full Sample	Husband is migrant	Odds Ratio	SE	Odds Ratio	SE
Low remittance (Rs. 100-10,000)	0.74**	0.79	0.55***	0.61*	0.79	1.09	0.77*	0.09	0.79	0.2
High remittance (Rs. 10,000+)	0.83	1.19	0.52***	0.69	0.94	1.45	0.80*	0.09	1.13	0.24
Log Income	1.10	0.93	1.16	0.96	1.04	0.87	1.08	0.04	0.94	0.07
Rural	0.85	0.94	1.00	1.14	0.68*	0.84	0.64***	0.07	0.61*	0.16
Religion (ref: Hindu)										
Muslim	0.44***	0.45*	0.28***	0.39***	0.66*	0.62	0.39***	0.05	0.38***	0.1
Other	0.76	0.42	0.82	0.51	0.92	0.37	0.73*	0.11	0.46*	0.16
Media exposure	1.49	1.94	2.38***	3.39*	1.53	2.19	1.27*	0.13	1.33	0.28
Female education	1.01	1.05	0.96	0.99	1.07***	1.10***	0.99	0.01	1.01	0.02
Female age	1.05*	1.06***	1.08***	1.09***	1.04*	1.04	1.05***	0.01	1.07***	0.01
Proportion of migrants in the district	0.15*	0.08	0.21	0.68	1.52	0.03	0.17	0.24	0.1	0.25
Contraceptive difference	0.98***	0.97***	0.97***	0.96***	0.98***	0.99*	0.98***	0	0.98***	0.01
Constant							0.22*	0.13	0.31	0.32
N	4,651	1,170	4,651	1,170	4,651	1,170	4,651		1,170	
Variance component							Beta	SE	Beta	SE
Random intercept terms										
Level One: Geographical region							0.139*	0.114	0.166	0.179
Level Two: District							0.418*	0.097	0.708	0.261

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, Multinomial models include controls for region

Table 7: Multinomial Logistic Regression for Migration by Low, Medium, and High Fertility Region by Type of Contraceptive Use

	Female Sterilization			Other Modern Method		
	Low	Intermediate	High	Low	Intermediate	High
Migrant (ref: No)	1.17*	0.97	1.13	1.11	0.83	1.21
Log Income	1.11	1.05	0.92	1.15	1.20**	1.03
Rural	0.77*	0.80*	0.87	0.66**	0.82	1.00
Religion (ref: Hindu)						
Muslim	0.39***	0.46***	0.43***	0.84	0.94	1.13
Other	0.88	0.65***	0.71*	0.85	0.97	0.79
Media exposure	2.25***	1.75***	2.44***	0.99	1.10	1.65***
Female Education	0.98**	0.96***	0.98	1.07***	1.04***	1.06***
Female Age	1.07***	1.10***	1.07***	1.03***	1.01	1.02**
Proportion of migrants in the district	0.01	0.04*	0.00***	2.98	0.04**	0.66
Contraceptive difference	0.98***	0.99*	0.98***	0.98**	0.97***	0.98***
N	12,392	15,823	12,942	12,392	15,823	12,942
Husband is migrant (ref: No)	0.37**	0.45	0.38***	0.67	0.51*	0.71
Log Income	1.12	1.04	1.03	1.04	1.14	1.01
Rural	0.74	0.69	1.26	0.34*	0.71	1.07
Religion (ref: Hindu)						
Muslim	0.24**	0.21**	0.34*	0.26*	1.18	0.66
Other	0.62	0.66	1.01	0.83	1.11	1.19
Media exposure	3.27***	1.57**	3.57***	1.14	1.06	1.79*
Female Education	0.95	0.92*	0.99	1.05	1.03	1.10***
Female Age	1.07***	1.06***	1.07**	1.05*	0.99	1.05*
Proportion of migrants in the district	0.00	27.05	0.02	0.17	0.15	0.28
Contraceptive difference	1.00	0.99	0.97**	0.96*	0.96***	0.99
N	1,286	1,639	1,726	1,286	1,639	1,726

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 8: Multinomial Logistic Regression for Remittance by Low, Medium, and High Fertility Region by Type of Contraceptive Use

	Female Sterilization			Other Modern Method		
	Low	Intermediate	High	Low	Intermediate	High
Remittances (ref: None)						
Low (Rs. 100-10,000)	0.20***	0.90	1.00	0.50	1.78*	0.82
High (Rs. 10,000+)	0.35***	0.51	0.52	0.94	0.91	0.95
Log Income	0.98	1.06	1.09	0.99	1.20	1.04
Rural	0.70	0.72	1.26	0.32**	0.75	1.06
Religion (ref: Hindu)						
Muslim	0.21**	0.22**	0.34*	0.24*	1.26	0.66
Other	0.72	0.65	1.11	0.85	1.16	1.27
Media exposure	3.65**	1.61**	3.41***	1.15	1.08	1.71*
Female Education	0.98	0.92*	0.99	1.06*	1.04	1.10***
Female Age	1.08***	1.07***	1.07**	1.05*	1.00	1.05*
Proportion of migrants in the district	0.00	14.91	0.01	13.0	0.10	0.24
Contraceptive difference	1.00	0.99	0.98*	0.97*	0.96***	1.00
N	12,392	15,823	12,942	12,392	15,823	12,942
Remittances from Husband (ref: None)						
Low (Rs. 100-10,000)	0.21**	0.93	1.06	0.51	1.82*	0.86
High (Rs. 10,000+)	0.48**	0.65	0.77	1.11	1.16	1.15
Log Income	0.94	1.03	1.02	0.97	1.17	1.01
Rural	0.73	0.69	1.27	0.33*	0.72	1.07
Religion (ref: Hindu)						
Muslim	0.21**	0.22**	0.34*	0.24*	1.23	0.66
Other	0.63	0.64	1.03	0.79	1.17	1.18
Media exposure	3.41**	1.62***	3.64***	1.13	1.08	1.76*
Female Education	0.97	0.93*	0.99	1.05	1.04	1.10***
Female Age	1.08***	1.06***	1.07**	1.05*	0.99	1.05
Proportion of migrants in the district	0.00	33.39	0.01	0.18	0.18	0.32
Contraceptive difference	1.00	0.99	0.97**	0.97*	0.96***	0.99
Husband migrant	0.43**	0.52*	0.43***	0.64	0.51*	0.66

N	1,286	1,639	1,726	1,286	1,639	1,726
---	-------	-------	-------	-------	-------	-------

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

CHAPTER 3: *Living Arrangements, Health Status, and Pensions among the Elderly in India: A Mixed- Methods Study*

Apoorva Jadhav¹, K.M. Sathyanarayana², Sanjay Kumar², K.S. James³

¹ Population Studies Center, University of Pennsylvania

² UNFPA India

³ The Institute for Social and Economic Change, India

Introduction

In India, the notion of kinship ties for support throughout the life course is central to everyday life. It stipulates that it is the duty of a child -particularly a male child- to provide parental support to his parents in their old age, traditionally in the form of co-residence. Demographic shifts currently underway will have a substantial impact on the Indian landscape, particularly that of the family (Rajan & Kumar, 2003). These shifts will be magnified between now and 2050, the year for which the United Nations projects that approximately 20 per cent of Indians will be above the age of 60 (UN, 2010), the cut-off age for being considered “elderly” in this analysis.

Three of the main demographic shifts expected for India are particularly noteworthy. First, mortality reductions and improvements in medical technology mean larger cohorts are surviving to older ages. Second, fertility reductions due to effective family planning and changing social attitudes imply that in the long run there will be fewer children to care for more family members that are elderly, which means the not only the absolute number but also the proportion of elderly is increasing. Finally, employment-driven migration means children are leaving and will continue to leave residences shared with parents, resulting in elderly having to care for themselves or in the company of a caretaker (Kuhn, Everett, & Silvey, 2011). Due to a shortage of space coupled with high the cost of living in urban areas, children who migrate to the rapidly growing urban areas often have no choice but to leave their parents behind.

A proportional increase in the older population will lead to an urgent need for greater elder care and support at a time in India where traditional family-based care is becoming less common than in the past (Arokiasamy, Bloom, Lee, Feeney, & Ozolins, 2012). Weak public pension and social security systems, coupled with changing household structures, makes planning for the elderly -especially in terms of

living arrangements, health, and financial stability- critical. Added to this is the fact that there are more elderly women surviving to older ages than their male counterparts, due to longer female life expectancies at birth and at age 60 (Agrawal, 2012; Drèze & Srinivasan, 1997). It is important to note, however, that there are other mechanisms in place that will manifest in a larger cohort of elderly women in the future. First, basic population estimates in Table 1 illustrate trends from 1950 and projected to 2100. In 1950, about 5 per cent of the total population was above the age of 60. The latest census estimates (2011) show that about 9 per cent are above age 60, and that by 2100, that proportion is estimated to rise to about 30 per cent. By gender, the 2011 census showed that about 9 per cent were above 60 compared to 8 per cent of all men. Both these proportions are expected to increase dramatically, with estimates in 2050 placing these proportions at 20 and 16 per cent, respectively. Given the size of India's population, these percentage differences will translate into a substantial number of elderly in the coming decades, particularly women. As Table 2 shows, these women were married when they were very young, spousal age differences were high, and female literacy was low. Thus, along with biological reasons for increased female survival to old age, there are social underpinnings which potentially amplify that number. Understanding the needs of the elderly population- particularly women- is thus essential to addressing their needs in the coming years.

[TABLE 1, 2 HERE]

Research Question

The research question for this analysis has three parts. What are the determinants of who lives alone or with their spouse only? What is the overall health status of the elderly in India, and level of access to healthcare and pensions? What are the patterns

of familial support between elderly and their non-co-residing children? While these may initially appear to be distinct research questions, I will show that there is substantial overlap among them, primarily through analysis that is largely descriptive in nature.

Literature Review

The western model of living arrangements is dominated by a nuclear household setup, wherein elderly either reside independently of their children or in assisted living facilities. Closer to India, Arab countries seem to be moving toward that model; in Lebanon for example, older individuals are more likely to live alone rather than with their children. As Tohme *et al.* (2011) note, the concept of living alone is not straightforward: it could signify financial ability to live independently but might also point to social isolation from one's family (Tohme, Yount, Yassine, Shideed, & Sibai, 2011). In the larger Asian context, Martin (1989) finds that the ability or inability to live alone largely depends on survivorship of one's spouse and living children among respondents in Fiji, South Korea, Malaysia, and the Philippines. Given that women- especially in older birth cohorts- have a large age gap between themselves and their spouses, coupled with longer life expectancy at birth, the underlying gender dimension to aging is noteworthy.

Living Arrangements in India

In India, elderly parents co-residing with their children can serve a dual purpose: children can take care of their parents' health and daily needs, while parents can provide childcare for young grandchildren or assist in food preparation. These are non-financial aspects of co-residence that typify a joint living arrangement. Other benefits include those to elder health, particularly in terms of the relationship between

co-residence and self-rated health, chronic and short-term morbidity (Sudha, Suchindran, Mutran, Rajan, & Sarma, 2006). Additionally, multigenerational households allow a pooling of finances and resources, which can relieve the household budget constraint in case of strong pension systems. Conversely, multigenerational living can exacerbate poverty due to limited resources for a larger number of people. In India, for elders living alone the financial safety net can disappear if there is no outside monetary support from the family or government, adding a poverty dimension to aging (Husain & Ghosh, 2011). Moreover, a longer life span of the elderly implies a longer period of dependency on children in the traditional Indian family setting, and thus higher costs to meet healthcare and other needs. In a move to alleviate the financial cost to co-residence, the Indian Government introduced the National Policy on Older Persons in 1999. This policy has provisions for tax relief for children who co-reside with their parents, allowing rebates for medical expenses and preference in the allotment of houses (MOSJE, 1999). This policy however, is yet to be adopted and enforced by a majority of states.

Health status and access to healthcare

Health status and living arrangements are linked: those with adverse health outcomes may be more likely to live alone, while isolated living may lead to poor health. Additionally, elders in India face a dual burden of disease - of infectious and chronic diseases (Kowal *et al.*, 2010) - making addressing these issues concurrently is a priority. Existing evidence from elderly in India that suggests that those living alone are likely to have more bouts of asthma, tuberculosis, malaria and jaundice (Agrawal, 2012), hypertension, and diabetes (Lena, Ashok, Padma, Kamath, & Kamath, 2009) compared to elderly in co-residence with family. The authors also find that women

who live alone are significantly more likely to report more chronic and acute ailments than men.

Subjective measures of health are available through existing surveys, and are important correlates of mortality. The Study on Global Aging and Adult Health (SAGE) analysis revealed that there is a strong association between “bad/very bad” self-rated health and mortality among men in rural India (Hirve *et al.*, 2012). There has been mixed evidence on the comparability of subjective and objective measures of health in India, with recent work suggesting that individuals with lower levels of educational attainment more likely to report specific morbidities and rate their health accordingly, counter to findings from other developing countries (Subramanian, Subramanyam, Selvaraj, & Kawachi, 2009).

Access to quality healthcare for the elderly in India is also a growing concern, with most national services targeted at the entire population with an emphasis on primary care, reproductive health, and maternal and child health. There is no existing network of primary healthcare centers that provide geriatric health care and what exists is largely expensive secondary or tertiary super-specialty hospitals that cater to the wealthy (Kumar, 2003). There are dedicated NGOs that fill some of this gap by targeting resources toward the older population, and provide outreach and medical camps in their areas of operation (Kumar, 2003), but these services continue to be inaccessible for elderly with disabilities and functional limitations. Indeed, recent findings from the Longitudinal Study of Aging in India (LASI) highlight some of the major challenges to healthcare access for Indian elderly: social barriers that are based on gender, caste, and socioeconomic status; physical barriers: reduced mobility, declining social engagement, and limited reach of the health system (Dey, Nambiar, & Lakshmi, 2012). It is clear that the growth of the elderly population in the coming

decades will bring with it unprecedented burdens of morbidity and mortality across the country, within a health system largely unprepared to meet the challenge.

Pensions and financial security

The informal sector has been the main source of employment for a majority of elderly, if they worked at all. Since these individuals are not eligible then for employer-based pensions, it is all the more imperative that a public safety net exists to meet their needs. The Government of India has a large anti-poverty program for the elderly in India, primarily through cash transfers directed to all elderly above age 60 (Indira Gandhi National Old Age Pension Scheme), or widows above age 45 (Widowhood Pension Scheme). These amounts are paltry, ranging from Rs. 200 to 500 per month, with matching contributions expected from the states (MRD, 2009; NSAP, 2014). Individuals choose healthcare from the private sector at much higher rates than from public health centers, despite high cost (Amit Sengupta & Samiran Nundy, 2005), and mixed evidence on quality of care (Das *et al.*, 2012). Higher costs of healthcare at older ages, coupled with low usage of the public health system for preventative and curative health services make it is necessary for strong financial support systems in old age (Reddy *et al.*, 2011). Healthcare costs are met by the household, with poorer households resorting to borrowing money, or even the sale of assets to meet costs that tend to be out-of-pocket. The monthly per capita health spending of elderly households (in which all residents are above 60) is estimated to be 3.8 times higher than that of non-elderly households (in which no residents are above 60), with health spending accounting for double the consumption expenditure for elderly households (Mohanty, Chauhan, Mazumdar, & Srivastava, 2014). From a lifecycle perspective, the challenge of ensuring old-age income security in India requires simultaneously addressing the need for adequate incomes while developing

appropriate vehicles for translating savings into productive investments, and mechanisms to address uncertainty about the length of life and health risks (Bloom, Mahal, Rosenberg, & Sevilla, 2010). As Bloom *et al.* (2010) show, these challenges are particularly serious for workers in the informal sector, who account for nearly 90 per cent of India's labor force, especially those workers who are less skilled and have less access to assets, which is largely older Indian women (Bloom *et al.* 2010). Vulnerability in old age does not start when individuals turn 60; instead, it stems from a lifetime of disadvantage reflected in employment history, and accumulation of savings and assets to fall back on as social security.

The Cumulative Disadvantage Theory

Reviews of literature on living arrangements, access to healthcare, and pensions in India all point to a dearth of reliable data on the burden of access, affordability, and acceptance of government initiatives and familial transfers. In fact, a major reason for the lack of adequate data is that routine cross-sectional data collection in India is not designed to reflect differential progression over the life course for men and women: a process wherein the timing of marriage, childbirth, and widowhood determine caregiving later in life; education is related to access to better paying jobs; history of employment and access to banking is related to financial stability. Additionally, data collection procedures (National Sample Surveys, Census data, civil registries or death certificates) in India do not capture pathological progression of health nor do they disaggregate morbidity and disability outcomes among the elderly (Dey *et al.*, 2012). If vulnerability in old-age indeed stems from a lifetime of disadvantage, the focus of governmental intervention needs to start well before individuals reach age 60.

We frame the qualitative component of this analysis in the cumulative disadvantage theory in order to understand some of the findings of the quantitative survey. The cumulative disadvantage theory states that disadvantage can be defined as the systematic tendency for inter-individual divergence in a given characteristic (money, health, status) with the passage of time (Dannefer, 2003). It looks beyond age-based generalizations to examine the intra-cohort distribution of key characteristics, their trajectories and -more importantly the forces that produce them. An important implication of this theory is that vulnerability at any given point of time is not necessarily due to forces present at that time, but rather an accumulation of adverse events over the years. If education is a mechanism through which caste-based inequalities are reproduced, then divergent trajectories that culminate in poor health or isolated living arrangements can have roots in early childhood. Specifically in terms of aging, older women who live alone may have been married at young ages, thus not allowed to continue their education, then widowed at young ages, and thus without solid social networks for support. Alternatively, older women living in co-residential arrangements may prefer to live independently, but do not have the means to do so because their pension and/or assets may be seized by family members.

Data and Methods

We use a mixed-methods approach to understand the experience of aging in India, and the linkages with living arrangements and access to healthcare and pensions. First, we describe the data and methods for the quantitative component, and then do the same for the qualitative survey.

Quantitative Survey

We use the Building a Knowledge Base on Population Aging in India (BKBP AI) Survey for the quantitative component of the analysis. UNFPA India, along with partners at the Institute for Social and Economic Change (ISEC) Bangalore, and the Institute of Economic Growth (IEG) New Delhi, created the BKBP AI Survey to better understand the process and consequences of aging in India. In 2011, the BKBP AI Survey interviewed 9,852 men and women aged 60 and above, sampled throughout seven states with the highest proportion of elderly in the country. These are: Himachal Pradesh and Punjab in the North; West Bengal and Orissa in the East; Maharashtra in the West; Kerala and Tamil Nadu in the South. The objective of this project is to create a knowledge base on different aspects of aging in India by facilitating a series of thematic studies and disseminating the findings to different stakeholders. Along with living arrangements, each respondent was asked a series of questions on various dimensions of aging: socio-economic characteristics, income/assets, health status, healthcare utilization, social security, role within the household, and perceptions on aging.

The main focus of the quantitative analysis is on understanding the family structure, household composition, health status, and living arrangements of the elderly across various categories. The first portion of this section presents descriptive and multinomial logistic regression results to answer the question: Which elderly in India are more likely to live alone or with their spouse only, and what is their health status? Once we set the stage as to living arrangements in the country, we can answer the second question: What are the patterns of familial support? For this part, we use three criteria to assess support both to and from elderly: frequency of meeting, frequency of communication, and whether there are any monetary transfers.

Dependent variable: In the descriptive analysis, living arrangements of the elderly are classified as living: alone, with spouse only, with spouse, with children, and grandchildren, and others (other relatives, old-age homes). For the purpose of multivariate analysis, since the focus is on disentangling the characteristics of elderly who live alone, the dependent variable for the first set of multinomial logistic regressions is living arrangement coded as: living alone, living with spouse only, or in co-residence (with spouse, children, and/or grandchildren).

For the second set of regressions, there are three dependent variables: monetary transfers (yes/no) to the elderly, and frequency of communication and meeting between the elderly and their non-co-residing children, both coded as rarely (0=half yearly, yearly, 1-3 years, 3 years, never) and frequently (1= daily, weekly, fortnightly, monthly, quarterly).

Independent variables: The main predictors are demographic and socio-economic characteristics: age, sex, place of residence (rural/urban), marital status (currently married, widowed, other (which includes divorced, separated, never married), education, employment, religion, caste, and wealth quintile. We also include health and functionality controls such as self-rated health, Activities of Daily Living (ADL), Instrumental Activities of Daily Living (IADL), abuse after age 60 (any physical, verbal, economic abuse), and receipt of social pensions. For the second set of regressions, living arrangement is included as a predictor as well.

Construction of other key variables:

ADL: The Activities of Daily Living (ADL) are a set of six domains in everyday life that measure disability. These include bathing, dressing, toilet, mobility, continence, and feeding. Each category consists of potential answers on a spectrum from

independence to complete dependence, with scores of either 1 or 0 respectively. We use the Index of Independence in Activities of Daily Living as formulated by Katz *et al* (1970), which is a widely applicable instrument that is used in a variety of settings for the prevention of disability in all aging populations. Each category receives an equal weight of 1 for independence, and 0 for some or complete dependence with each activity, for a minimum score of 0 and maximum of 6 for ADL (Shelkey & Wallace, 2012). The ADL scores provide objective assessments of disability and are have been shown to be good correlates of living arrangements and health expenses in international settings (Palmer & Harley, 2012).

IADL: The Instrumental Activities of Daily Living (IADL) assesses independent living skills and functionality in a way that is more complex than the ADL. These questions identify improvement or deterioration of functionality over time (Graf, 2013). We use the Lawton Instrumental Activities of Daily Living scale that covers eight domains: ability to use the telephone, shopping, food preparation, housekeeping, laundry, transportation, medication and finances with scores from 0 to 1. The scores range from lowest to highest functionality from 0 to high functionality at 8 (Lawton & Brody, 1969).

Self-rated health: Defined as the answer to the question, “compared to others your own age, how do you rate your health- excellent, very good, good, fair, or poor?” This is considered an objective measure of one’s health in international settings (Salomon, Tandon, & Murray, 2004) as well as a good predictor of mortality among elderly (Mossey & Shapiro, 1982) from different socioeconomic strata (Burström & Fredlund, 2001). Counter to the commonly held view that there is a positive association between measures of SES and self-reported health in developing countries, Subramanian and colleagues (2009) find that individuals with less

education are more likely to report specific morbidities and rate their health accordingly in India.

Pensions: There are various pension schemes from the central government that are targeted to the elderly population, with implementation and matching contribution at the state level. The Indira Gandhi National Old Age Pension Scheme (IGNOAPS) is restricted to individuals that fall below the national poverty line with a compensation of Rs. 200 per month for those above age 60 and Rs. 500 per month for those aged 80 and above (MRD, 2007). The Indira Gandhi National Widow Pension Scheme (IGNWPS) is not confined to only older widows, but for all widow/ers above age 40 who also fall below the national poverty line. The amount for those eligible is Rs. 200 per month (MRD, 2009). Finally, the Annapurna Scheme is a poverty alleviation scheme to provide food security to elderly who should, but are not receiving the IGNOAPS. Each individual is eligible for 10kg of food grain per month (MRD, 2000). For the purposes of multivariate analysis, we restrict the answers to, “Do you receive *any* social pension”, rather than delving into specific schemes.

Qualitative Survey

The quantitative BKBPAI survey findings raised three points which motivated the qualitative in-depth interviews. First, widows were the most vulnerable group in terms of social and financial isolation. Second, those from economically disadvantaged groups are most likely to live alone - be it individuals from lower castes and/or from lower wealth quintiles. Finally, navigating pensions and healthcare is a challenge mostly for widows, women, and the poor.

This qualitative research seeks to understand social processes from a life-course perspective which culminate in vulnerability in old-age for certain individuals. Thus,

in-depth qualitative interviews help inform how early processes like age at marriage and education lead to certain financial status; how expectations from children lead to care in old age; and how differential access to government pensions and healthcare providers impact health and intergenerational dynamics. These relationships cannot be properly teased out with a cross-sectional survey, since we are unable to delve into the “why?”: why do some elderly choose to live alone, why are some elderly successful in getting pensions while others are not (and how do they navigate the pension system), and why do certain elderly have specific expectations from their children, while others do not. As a result, interviewing women selected on specific characteristics may shed light on inter-related processes that may aid in targeted policy directives for elderly in India. This was the motivation for the qualitative part of this study.

Sample recruitment

We used purposive sampling to recruit participants based on two dimensions: women above age 60 who at the time of survey were either still married or widowed. These participants were found using two strategies. First, we contacted professors at a local university who served as knowledgeable gatekeepers to specific communities within Hyderabad (decision on location is described in the “Setting” section); particularly in areas not served by NGOs, religious organizations, or other senior citizen support groups. Second, we contacted a local branch of a national NGO whose mandate is to serve health needs of the elderly, who introduced us to potential participants in the communities they serve, thus resulting in a form of snowball sampling. We are aware of the limitations of the latter strategy since there could be a potential bias in response based on who the gatekeepers selected. Thus, we did not rely solely on participants referred to us by the NGO but also found participants through the first strategy

mentioned, and found the experiences and challenges faced by the respondents to be similar.

Research process

The data were collected between May and July 2013 in the Greater Hyderabad Municipal Corporation (GHMC) area in the state of Andhra Pradesh. The interviews were conducted by the lead author and a translator, in either one of the local languages, Telugu and Hindi, after verbal consent was provided in the language of interview. Audio recordings were then professionally transcribed and translated into English. Ethical approval was provided by the University of Pennsylvania's Institutional Review Board prior to data collection. We interviewed 40 women in total. Our goal was to gain a deeper understanding of intergenerational relations, access to social pensions, and healthcare through a life course perspective for the most marginalized groups: elderly widows and urban poor elderly women. Individual face-to-face interviews (N=40) were conducted using qualitative semi-structured interview guides. These guides were pilot tested with married and widowed women.

We used ATLAS.ti qualitative analysis software to identify themes and critical concepts across all the interviews. Additional care was taken to include emergent themes that were not initially hypothesized, and will be discussed below. The lead author was the only person with access to the English transcripts and conducted the analysis independently, which was checked by another rater to ensure inter-rater reliability in coding.

Setting

The quantitative component of this analysis, the BKBPAI Survey, was designed to gain an in-depth understanding of aging in seven states of India with the highest proportion of elderly: Himachal Pradesh and Punjab in the North, West Bengal and Orissa in the East, Maharashtra in the West, and Tamil Nadu and Kerala in the South. In addition to the southern states in the survey, the Census of India 2011 reports that the two other states in the South also have a high proportion of elderly in the country: Karnataka and Andhra Pradesh (see Table 3). The southern region of India has low fertility and high rates of female literacy and employment (Bloom *et al.*, 2010; Dey *et al.*, 2012). We wanted to thus gain an understanding of the experience of aging in South India from a life course perspective for elderly married or widowed women. We decided to begin qualitative research with a site in Andhra Pradesh, the largest city which makes up more than half of the state's population, Hyderabad. What follows is an analysis of the results from this first qualitative study site. Similar studies in other southern states (Chennai in Tamil Nadu, and Bangalore in Karnataka) are currently underway by the UNFPA.

[TABLE 3 HERE]

Results

The mean age at marriage for the men in the quantitative analysis was 24, with those currently living alone with a slightly lower mean age at marriage (Table 4). The men on average were widowed at about age 60, while women were widowed about 6 years earlier. In the qualitative survey, which by no means is nationally representative, the mean age at widowhood is about 50, and the women had about 2 years of education on average. These women have a much lower average age at marriage, at about 13 compared to 17 in the quantitative survey, which could be a result of a high

proportion of Muslim respondents (15 per cent) and that a majority were from rural areas with only recent migration to the city.

[TABLE 4 HERE]

Who lives alone?

Descriptive results

The traditional co-residential family living arrangement is the most common living arrangement across all survey states; however there are a few noteworthy trends as seen from the profile of elderly men and women by their place of residence and living arrangements (Table 5). A majority of elderly are co-residing but a fifth of all elderly are living alone or with their spouse only, with 6 per cent are living alone. A much higher proportion of elderly women than men live alone (10 per cent women and 2 per cent men). This is true in both rural and urban areas of the country.

[TABLE 5 HERE]

Once living arrangements are further disaggregated by background characteristics, other patterns emerge (Table 6). The dominant type of living arrangement across all categories remains living with one's spouse, children, and grandchildren. Widowed older women, those with no education, and who never worked, live mostly with children and grandchildren. Marital status, particularly widowhood as a determinant of living arrangement emerges, with about 15 per cent of widowed women and men reporting that they live alone. A higher proportion of elderly Hindus live alone compared to their Muslim counterparts, as well as those in the lower caste hierarchy compared to high-caste Hindus. Presence of living children is key: in the sample, 9,472 respondents answered the question on surviving children at the time of survey,

of which 9,339 respondents reported they had at least one surviving child. About 20 per cent reported having only male child/ren, while 10 per cent reported only female child/ren, and the rest had at least one of both gender. Elders with no children lived alone more often than those with children (27 per cent), with important differences by gender of child: 15 per cent of elderly with only female children lived alone compared to 5 per cent with only male children. Those with lower levels of education and those at the lowest ends of the wealth index report higher levels of living alone as do those who have never worked- a category dominated by women. Notably, more elderly who report good, fair or poor health live alone compared to those in excellent or very good self-rated health. Respondents score high on average in terms of ADL and IADL, with those living alone or with spouse with slightly higher scores than those in co-residence. About 10 per cent of the elderly reported facing any abuse physical, verbal or economic- after turning 60, of which a higher proportion are in co-residential arrangements. We describe more of the health analysis in the section that follows. About half of elderly who live with their children receive a social pension, compared to 10 per cent of those that live alone. When it comes to specific national pension schemes, the story is similar, with those living alone on the lower end of receiving the National Old Age Pension Scheme and Annapurna at 8 per cent each. Interestingly, a higher proportion of those eligible for widowhood pension receive it if they are living alone than any other pension scheme at 16 per cent.

[TABLE 6 HERE]

The main reason for living alone (Figure 1) is not having children or children living elsewhere, most likely due to employment-related migration by male children, and marriage migration for female children. What is striking however is that this is more prominent in urban areas with 77 per cent of men and 75 per cent of women citing

this reason for living alone compared to 56 per cent each of men and women in rural areas. Family conflict, or a preference to be independent are the other main factors responsible for elderly living alone; with more rural elderly citing family conflict (20% men and 21% women) than urban elderly (9% men and 11% women).

[FIGURE 1 HERE]

Multinomial regression results

Central to our research question is which profile of the elderly are more likely to live alone. For this, we used multinomial logistic regression analysis for 2 categories: those that report living alone, and those that report living with their spouse only. For each of these categories, the reference group was those in any form of co-residence (with their spouse and children, or spouse and grandchildren, or other). The benefit of multinomial logistic regression is that the nuance of reference group is not lost when pooled together, as is the case for simple multivariate logistic regression.

Table 7 shows this analysis with controls for demographic, socioeconomic, health, and social pension indicators and answers several important questions. First: Who is more likely to live alone? Our results in Panel 1 indicate that older (age 70+), women, widowed, those belonging to lower castes, those with no children or female children, those with more education, those higher on the IADL scale, and those who faced abuse after turning 60 are significantly more likely to live alone. Of these, the strongest associations are for widowed elderly and those with no children or female children only. There seems to be a protective wealth gradient, with those at the highest end of the wealth quintile significantly less likely to live alone than those worse off. Elders who reported being homemakers, i.e. those who were in unpaid housework were significantly less likely to live alone. Notably, there was no

association of the likelihood of living alone with self-rated health or differences by religion.

Next: Who is more likely to live with their spouse only compared to co-residence with children? Our results in Panel 2 of Table 7 show similar patterns to elderly who live alone, with some important differences. First, elders in urban areas are less likely to live with their spouse only compared to those in rural areas, indicating different family sizes and household structures. Second, religion does seem to play a role, with Muslim elderly significantly less likely to live with their spouse only compared to their Hindu counterparts, while Sikh elderly are more likely to live with their spouse only. Finally, elderly who have worked before are more likely to live with their spouse only compared to those that are currently working.

[TABLE 7 HERE]

Living arrangements in a cumulative disadvantage perspective: Results from qualitative analysis

Among the women interviewed, most had married before puberty, and remained in their natal home until they began menstruation, after which time they moved in with their husband and in-laws. These marriages were arranged by family members, and child marriage was the norm (Agarwala, 1957). The usual process constituted cross-marriage between cousins according to one woman:

“His [father’s] sister and her husband died. They had a son of 7 [years of age] and they married me to him when I was 2. Initially I stayed with my parents, but when I was able to have children, I went to live with him and his uncle’s family. Before, I could not utter a word. I was timid; I never stayed in the room when elders and my in-laws used to talk. That used to be the practice those days in the houses. They [her family] were in a hurry to get me married. Now also, I am in a hurry to leave this earth”.

This cohort of women largely remained uneducated, and this translated to lack of autonomy in the marital household coupled with a perceived lack of self-worth. One woman describes a common narrative about why education did not seem to be a priority:

“Those days, it was not common for girls to go for higher education, or education post-marriage. They [parents] would question what will the girl do with studies? Does she have to work and earn? All she has to do is to get married and take care of the family. In fact, if the girl went out, they would call her by all kinds of names”.

This perceived societal backlash for families that sent their young daughters to school was not something that ended once the girl was married; instead, it was something that ensured the continued safety and implied “purity” of a young woman:

“My mother in law was not in favor of my studying. Why to raise unnecessary quarrels in the family? They [in-laws] will feel bad. People in those days were not very progressive in their thinking when it came to girl’s education. They also were afraid. If a girl goes out to study, something untoward may happen. Young girl, so all kinds of fears”.

Confirming results from the quantitative component, children, particularly male children, are the main form of social security and support in old age in India. Indeed, this caregiving seems to be expected:

“Caring for one’s parents should come from the children only. We cannot say and make them do. Maybe it is partly because of our previous sins. Or it is the sin that the children are committing today. This may be a combination of both. Everyone has to think today if we desert our parents, tomorrow our children can desert us. This thinking should come from within: We should know our own dharma. You cannot take care of an item when it is of use to you and then abandon it when it is not”.

One woman illustrates this point by describing what kinds of support she expects from her sons relative to what is potentially occurring around her, where sons are “abandoning” their parents:

“As long as I had strength, I worked [daily labor]. Now, I find it difficult. My son takes care of me. These days, sons don’t even keep their parents with them. In that way, I am happy I am able to eat my two meals a day on time and I feel that is great in itself”.

In fact, living with one’s married daughter and her family is still seen as taboo, and not even considered as a last resort in some parts of the country, particularly the north. We found that while strong son preference does dominate in these qualitative interviews, there is a gradual acceptance or adaption to modernity, even if it means living with one’s daughters and role in the household:

“I am satisfied in the way that I live, with the fact that I live with my daughter. As per today’s generation, it is okay. We cannot expect yesterday to return today. One has to adjust with whatever is happening instead of thinking about the past. Married couples today have no time for each other. No time to say a word of love to each other, nor to sit and enjoy life together. All the time busy, busy. In our time, we used to get an annual income which was sufficient. We enjoyed it all through the year. It is not so now, all kinds of tensions. We did not have any tensions, and we enjoyed good health. It is not so now. Although, it has given me strength to keep up with the housework. I do all the cooking, cleaning, clothes washing myself for my daughter’s family. I can’t sit idle for five minutes.”

While there is some literature that stipulates living in co-residential arrangements is preferred by elderly due to the constant familial support network, we were surprised to find that some of these women choose to live in these arrangements in order to not offend their sons’ sensibilities:

“We give birth to them [children]. We should not do things which hurt them. We gave birth to them, kept them in our wombs for nine months. We helped them grow. Took

care of their welfare, we performed their marriages. It doesn't look nice to say I prefer staying at a better place, does it?"

Another woman claims that living in these arrangements confers a status and respectability in society, which is not the case for those living alone or in other arrangements:

"I don't stay with my son because of money. I can do anything if I want. But it will be awkward if I leave his family and come out. That's why I am staying with him. Otherwise, I can take up a room, have a maid and get work done. But it is good to be with your own people; it gives respect in the society to my son and to me also. Otherwise there will be talk, "Only one son, and he also sent the mother away""

Then there are others, who claim to face abuse in the household, largely perpetrated by their own sons, rather than common perceptions of daughters-in-law as primary abusers:

"They [my sons] have become Rakshasas [demons] and keep telling me how they wish I wasn't around to be a burden to them. There is a saying- a Dhobi [person who washes clothes] is better than an educated fool. Dhobi, though illiterate, collects soiled clothes from house to house, washes, marks each piece, and returns each cloth to its legitimate owners without fail. He is so dutiful. Unlike one's own family"

This notion of a son's "duty" to care for parents is recurring and complex, this time equated with clashing expectations from a mother and sons who are concerned with providing for their nuclear families rather than focus on their perceived duties as a son.

What is the health status of elderly and ease of access to healthcare and pensions?

The evidence that health status and living arrangements are inextricably linked warrants further discussion. As Figure 2 shows, there is variation in ADL and IADL scores by sex and age group. As expected, ADL and IADL are inversely related to

age, with the decrease in IADL being sharper than that for ADL. Notably, women across the board have lower ADL and IADL scores compared to men.

[FIGURE 2 HERE]

Chronic morbidity is increasing in the country with arthritis, high blood pressure, cataract, and diabetes being the top diagnoses for men and women (Table 8), with the prevalence of arthritis higher for those living alone compared to other forms of residence for both sexes. Traditional healers and *ayurvedic* treatments for illnesses are uncommon, with most of the sample of elderly opting for private hospitals or clinics for treatment rather than government hospitals (65 per cent to 27 per cent). The source of payment for various treatments differs by sex and living arrangement, as can be seen in Figure 3. Men are more self-sufficient regardless of living arrangement, while women are heavily reliant on their spouse or children for payment (Figure 3). This measure can be used as a proxy for financial independence, and the gender difference is thus notable.

[TABLE 8, FIGURE 3 HERE]

Results from the qualitative survey

Most women preferred going to private clinics over government hospitals for common to severe ailments. This was not very surprising, given different quality of care between each. One woman summarizes:

“Even though we do not have much money, we go to the private hospital. In the government hospital, one has to stand in a queue for a long time. Who has the energy for that? I have severe pain in my legs, could I stand for hours on end? We get golis [tablets] from the private hospital, and they work better.”

The proportion of women who receive pension is a little over half of all respondents.

Most of those women said that these pensions, largely the National Widowhood

Pension Scheme, were received thanks to maneuvering of their local politicians. One says:

“We had no difficulty in getting the pension. My son helped me apply; they asked us to open a bank account with Rs. 500. Then they gave us a book and every month, Rs. 200 goes into the account. If I did not have the bank, I would have to go to the main office to collect it every month. The councillor and sarpanch [elected village leader] here helped us. We got the pension right away, and the elections happened soon after. But at least I got my pension, so I was happy.”

That these elected officials helped procure pensions for women in the area right before elections was not lost on most women. In the end, they were beneficiaries and saved a tremendous amount of time in circumventing bureaucratic rigmarole, so were satisfied. Others were not as fortunate, some surprisingly so due to opposition from sons:

“I do not receive any pension because my son dissuaded me for applying for one. I gave signed papers and photos also. That time he did not care. He says Amma [mother] you need not worry as long as you are staying with me. But they are having some financial problems now. I also need my own money; I wish I had applied for it without him knowing.”

Most of the women who did not receive pensions described the process, and how it was harsh on women with illness or disabilities, or with no one to accompany them to explain the application process:

“We tried a lot to receive pensions. I have no more stamina to go around. It has already been a year since we applied. Office people say it will be cleared in 2 months; it has already been six months. I am not educated and do not exactly understand what they [office] want and say. I tried asking my son to go with me to the pension office, but he has to work during the same hours that office is open, so of course he cannot accompany me”.

One woman was honest about corruption within the system, from various middle men who promise to facilitate the pension process but fleece the intended recipient instead:

“I went around the office for three years; paid money [bribe] to this fellow, that fellow. They keep saying, “You will get it directly to your home, no need for you to come to the office to come.” Now I cannot even go and follow-up so many times. So I gave up”.

This is not to say that the entire system of procuring pensions is riddled with corruption, but is illuminating in terms of the different points of the process that prove to be challenging for older women, particularly those without the knowledge or ability to demand pensions.

What are the patterns of familial support?

The next sets of questions explore the type and extent of interaction between the elderly and their non-co-residing children. In the BKBPAI survey sample of 9,852 elderly respondents, 9,339 (94.7 per cent) had at least one surviving child. Of these, 7,840 elderly (84 per cent) had at least one non-co-residing child. One limitation of the survey is that the questions on interaction were asked only of elderly with at least one non-co-residing child, thus our analytic sample is restricted to those 7,840 elderly respondents. It is important to note that female children dominate the non-co-residing children category, with 6,778 non-co-residing female children compared to 1,062 male children. This difference is largely due to cultural norms that state the son resides with parents while the daughter lives with her husband after marriage. The questions on interaction were bimodal: interaction from children to elderly, and from elderly to children. We analyze both below.

Two trends are noteworthy: frequent communication and meeting are the norm, with female children doing more so than male children. This is true for frequent communication from parents to children as well, with female children receiving more interaction. Second, a higher proportion of male than female children report never communicating or meeting with elderly parents that live alone or with spouse only. Interestingly, these patterns of higher involvement by female children hold for monetary transfers for elders who live alone (42%) compared to male children (36%),

but the reverse holds true for all other living categories. Table 10 also shows that elders in all living arrangements have some individuals who send money to their children, thus indicating a downward flow in addition to what they receive. About 10 per cent of elders who live alone send money to a male child, while 7 per cent send money to female children.

[TABLE 9 HERE]

Children to Elders

Table 11 shows results from the logistic regression results for frequent communication, meeting, and transfers from children to elderly. Due to sample size constraints for male non-co-residing children, these analyses include male and female children together. Elders who live with their spouse only (versus co-residence), Muslims, those of the OBC caste, with higher education, higher wealth index, higher IADL score are more likely to receive frequent communication from their non-co-residing children. Conversely, those living in urban areas, belonging to the Sikh faith, who have male children only, and those who receive a pension are less likely to receive frequent communication from their children.

Similarly, elders who live alone or with their spouses aged 80 and over, Muslim, and those in the middle wealth index are more likely to receive frequent in-person visits from their non-co-residing children. Similar to communication, those in urban areas, in upper castes, and with only male children are less likely to meet. Additionally, those who have faced abuse are less likely to receive frequent meetings.

Finally, elders who live alone or with their spouse, aged 80 and over, are Muslim, have only male children, who reported being homemakers in the past, worked before,

report poor or fair health, have higher IADL score, and receive pension are more likely to receive transfers. Conversely, Sikh elderly, those with female children, who score high on ADL, and faced abuse, are less likely to receive transfers.

[TABLE 10 HERE]

Elders to Children

In the other direction of elderly to children, the flow is not quite as strong, as shown in Table 12. For instance, those in the OBC caste, high education, higher wealth quintiles, higher ADL and IADL score are more likely to communicate with their children. Those that receive pension, report being in fair health, having only male children, belonging to the Sikh religion are less likely to communicate with their children.

Meeting follows different patterns, with elderly living with spouse only, higher wealth index, higher ADL and IADL are more likely to meet their children. Those reporting fair or poor health, higher levels of education, higher caste, Sikh, and living in urban areas are less likely to meet their non-co-residing children. Similarly, elders living with spouse only, those in very good health, higher IADL score are more likely to transfer money to their children while those that have worked before are less likely to transfer money to their children.

[TABLE 11 HERE]

Discussion

This mixed-methods study has shed light on various important aspects of aging in India: the vulnerability of widows in old-age is a reflection of an accumulation of disadvantage that begins in early childhood, the urban poor are isolated in terms of

living arrangements with more in lower wealth quintiles living alone as well as less likely recipients of pensions, and that better measurements of health in quantitative surveys are needed to tease out the relationships between health status and living arrangements- particularly mental health as has emerged from the qualitative study.

This paper covered a range of topics related to the experience of aging in India. It is helpful then to recap the major findings related to the parts of the research question.

1. Who lives alone?

Older individuals, women, widowers, those with no or female children, those that are highly functional and educated and who faced any abuse in old age are more likely to live alone or only with their spouse only compared to co-residential arrangements. Additionally, Muslim elderly are less likely to live with only their spouse, signaling potentially different kinship structures than for their Hindu counterparts. It is possible that the experience of aging and expectations from kin are shaped by religion: faith plays an important role in one's purpose in old-age, and religious activities organized at the group level promote social activities and prevent isolation in old-age (Mehta, 1997). There is a strong wealth gradient that indicates that the richer individuals are, the less likely they are to live alone or with their spouse only- or conversely, economically disadvantaged are more likely to not be in co-residential arrangements, thus indicating that financial status is strongly related to living arrangement in old age. It is not possible to establish the direction of impact between these two indicators due to the cross-sectional nature of the survey. It is possible however, as Husain and Ghosh (2011) note that co-residence allows the pooling of resources, thus elevating reported wealth of the individual (Husain & Ghosh, 2011). In an important departure from the findings from Panigrahi (2009), our results do not indicate that the presence

of male children significantly mitigates the likelihood of living alone; the presence of female children is associated with an increased likelihood of living alone and with spouse only. Our study does confirm that education and living alone are positively correlated. Surprisingly, we do not find any significant relationship between self-rated health and living arrangement which may imply that this is a weak objective measure of health among elderly in developing countries. Further study is warranted.

2. What is the overall health status and, access to healthcare and pension among the elderly in India?

Indian women rank lower on the ADL and IADL scale compared to men, which is consistent with other research that finds that gender differences in function (disability) are caused by women's greater prevalence of mostly nonfatal but disabling conditions (Murtagh & Hubert, 2004). In fact, older women experience lower mortality rates and lower rates of some chronic diseases and use health care services more often than men, and consistently report more functional limitations and physical disability than their male counterparts. In our study, in terms of chronic diseases, men and women share some of the major indicators: arthritis, high blood pressure, and cataract topping the list. Diabetes, asthma, heart disease follow for both, and is consistent with research that finds chronic illnesses are on the rise in India, along with a continuation of certain infectious disease (Reddy *et al.*, 2011). Indian men have a high prevalence of renal disease, while women have high levels of osteoporosis. There do seem to be differences by living arrangements, with individuals who co-reside with children report being in excellent or very good health, and lower prevalence of arthritis compared to those who live alone. The dominant source of treatment is private health clinics or private hospitals, which is in line with research that finds that private hospitals are preferred overall (Das *et al.*, 2012), this is confirmed in our study for

older persons as well. The qualitative component sheds light on why is the case, with older women reporting that long wait times (most likely in the heat) to see the doctor, are prohibitive. Additionally, they are willing to pay for tablets in private clinics rather than get medication for free from public health centers, because they place a premium on the effectiveness of the drug based on price.

The qualitative survey shed the greatest light on the issue of pension procurement. Overall, recipients face a mountain of bureaucratic red tape to circumvent in order to get the pensions due to them – consistent with the process of obtaining of other public goods throughout India. What is clear, however, is that given ill health or functional disability, women have to rely on proxies to get paperwork processed, and this is contingent on the relationship between them and their sons. Some women expressed frustration that their sons had dissuaded them from applying for pensions, because it would then appear that their sons were unable to look after them. Financial independence was something most women reported wanting, if not for contributing to the household, then at least for personal use toward medicines or food. Most of the women had no concept of legal rights on their own assets or property, largely farmland. Thus, these narratives illuminated that the reason behind women struggling to receive their pensions or being financially dependent on their caretakers was not only due to institutional obstacles, but also familial.

3. What is the pattern of intergenerational transfers?

In terms of interaction and familial support, there are interesting patterns of note. Elders in urban areas have lower levels of familial interaction, which is not surprising given that support networks tend to be stronger in rural areas. Female children have differential patterns of familial support than male children, with females indulging in

more by way of communication and meeting, while male children are more likely to assist monetarily. Health and functionality are important indicators of interaction: those in worse health are more likely to receive monetary support, while those in better health are more likely to send transfers to their children. Pensions do not seem to protect elderly in terms of living arrangements, instead, compound familial support: elderly who receive pensions are also more likely to receive monetary support from their children. This could also mean that these are the most vulnerable elderly who need both public and private transfers.

Qualitative survey highlights

It is possible then, that India is moving toward a more western system of living arrangements, where highly educated, functional elderly in good health are more likely to live independently by choice rather than compulsion. There is, however, the fact that women irrespective of marital status are the most vulnerable to residential and financial isolation and need better governmental safety nets. Indeed, the qualitative survey shows just that. Widows and urban poor women spoke about the many hardships in their living situations, largely those stemming from co-residence. The cumulative disadvantage theory is supported through many of the narratives: most of these women have little education, were married at very young ages, and had little to no autonomy in the marital household. Thus, they were constrained to the house rather than seek employment, and had no financial independence. Upon the death of their husbands, the widowed respondents reported that they were taken in by their sons or daughters, and continued to face financial instability. A common thread was that whatever assets the women had -largely jewelry and some farm land- were seized by their sons or other relatives, and were given no remuneration. In fact, as some women reported, whatever financial independence they could manage through

pensions was also something that was difficult to garner, since their sons persuaded them from not getting pensions, with the assurance that their own income would be sufficient. One emergent theme from the qualitative interviews was the perceived lack of self-worth and overall mental health status of the respondents. This was evident in recounting stories about relationships with elders in their own family, their in-laws, and mental abuse from their sons. In a way, having children was a way to gain social status in their households. Thus, when and the reality of their interactions with their sons fell short of expectations in old age, there is a renewed lack of self-worth and fatalistic notions of life because of “diminished social status”. Mental health issues thus remain to be under-studied aspects of elder health in India, and are an important aspect of health and well-being. There also needs to be a push for more mental-health awareness among the elderly and health professionals, that may help reduce the stigma associated with mental health care-seeking behaviors (Patel & Prince, 2001).

Implications

Going forward, there are certain ways in which the Government of India can address the needs of its current and future elderly population.

1. National healthcare system needs to carve out special provisions for the elderly

The proposed Integrated National Health System in India by leading public health and medical experts of the country is the biggest step forward in including elderly in preventative and curative healthcare (Reddy *et al.*, 2011). Given that private healthcare is preferred to the public sector, key steps have been proposed to strengthen the latter. These include expansion of service delivery with financing from a combination of public, employer, and private sources; increasing public spending on health from 1 per cent to 6 per cent of the GDP; establishment of the Indian Health

Service with an emphasis on increasing health providers in underserved areas; comprehensive health information and surveillance system; and the implementation of a national network of pharmacies for generic low-cost drugs for the entire population (Reddy *et al.*, 2011). While these are commendable goals that will go a long way in setting up mechanisms for affordable healthcare and health insurance, we propose one major inclusion- revamping the medical curriculum. Gerontology education in the country is severely lacking, with only 2 universities offering a Diploma in Gerontology, and 1 medical institution requiring a course on gerontology during medical training. In fact, that institution- the All India Institute of Medical Sciences (AIIMS) in New Delhi is the first (and only) in the country to have a dedicated outpatient department for geriatric care under the National Programme for Health Care of the Elderly. More institutions with a uniform curriculum and requirement for geriatric care training would be a necessary first step in understanding the health status and care of elderly, if correct diagnostic and treatment procedures were in place across the country.

2. Pension integration into the Aadhar card

The Unique Identification Authority of India (UIDAI) has been set up by the Government of India to provide a unique identification number to each person in the country. This card, called “*Aadhar*”, will serve as a proof of identity and address (UIDAI 2014). The idea is to tie the provision of social benefits -including pensions- to each individual through this identification card. The aim is to avoid duplication of entitlements, and provide an easier route to procuring pensions for eligible individuals. There are obvious issues related to privacy since biometric (through iris scans) data will be linked to identification, without any safeguard ensuring these details are not misused. This case is currently being heard in the Supreme Court (Nair,

2014), but if properly implemented, *Aadhar* can be a great benefit. However, the rural banking system needs serious restructuring to make it accessible to elderly in remote parts of the country, or those with functional disabilities who cannot go to local pension offices to collect their money each month.

3. *Financial safety nets for older women who live alone (or in co-residential arrangements)*

These could take the form of microfinance aimed at either the participation of older women, or toward the care of older women in the household. Surprisingly, none of the current poverty reduction programs include the empowerment of older women. Most of these women may be in good health, or with disabilities that may not impede their participation in such groups. Not only would it give elderly women some financial stability, but will also legitimize them at an age where they may feel like a burden to their family -the lack of self-worth that came through in the qualitative survey- and have a positive impact on overall health and well-being. These groups could also instruct women on basic legal rights they have to their own property, and even provide pro bono legal assistance to the women.

Table 1: Indian Population Trends from 1950-2100

Year	Total population	Total population above 60 (%)	Females above 60 (% of total population)	Males above 60 (% of total population)	Females above 60 (% of female population)	Males above 60 (% of male population)
1950	376,325,000	5.4	2.7	2.7	5.6	5.2
2000	1,042,262,000	6.9	3.5	3.3	7.4	6.4
2011	1,206,365,175	8.6	4.4	4.2	9.0	8.2
2050	1,620,051,000	18.3	9.7	8.6	19.9	16.8
2100	1,546,833,000	30.2	15.5	14.7	31.6	28.9

Source: Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, *World Population Prospects: The 2012 Revision*, <http://esa.un.org/unpd/wpp/index.htm>

Table 2: Mean Age at Marriage, Life Expectancy at Birth, and Literacy in India from 1901 to 2011.

Year	Mean age at marriage			Life expectancy at birth			Literacy		
	Men	Women	Difference	Men	Women	Difference	Men	Women	Difference
1901	20.2	13.2	7.0	22.6	23.3	-0.7	9.8	0.6	9.2
1911	20.5	13.6	6.9	19.4	20.9	-1.5	10.6	1.1	9.5
1921	18.4	12.6	5.8	26.9	26.6	0.3	12.2	1.8	10.4
1931	20.2	15.0	5.2	32.1	31.4	0.7	15.6	2.9	12.7
1941	19.8	15.4	4.4	32.4	31.7	0.7	24.9	7.3	17.6
1951	21.4	16.1	5.3	41.9	40.6	1.3	25.0	7.9	17.0
1961	21.3	16.7	4.6	47.1	45.6	1.5	34.4	13.0	21.5
1971	22.7	17.7	5.0	51.6	49.7	1.9	39.5	18.7	20.8
1981	23.4	18.3	5.1	55.4	55.7	-0.3	46.7	24.9	21.9
1991	24.0	19.3	4.7	60.6	61.7	-1.1	64.1	39.3	24.9
2001	24.8	20.2	4.6	63.8	66.1	-2.3	75.3	53.7	21.6
2011	26.0	22.2	3.8	67.3	69.6	-2.3	82.1	65.5	16.7

Source: Census of India, 2011: Trends in Census Population in India 1901-2011

Table 3: Proportion of Population above Age 60 by State, Census of India 2011

State/Region	Proportion of Population above 60			In	In
	Total	Male	Female	Quantitative Survey	Qualitative Survey
India	8.6	8.2	9.0		
Himachal Pradesh	10.2	9.8	10.7	X	
Punjab	10.3	9.9	10.9	X	
West Bengal	8.5	8.2	8.8	X	
Orissa	9.5	9.4	9.6	X	
Maharashtra	9.9	9.0	10.8	X	
Kerala	12.6	11.8	13.3	X	
Tamil Nadu	10.4	10.1	10.7	X	
Karnataka	9.5	8.9	10.1		
Andhra Pradesh	9.8	9.2	10.4		X

Table 4: Mean Years of Education, Age at Marriage, and Age at Widowhood for Quantitative and Qualitative Sample

Quantitative Survey	Men			Women			Total		
	Age at marriage	Age at widowhood	Education	Age at marriage	Age at widowhood	Education	Age at marriage	Age at widowhood	Education
Alone	23.6	60.2	4.6	17.4	54.1	2.7	18.5	54.9	3.1
Spouse only	24.7	-	6.4	18.7	-	3.7	22.6	-	5.4
Spouse, children, and grandchildren	24.8	-	5.9	18.4	-	3.3	22.8	-	5.1
Children and grandchildren	22.7	60.6	4.0	17.2	55.1	2.1	18.3	56.1	2.5
Others	24.3	54.6	5.9	17.6	53.6	2.9	20.5	53.8	4.2
Total	24.5	60.0	5.7	17.7	54.8	2.7	21.0	55.7	4.1
Qualitative Survey				12.7	49.8	2.3			

Table 5: Percentage Distribution of Elderly by Type of Living Arrangement According to Residence and Sex

	Rural			Urban			Total		
	Men	Women	Total	Men	Women	Total	Men	Women	Total
Alone	2.1	9.3	5.9	1.7	10.5	6.5	2.0	9.6	6.0
Spouse only	21.4	12.9	17.0	19.2	7.0	12.6	20.8	11.3	15.8
Spouse, children, and grandchildren	57.6	25.7	41.0	59.3	22.5	39.3	58.0	24.9	40.6
Children and grandchildren	12.4	43.6	28.6	11.3	50.6	32.7	12.1	45.5	29.7
Others	6.5	8.5	7.6	8.5	9.4	9.0	7.0	8.8	7.9
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
N	2,453	2,685	5,138	2,219	2,495	4,714	4,672	5,180	9,852

Table 6: Percentage Distribution of Elderly by Type of Living Arrangement and Background Characteristics

	Alone	Spouse only	Spouse, children, and grandchildren	Children and grandchildren	Others	Total	N
Demographic Variables							
Age							
60-69	5.9	15.8	47.3	23.4	7.6	100.0	6,239
70-79	6.5	17.4	33.1	35.4	7.6	100.0	2,601
80+	5.5	11.8	20.9	51.1	10.7	100.0	1,012
Sex							
Men	2.0	20.8	58.0	12.1	7.0	100.0	4,672
Women	9.6	11.3	24.9	45.5	8.8	100.0	5,180
Residence							
Rural	5.9	17.0	41.0	28.6	7.6	100.0	5,138
Urban	6.5	12.6	39.3	32.7	9.0	100.0	4,714
Marital Status							
Married	0.5	26.2	67.3	0.0	6.1	100.0	5,847
Widowed	14.4	0.0	0.0	76.8	8.8	100.0	3,768
Other	15.5	0.0	0.0	44.1	40.5	100.0	237
Religion							
Hindu	6.5	16.7	40.2	29.5	7.2	100.0	7,781
Muslim	4.7	6.9	41.4	34.0	13.0	100.0	804
Sikh	2.7	14.6	46.2	27.2	9.3	100.0	826
Other	7.0	19.7	34.4	29.4	9.5	100.0	441
Caste/tribe							
SC/ST	6.2	15.6	39.7	31.2	7.4	100.0	2,383
OBC	7.6	16.8	39.1	29.4	7.1	100.0	3,353
Other	3.9	15.0	43.5	28.5	9.2	100.0	3,872
Living Children							
None	26.9	23.2	8.2	2.2	39.6	100.0	133
Only a male	5.2	12.2	42.7	35.1	4.8	100.0	1,899
Only a female	15.0	35.9	15.5	18.9	14.9	100.0	911
A male and female	3.8	13.3	45.9	31.7	5.4	100.0	6,529
Socioeconomic variables							
Education							
None	7.3	14.0	32.8	38.0	7.8	100.0	4,588
1-4 years	4.5	13.7	43.3	30.0	8.5	100.0	1,258
5-7 years	5.8	14.0	46.8	25.9	7.5	100.0	1,324
8+ years	4.1	21.9	53.0	12.8	8.2	100.0	2,682
Wealth Index							
Lowest	13.6	22.3	29.5	27.9	6.8	100.0	1,954
Second	6.8	17.6	39.0	29.4	7.3	100.0	1,974
Middle	4.0	13.6	43.0	31.4	8.0	100.0	1,938
Fourth	1.2	11.7	47.2	31.0	8.9	100.0	1,962
Highest	1.4	10.7	49.4	29.0	9.6	100.0	2,018
Employment							
Never worked	10.5	9.1	23.5	46.6	10.3	100.0	529
Housewife/homemaker	6.0	11.2	28.9	45.2	8.7	100.0	3,057
Worked before	5.0	17.5	44.9	25.0	7.6	100.0	4,002
Currently working	6.7	20.4	52.1	13.8	7.0	100.0	2,264
Reasons for current employment							
Choice	2.6	17.9	58.8	13.2	7.5	100.0	660
Economic Need	7.9	21.4	49.8	14.1	6.9	100.0	1,498
Other compulsion	15.2	21.1	45.0	12.2	6.5	100.0	107
Health and Functionality							

Self-rated health							
Excellent	4.8	15.0	52.8	23.5	3.9	100.0	259
Very good	2.9	17.5	50.6	21.6	7.4	100.0	1,345
Good	7.1	18.1	40.7	27.3	6.8	100.0	2,947
Fair	6.0	15.1	39.7	30.8	8.3	100.0	3,592
Poor	6.5	12.4	33.7	37.4	10.0	100.0	1,688
Mean ADL (0-6)	5.9	5.9	5.8	5.6	5.7	-	9,852
Mean IADL (0-8)	5.9	5.5	5.1	4.1	4.7	-	9,852
Abuse history							
Never	5.6	15.7	41.1	29.6	8.1	100.0	8,865
After 60	10.4	20.3	34.7	27.6	7.1	100.0	504
In the last month	8.4	13.4	38.6	33.3	6.4	100.0	483
Social Benefits							
Receive pension	10.1	13.0	24.6	43.6	8.8	100.0	9,852
National Old Age Pension Scheme	7.2	20.7	34.7	29.6	7.9	100.0	7,651
Annapurna Scheme	7.9	15.7	46.2	25.1	5.0	100.0	3,802
Widowhood Pension Scheme	16.9	0.3	1.2	69.9	11.8	100.0	7,025
State							
HP	4.0	18.4	44.1	26.8	6.7	100.0	1,482
Punjab	3.3	13.3	46.5	28.2	8.7	100.0	1,370
WB	6.3	8.8	38.5	32.2	14.2	100.0	1,275
Orissa	2.8	16.5	46.1	30.9	3.8	100.0	1,481
MH	5.7	13.8	45.1	28.7	6.7	100.0	1,435
Kerala	3.6	11.1	38.6	34.5	12.3	100.0	1,365
TN	16.2	27.5	24.9	27.1	4.3	100.0	1,444
Total	6.0	15.8	40.6	29.7	7.9	100.0	9,852

Figure 1: Main reason for living alone or with spouse

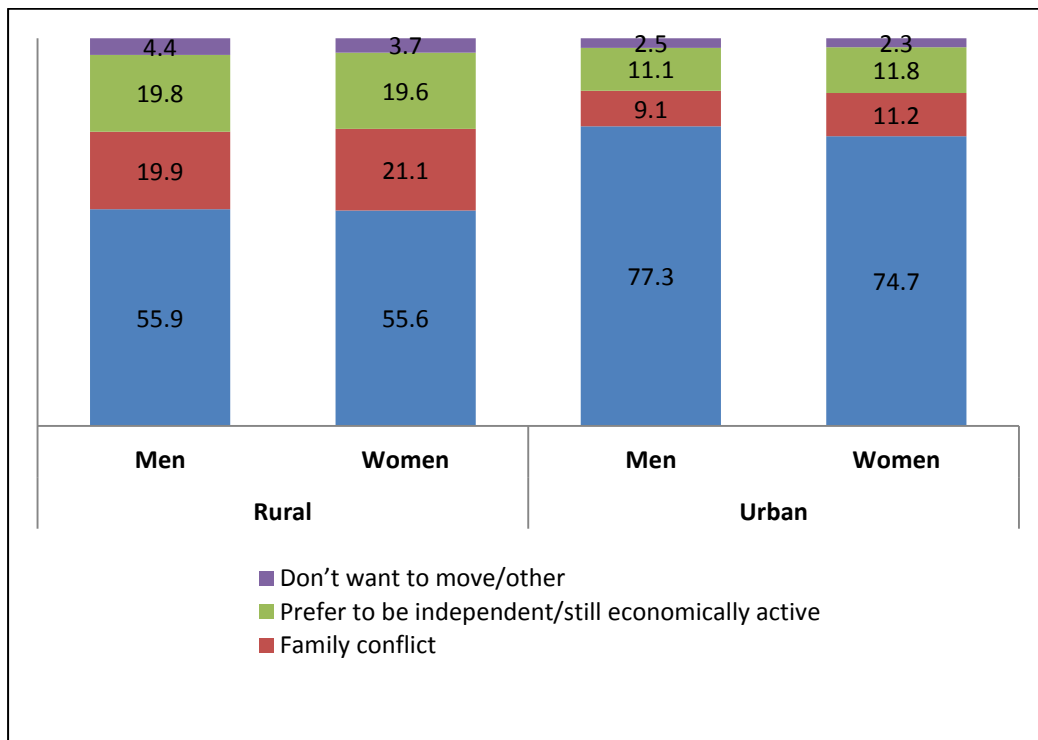


Table 7: Multinomial Logistic Regression for Odds of Living Alone or with Spouse Only

Demographic Variables	Living Alone				Living with Spouse Only					
	RRR	SE	CI	CI	RRR	SE	Significant	CI	CI	
Age (ref: 60-69)										
70-79	1.92	0.26	***	1.47	2.51	1.88	0.16	***	1.59	2.22
80+	1.96	0.40	***	1.32	2.92	2.31	0.36	***	1.70	3.14
Women (ref: Men)	1.70	0.30	***	1.20	2.39	1.81	0.21	***	1.45	2.26
Urban (ref: Rural)	1.12	0.14		0.88	1.44	0.76	0.06	***	0.65	0.89
Marital Status (ref: Married)										
Widowed	16.85	3.48	***	11.23	25.26	0.00	0.00		0.00	.
Other	9.09	3.47	***	4.30	19.21	0.00	0.00		0.00	.
Religion (ref: Hindu)										
Muslim	0.77	0.20		0.45	1.29	0.41	0.08	***	0.28	0.60
Sikh	0.88	0.27		0.48	1.60	1.42	0.21	*	1.07	1.88
Other	1.26	0.35		0.74	2.17	1.23	0.21		0.88	1.72
Caste/tribe (ref: SC/ST)										
OBC	2.07	0.32	***	1.53	2.80	1.30	0.13	**	1.07	1.59
Other	1.72	0.29	***	1.24	2.39	1.19	0.12		0.98	1.45
Living Children (ref: One boy and one girl)										
None	6.85	2.02	***	3.85	12.21	4.90	1.35	***	2.86	8.41
Only a male	1.15	0.17		0.86	1.53	0.88	0.08		0.73	1.06
Only a female	4.02	0.63	***	2.96	5.46	5.68	0.60	***	4.61	6.99
Socioeconomic variables										
Education (ref: None)										
1-4 years	1.00	0.20		0.68	1.47	0.90	0.11		0.71	1.14
5-7 years	1.75	0.34	**	1.20	2.55	1.07	0.13		0.84	1.36
8+ years	3.86	0.77	***	2.62	5.70	2.06	0.23	***	1.66	2.55
Wealth Index (ref: Lowest)										
Second	0.25	0.04	***	0.19	0.34	0.47	0.05	***	0.38	0.59
Middle	0.10	0.02	***	0.07	0.15	0.29	0.04	***	0.23	0.37
Fourth	0.03	0.01	***	0.02	0.05	0.19	0.03	***	0.14	0.25
Highest	0.02	0.01	***	0.01	0.04	0.14	0.02	***	0.11	0.19
Employment History (ref: Currently working)										
Never worked	1.06	0.26		0.66	1.70	1.21	0.27		0.79	1.87
Housewife/homemaker	0.62	0.11	**	0.44	0.88	0.89	0.13		0.67	1.17
Worked before	0.86	0.14		0.63	1.18	1.28	0.11	**	1.07	1.52
Health and Functionality										
Self-rated health (ref: Good)										
Excellent/Very Good	0.93	0.18		0.63	1.37	0.90	0.09		0.73	1.10
Fair	0.96	0.13		0.73	1.26	0.90	0.08		0.76	1.06
Poor	1.06	0.19		0.75	1.49	0.85	0.10		0.67	1.07
Mean ADL (0-6)	1.07	0.12		0.86	1.33	0.99	0.06		0.88	1.11
Mean IADL (0-8)	1.52	0.05	***	1.42	1.62	1.22	0.03	***	1.17	1.27
Abuse history (ref: Never)										
After 60	2.63	0.53	***	1.77	3.90	1.74	0.27	***	1.29	2.35
In the last month	1.00	0.24		0.62	1.59	1.06	0.18		0.76	1.48
Social Benefits										
Receive pension	0.88	0.12		0.67	1.15	1.07	0.13		0.85	1.34

**all models include controls for state of residence.*

Figure 2: Mean ADL and IADL by Sex and Age Group

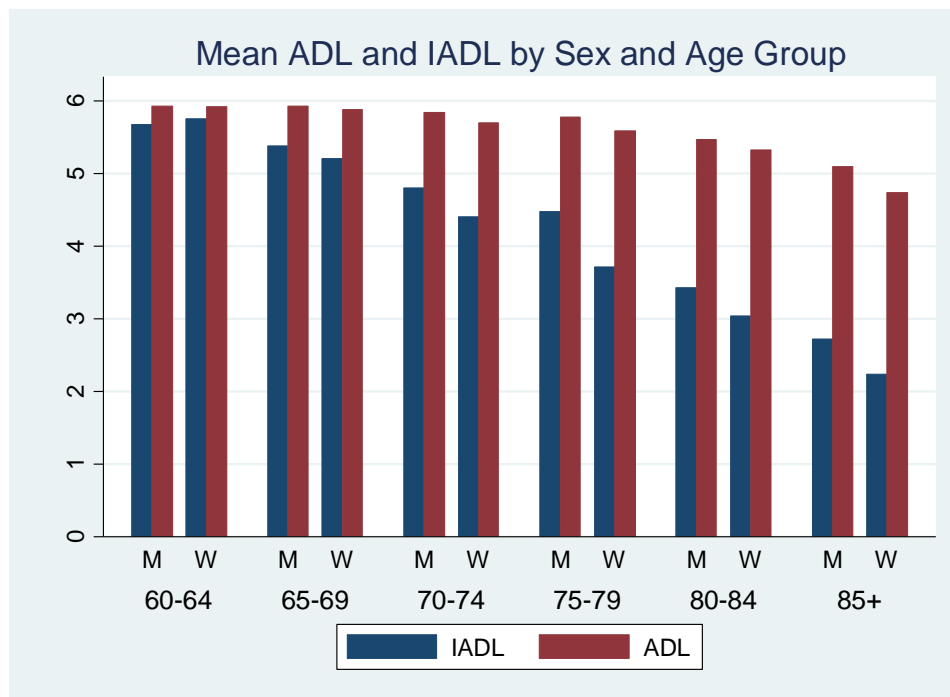


Table 8: Top 10 Chronic Morbidity Indicators (per 1,000) by Living Arrangement and Sex

Men						
	Alone	Spouse only	Spouse, children, and grandchildren	Children and grandchildren	Others	Total
Arthritis	348	231	240	267	239	244
High Blood Pressure	119	185	180	140	224	178
Cataract	94	108	113	176	150	122
Loss of Natural Teeth	145	103	107	163	144	117
Diabetes	122	97	105	89	121	103
Asthma	30	78	89	105	116	89
Heart Disease	28	66	66	50	102	66
Renal Disease	26	37	30	28	27	31
Skin Disease	31	29	26	50	31	30
Fall	0	23	33	32	17	29
Women						
	Alone	Spouse only	Spouse, children, and grandchildren	Children and grandchildren	Others	Total
Arthritis	307	385	332	333	351	338
High Blood Pressure	138	183	235	271	271	239
Cataract	117	100	102	163	156	136
Loss of Natural Teeth	88	101	130	143	161	131
Diabetes	65	93	103	101	132	100
Asthma	69	50	59	74	77	67
Heart Disease	40	43	50	59	47	52
Fall	31	38	41	47	41	43
Osteoporosis	8	38	31	34	30	31
Skin Disease	18	29	21	22	9	21

*As per doctor's diagnosis

Figure 3: Source of Payment for Treatment of Chronic Morbidity by Living Arrangement

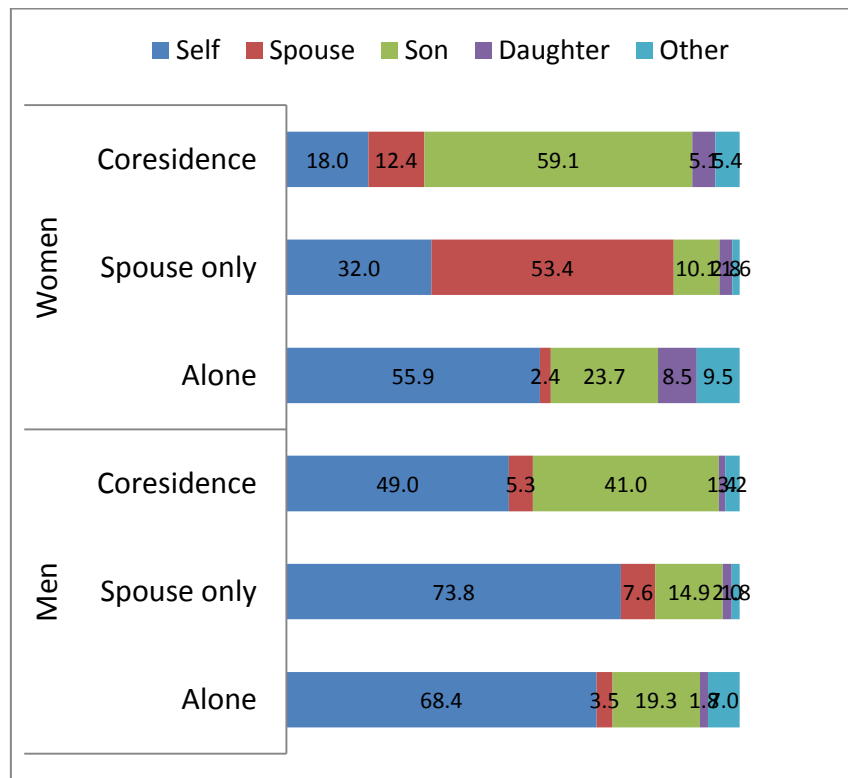


Table 9: Monetary Transfers between Non Co-residing Child and Elderly by Living Arrangement

Living Arrangement	Transfer to Elderly			Transfer by Elderly		
	By Male Child	By Female Child	Total	To Male Child	To Female Child	Total
Alone	36.6	41.1	40.2	9.5	7.1	7.6
Spouse Only	34.0	29.1	29.9	17.8	9.1	10.5
Spouse and Children	30.5	15.4	17.1	6.2	7.3	7.2
Children and Grandchildren	31.5	22.0	23.2	6.6	6.2	6.3
Others	35.7	31.0	31.7	7.4	6.6	6.7
Total	32.5	22.2	23.5	9.1	7.2	7.5
N	715	347	1,062	5,321	1,451	6,772

Table 10: Logistic Regression for Frequent Interaction from Children to Elderly

Demographic Variables	Communication				Meeting				Transfers						
	OR	SE	CI	CI	OR	SE	CI	CI	OR	SE	CI	CI			
Living arrangements Ref: Co-residence															
Living Alone	0.94	0.14		0.71	1.25	1.43	0.21	**	1.08	1.91	2.20	0.27	***	1.73	2.79
Living with Spouse Only	1.30	0.15	*	1.04	1.62	2.06	0.21	***	1.70	2.51	2.02	0.17	***	1.71	2.39
Age (ref: 60-69)															
70-79	1.11	0.10		0.94	1.32	1.13	0.08		0.98	1.30	1.10	0.08		0.96	1.26
80+	1.07	0.14		0.83	1.37	1.32	0.15	*	1.06	1.64	1.24	0.13	*	1.02	1.52
Women (ref: Men)															
0.95	0.10		0.77	1.18	1.05	0.10		0.87	1.25	1.12	0.10		0.94	1.33	
Urban (ref: Rural)															
0.75	0.06	***	0.64	0.88	0.77	0.05	***	0.68	0.87	0.92	0.06		0.82	1.04	
Marital Status (ref: Married)															
Widowed	0.98	0.10		0.81	1.19	1.05	0.08		0.90	1.22	1.08	0.08		0.93	1.26
Other	0.73	0.21		0.41	1.27	0.80	0.19		0.50	1.29	1.49	0.36		0.93	2.39
Religion (ref: Hindu)															
Muslim	1.89	0.33	***	1.34	2.67	1.91	0.27	***	1.45	2.51	1.65	0.17	***	1.35	2.02
Sikh	0.51	0.08	***	0.38	0.70	0.83	0.10		0.66	1.04	0.53	0.08	***	0.39	0.71
Other	1.28	0.25		0.87	1.89	0.77	0.10		0.59	1.01	1.04	0.14		0.81	1.35
Caste/tribe (ref: SC/ST)															
OBC	1.31	0.13	**	1.08	1.58	1.05	0.09		0.88	1.24	1.04	0.09		0.88	1.22
Other	1.06	0.10		0.87	1.28	0.78	0.06	**	0.66	0.91	1.01	0.08		0.86	1.19
Living Children (ref: One boy and one girl)															
Only a male	0.54	0.06	***	0.44	0.67	0.83	0.08	*	0.69	1.00	1.63	0.14	***	1.38	1.93
Only a female	0.89	0.12		0.69	1.15	0.82	0.09		0.66	1.01	0.56	0.06	***	0.45	0.69
Socioeconomic variables															
Education (ref: None)															
1-4 years	0.96	0.11		0.77	1.19	0.85	0.08		0.70	1.02	1.17	0.10		0.98	1.39
5-7 years	1.05	0.13		0.83	1.33	0.82	0.08	*	0.68	0.99	1.12	0.10		0.93	1.34
8+ years	1.48	0.20	**	1.14	1.91	0.96	0.09		0.80	1.16	0.92	0.09		0.77	1.11
Wealth Index (ref: Lowest)															
Second	1.82	0.18	***	1.50	2.20	1.12	0.11		0.92	1.36	0.93	0.09		0.77	1.11
Middle	3.49	0.42	***	2.75	4.43	1.23	0.13	*	1.00	1.52	1.06	0.11		0.87	1.29
Fourth	4.21	0.59	***	3.19	5.55	1.23	0.14		0.98	1.54	1.20	0.13		0.97	1.49
Highest	4.97	0.80	***	3.63	6.82	1.04	0.13		0.82	1.32	1.10	0.13		0.87	1.39
Employment History (ref: Currently working)															

Never worked	1.05	0.19	0.73	1.51	1.26	0.21	0.91	1.74	1.08	0.16		0.80	1.45		
Housewife/homemaker	1.09	0.14	0.85	1.40	1.17	0.13	0.94	1.46	1.36	0.15	**	1.11	1.68		
Worked before	1.00	0.10	0.82	1.21	0.97	0.08	0.83	1.13	1.35	0.11	***	1.15	1.59		
Health and Functionality															
Self-rated health (ref: Good)															
Excellent/Very Good	1.07	0.13	0.84	1.37	0.99	0.09	0.83	1.19	1.02	0.10		0.85	1.23		
Fair	0.94	0.09	0.79	1.12	0.91	0.07	0.79	1.05	1.35	0.10	***	1.17	1.56		
Poor	1.03	0.12	0.82	1.28	0.99	0.10	0.82	1.20	1.52	0.14	***	1.27	1.81		
Mean ADL (0-6)	1.04	0.04	0.97	1.13	0.96	0.04	0.89	1.03	0.90	0.03	**	0.84	0.96		
Mean IADL (0-8)	1.08	0.02	***	1.04	1.12	1.03	0.02	1.00	1.06	1.05	0.02	**	1.02	1.08	
Abuse history (ref: Never)															
After 60	0.90	0.13	0.67	1.21	0.72	0.09	**	0.57	0.92	0.93	0.12		0.72	1.21	
In the last month	0.90	0.13	0.67	1.20	0.85	0.12		0.65	1.11	0.55	0.08	***	0.41	0.74	
Social Benefits															
Receive pension	0.75	0.07	**	0.62	0.90	1.24	0.11	*	1.05	1.48	1.25	0.10	**	1.07	1.47

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

Table 11: Logistic Regression for Frequent Interaction from Elderly to Children

Demographic Variables	Communication				Meeting				Transfers					
	OR	SE	CI	CI	OR	SE	CI	CI	OR	SE	CI	CI		
Living arrangements Ref: Co-residence														
Living Alone	0.92	0.12	0.72	1.18	1.18	0.14	0.93	1.50	1.13	0.23	0.76	1.68		
Living with Spouse Only	1.20	0.11	1.00	1.43	1.64	0.14	***	1.39	1.93	1.35	0.16	*	1.07	1.71
Age (ref: 60-69)														
70-79	1.04	0.07	0.90	1.19	1.10	0.07	0.98	1.24	0.81	0.09	0.66	1.01		
80+	0.96	0.10	0.79	1.17	1.01	0.09	0.85	1.22	1.06	0.18	0.76	1.47		
Women (ref: Men)														
Urban (ref: Rural)	0.89	0.06	0.78	1.01	0.89	0.05	*	0.79	0.99	1.00	0.10	0.83	1.21	
Marital Status (ref: Married)														
Widowed	0.93	0.07	0.80	1.08	1.00	0.07	0.88	1.14	0.98	0.12	0.78	1.24		
Other	0.55	0.13	*	0.35	0.87	0.75	0.16	0.50	1.15	1.84	0.59	0.98	3.45	
Religion (ref: Hindu)														
Muslim	1.22	0.13	0.98	1.51	1.08	0.11	0.88	1.31	0.99	0.18	0.70	1.41		
Sikh	0.47	0.06	***	0.36	0.61	0.65	0.07	***	0.53	0.79	0.68	0.13	0.46	1.01
Other	0.95	0.13	0.73	1.24	0.58	0.07	***	0.46	0.73	0.92	0.19	0.62	1.37	
Caste/tribe (ref: SC/ST)														
OBC	1.21	0.10	*	1.03	1.41	0.93	0.07	0.80	1.08	0.85	0.11	0.66	1.08	
Other	1.07	0.09	0.91	1.25	0.77	0.06	***	0.67	0.89	0.83	0.10	0.65	1.05	
Living Children (ref: One boy and one girl)														
Only a male	0.65	0.06	***	0.55	0.78	0.89	0.08	0.76	1.05	1.10	0.15	0.84	1.44	
Only a female	1.06	0.11	0.86	1.30	0.85	0.08	0.71	1.02	0.95	0.14	0.70	1.27		
Socioeconomic variables														
Education (ref: None)														
1-4 years	0.98	0.08	0.83	1.16	0.85	0.07	*	0.72	1.00	0.80	0.12	0.59	1.09	
5-7 years	1.11	0.10	0.92	1.33	0.85	0.07	*	0.72	1.00	1.01	0.15	0.76	1.34	
8+ years	1.83	0.19	***	1.50	2.23	0.95	0.08	0.80	1.11	1.26	0.17	0.96	1.64	
Wealth Index (ref: Lowest)														
Second	1.30	0.11	**	1.10	1.53	1.19	0.10	*	1.01	1.40	0.84	0.13	0.63	1.14
Middle	1.84	0.18	***	1.52	2.22	1.07	0.10	0.89	1.27	0.89	0.14	0.65	1.22	
Fourth	2.12	0.23	***	1.72	2.62	1.12	0.11	0.92	1.35	1.21	0.20	0.87	1.67	
Highest	2.25	0.27	***	1.78	2.86	0.82	0.09	0.67	1.01	1.34	0.24	0.95	1.91	

Employment History (ref: Currently working)															
Never worked	1.09	0.16	0.82	1.44	1.28	0.18	0.98	1.68	0.78	0.19	0.48	1.25			
Housewife/homemaker	1.04	0.11	0.85	1.28	1.17	0.11	0.97	1.41	0.91	0.15	0.66	1.24			
Worked before	1.02	0.08	0.87	1.20	1.04	0.07	0.90	1.19	0.71	0.08	**	0.57	0.89		
Health and Functionality															
Self-rated health (ref: Good)															
Excellent/Very Good	1.15	0.11	0.94	1.39	0.95	0.08	0.80	1.11	1.36	0.17	*	1.07	1.74		
Fair	0.83	0.06	**	0.72	0.95	0.72	0.05	***	0.64	0.82	1.11	0.12	0.89	1.37	
Poor	0.92	0.08		0.77	1.10	0.70	0.06	***	0.60	0.83	1.02	0.15	0.77	1.37	
Mean ADL (0-6)	1.07	0.03	*	1.01	1.14	1.06	0.03	*	1.00	1.12	0.97	0.06	0.86	1.10	
Mean IADL (0-8)	1.12	0.02	***	1.08	1.15	1.08	0.02	***	1.05	1.11	1.08	0.03	**	1.03	1.14
Abuse history (ref: Never)															
After 60	0.96	0.12		0.74	1.23	0.96	0.11	0.77	1.20	0.70	0.16	0.45	1.09		
In the last month	0.92	0.11		0.72	1.17	1.12	0.14	0.88	1.42	0.83	0.19	0.53	1.30		
Social Benefits															
Receive pension	0.74	0.06	***	0.64	0.86	1.12	0.08	0.97	1.30	0.85	0.12	0.65	1.13		

REFERENCES

- Abraham, L., & Kumar, K. A. (1999). Sexual experiences and their correlates among college students in Mumbai City, India. *International Family Planning Perspectives*, 25(3), 139-146+152.
- Agarwala, S. N. (1957). The age at marriage in india. *Population Index*, 23(2), 96-107.
- Agrawal, S. (2012). EFFECT OF LIVING ARRANGEMENT ON THE HEALTH STATUS OF ELDERLY IN INDIA. *Asian Population Studies*, 8(1), 87-101. doi:10.1080/17441730.2012.646842
- Alexander, M., Garda, L., Kanade, S., Jejeebhoy, S., & Ganatra, B. (2006). Romance and sex: Pre-marital partnership formation among young women and men, pune district, india. *Reproductive Health Matters*, 14(28), 144-155. doi:10.1016/S0968-8080(06)28265-X
- Amit Sengupta, & Samiran Nundy. (2005). The private health sector in india. *BMJ*, 331(7526), 1157-1158. doi:10.1136/bmj.331.7526.1157
- Arokiasamy, P., Bloom, D., Lee, J., Feeney, K., & Ozolins, M. (2012). Longitudinal aging study in india: Vision, design, implementation, and preliminary findings. In James P. Smith (Ed.), *Aging in asia: Findings from new and emerging data initiatives*. (). Washington, DC: The National Academies Press.
- Basu, A. M. (1993). Cultural influences on the timing of first births in india: Large differences that add up to little difference. *Population Studies*, 47(1), 85-95.
- Becker, G. (1960). An economic analysis of fertility. In G. Becker (Ed.), *Demographic and economic change in developed countries* (pp. 209-240). Princeton, NJ: Princeton University Press.
- Beine, M., Docquier, F., & Schiff, M. (2009). International migration, transfers of norms and home country fertility. *World Bank Policy Research Working Paper*, (4925)
- Bhat, P. N. M., & Halli, S. S. (1999a). Demography of brideprice and dowry: Causes and consequences of the indian marriage squeeze. *Population Studies*, 53(2), 129-148.
- Bhat, P. N. M., & Halli, S. S. (1999b). Demography of brideprice and dowry: Causes and consequences of the indian marriage squeeze. *Population Studies*, 53(2), 129-148.
- Bloom, D. E., & Reddy, P. H. (1986). Age patterns of women at marriage, cohabitation, and first birth in india. *Demography*, 23(4), 509-523.
- Bloom, D. E., Mahal, A., Rosenberg, L., & Sevilla, J. (2010). Economic security arrangements in the context of population ageing in india. *International Social Security Review*, 63(3-4), 59-89. doi:10.1111/j.1468-246X.2010.01370.x
- Blossfeld, H., & Huinink, J. (1991). Human capital investments or norms of role transition? how women's schooling and career affect the process of family formation. *American Journal of Sociology*, 97(1), 143-168.

- Bongaarts, J. (1978a). A framework for analyzing the proximate determinants of fertility. *Population and Development Review*, 4(1), 105-132.
- Bongaarts, J. (1978b). A framework for analyzing the proximate determinants of fertility. *Population and Development Review*, 4(1), 105-132.
- Burström, B., & Fredlund, P. (2001). *Self rated health: Is it as good a predictor of subsequent mortality among adults in lower as well as in higher social classes?* doi:10.1136/jech.55.11.836
- Caldwell, J. C., Reddy, P. H., & Caldwell, P. (1983). The causes of marriage change in south india. *Population Studies*, 37(3), 343-361.
- Chattopadhyay, A., White, M. J., & Debpuur, C. (2006). Migrant fertility in ghana: Selection versus adaptation and disruption as causal mechanisms. *Population Studies*, 60(2), 189-203. doi:10.1080/00324720600646287
- Claeson, M., Bos, E. R., Mawji, T., & Pathmanathan, I. (2000). Reducing child mortality in india in the new millennium. *Bulletin of the World Health Organization*, 78(10), 1192-1199.
- Cleves, M., Gutierrez, R., Gould, W., & Marchenko, Y. (2010). *An introduction to survival analysis using stata* (Third ed.). Texas, United States: Stata Press.
- Dannefer, D. (2003). Cumulative advantage/disadvantage and the life course: Cross-fertilizing age and social science theory. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, 58(6), S327-S337. doi:10.1093/geronb/58.6.S327
- Das Gupta, M., Zhenghua, J., Bohua, L., Zhenming, X., Chung, W., & Hwa-Ok, B. (2003). Why is son preference so persistent in east and south asia? a cross-country study of china, india and the republic of korea. *The Journal of Development Studies*, 40(2), 153-187. doi:10.1080/00220380412331293807
- Das Gupta, M. (1996). Life course perspectives on women's autonomy and health outcomes. *Health Transition Review, Supplement 6*, 213.
- Das, J., Holla, A., Das, V., Mohanan, M., Tabak, D., & Chan, B. (2012). In urban and rural india, A standardized patient study showed low levels of provider training and huge quality gaps. *Health Affairs*, 31(12), 2774-2784. doi:10.1377/hlthaff.2011.1356
- Davis, J. (2011). Decoupling migration effects from income effects on reproduction in central american migrant-sending households. *The International Migration Review*, 45(2), 325-347.
- Davis, J., & Lopez-Carr, D. (2010). The effects of migrant remittances on population-environment dynamics in migrant origin areas: International migration, fertility, and consumption in highland guatemala. *Population and Environment*, 32(2-3), 216-237. doi:10.1007/s11111-010-0128-7
- Davis, K., & Blake, J. (1956). Social-structure and fertility- an analytic framework. *Economic Development and Cultural Change*, 4(3), 211.

- de Oliveira, I. T., Dias, J. G., & Padmadas, S. S. (2014). Dominance of sterilization and alternative choices of contraception in india: An appraisal of the socioeconomic impact. *PLoS One*, 9(1), e86654. doi:10.1371/journal.pone.0086654; 10.1371/journal.pone.0086654
- De, P. (2010). Cultural transmission and contraceptive use- evidence from US-mexico migration. SSRN, <http://ssrn.com/abstract=1589043>
- Desai, S., Dubey, A., Joshi, B. L., Sen, M., Shariff, A., & Vanneman, R. (2009). *India human development survey (IHDS)*
- Desai, S., & Andrist, L. (2010). Gender scripts and age at marriage in india. *Demography*, 47(3), 667-687.
- Dey, S., Nambiar, D., & Lakshmi, J. (2012). Health of the elderly in india: Challenges of access and affordability. In J. Smith, & M. Majmundar (Eds.), *Aging in asia: Findings from new and emerging data initiatives* (). Washington, DC: National Academies Press.
- Dharmalingam, A., & Morgan, S. P. (2004). Pervasive muslim-hindu fertility differences in india. *Demography*, 41(3), 529-545.
- Drèze, J., & Murthi, M. (2001). Fertility, education, and development: Evidence from india. *Population and Development Review*, 27(1), 33-63. doi:10.1111/j.1728-4457.2001.00033.x
- Drèze, J., & Srinivasan, P. V. (1997). Widowhood and poverty in rural india: Some inferences from household survey data. *Journal of Development Economics*, 54(2), 217-234. doi:[http://dx.doi.org/10.1016/S0304-3878\(97\)00041-2](http://dx.doi.org/10.1016/S0304-3878(97)00041-2)
- Dyson, T., & Moore, M. (1983). On kinship structure, female autonomy, and demographic behavior in india. *Population and Development Review*, 9(1), 35-60.
- Easterlin, R., & Crimmins, E. (1985). *The fertility revolution: A supply-demand analysis*. Chicago: University of Chicago Press.
- Eatwell, J., Milgate, M., & Newman, P. K. (1990). *Econometrics: The new palgrave* (1 American ed.). New York: Norton.
- Edwards, A., Cox, A., & Ureta, M. (2003). International migration, remittances, and schooling: Evidence from el salvador. *Journal of Development Economics*, 72(2), 429-461.
- Fargues, P. (2011). International migration and the demographic transition: A two-way interaction. *International Migration Review*, 45(3), 588-614. doi:10.1111/j.1747-7379.2011.00859.x
- Feng, W., & Quanhe, Y. (1996). Age at marriage and the first birth interval: The emerging change in sexual behavior among young couples in china. *Population and Development Review*, 22(2), 299-320.
- Goode, W. J. (1970). *World revolution and family patterns: [With a new preface]* (1 paperback ed.). New York: The Free Press.

- Graf, C. (2013). *The lawton instrumental activities of daily living*. (No. Hartford Institute for Geriatric Nursing, New York University).
- Haub, C., & Gribble, J. (2011). *The world at 7 billion*. (No. 2).
- Hirschman, C. (1985). Premarital socioeconomic roles and the timing of family formation: A comparative study of five asian societies. *Demography*, 22(1), 35-59.
- Hirve, S., Juvekar, S., Sambhudas, S., Lele, P., Blomstedt, Y., Wall, S., . . . Ng, N. (2012). Does self-rated health predict death in adults aged 50 years and above in india? evidence from a rural population under health and demographic surveillance. *International Journal of Epidemiology*, 41(6), 1719-1727. doi:10.1093/ije/dys163
- Hong, Y. (2006). Marital decision-making and the timing of first birth in rural china before the 1990s. *Population Studies*, 60(3), 329-341. doi:10.1080/00324720600896148
- Husain, Z., & Ghosh, S. (2011). Is health status of elderly worsening in india? A comparison of successive rounds of national sample survey data. *Journal of Biosocial Science*, 43(02), 211. doi:10.1017/S0021932010000623
- International Institute for Population Sciences, & ORC Macro. MEASURE/DHS+. (2006). *National family health survey (NFHS-3), india, 2005-06*. Mumbai; Maryland, U.S.A.: International Institute for Population Sciences; Measure DHS+, ORC Macro.
- James, K. S. (2011). India's demographic change: Opportunities and challenges. *Science*, 333(6042), 576-580. doi:10.1126/science.1207969
- Jaya, & Hindin, M. (2009). Premarital romantic PARTnerships: Attitudes and sexual experiences of youth in delhi, india. *International Perspectives Ib Sexual and Reproductive Health*, 35(2), 97.
- Kapur, D. (2010). *Diaspora, development, and democracy: The domestic impact of international migration from india*. Princeton, NJ: Princeton University Press.
- Kowal, P., Kahn, K., Ng, N., Naidoo, N., Abdullah, S., Bawah, A., . . . Tollman, S. M. (2010). Ageing and adult health status in eight lower-income countries: The INDEPTH WHO-SAGE collaboration. *Global Health Action*, 3, 10.3402/gha.v3i0.5302. doi:10.3402/gha.v3i0.5302; 10.3402/gha.v3i0.5302
- Kuhn, R., Everett, B., & Silvey, R. (2011). The effects of children's migration on elderly kin's health: A counterfactual approach. *Demography*, 48(1), 183-209. doi:10.1007/s13524-010-0002-3
- Kumar, V. (2003). Health status and health care services among older persons in india. *Journal of Aging & Social Policy*, 15(2-3), 67-83. doi:10.1300/J031v15n02_05
- Lawton, M., & Brody, E. (1969). Assessment of older people: Self-maintaining and instrumental activities of daily living. *The Gerontologist*, 9(3), 179-186.
- Lena, A., Ashok, K., Padma, M., Kamath, V., & Kamath, A. (2009). Health and social problems of the elderly: A cross-sectional study in udupi taluk, karnataka. *Indian Journal of Community Medicine : Official Publication of Indian Association of*

Preventive & Social Medicine, 34(2), 131-134. doi:10.4103/0970-0218.51236;
10.4103/0970-0218.51236

- Levitt, P. (1998). Social remittances: Migration driven local-level forms of cultural diffusion. *The International Migration Review*, 32(4), 926-948.
- Lindstrom, D. P., & Munoz-Franco, E. (2005). Migration and the diffusion of modern contraceptive knowledge and use in rural guatemala. *Studies in Family Planning*, 36(4), 277-288.
- Lu, M., & Yang, W. (2012). Multivariate logistic regression analysis of complex survey data with application to BRFSS data. *Journal of Data Science*, 10, 157-173.
- Malhotra, A. (1991). Gender and changing generational relations: Spouse choice in indonesia. *Demography*, 28(4), 549-570.
- Malhotra, A., Vanneman, R., & Kishor, S. (1995). Fertility, dimensions of patriarchy, and development in india. *Population and Development Review*, 21(2), 281-305.
- Mari Bhat, P. N. (2002). Returning a favor: Reciprocity between female education and fertility in india. *World Development*, 30(10), 1791-1803. doi:10.1016/S0305-750X(02)00065-7
- Mehta, K. K. (1997). The impact of religious beliefs and practices on aging: A cross-cultural comparison. *Journal of Aging Studies*, 11(2), 101-114.
doi:[http://dx.doi.org/10.1016/S0890-4065\(97\)90015-3](http://dx.doi.org/10.1016/S0890-4065(97)90015-3)
- Mishra, V. (2004). Muslim/non-muslim differentials in fertility and family planning in india. *East-West Center Working Papers, Population and Health Series*, no. 112,
- Mohanty, S., Chauhan, R., Mazumdar, S., & Srivastava, A. (2014). Out-of-pocket expenditure on health care among elderly and non-elderly households in india. *Social Indicators Research*, 115(3), 1137-1157. doi:10.1007/s11205-013-0261-7
- Morgan, S. P., Stash, S., Smith, H. L., & Mason, K. O. (2002). Muslim and non-muslim differences in female autonomy and fertility: Evidence from four asian countries. *Population and Development Review*, 28(3), 515-537. doi:10.1111/j.1728-4457.2002.00515.x
- MOSJE. (1999). National policy on older persons. Retrieved April 5, 2013,
- Mossey, J., & Shapiro, E. (1982). Self-rated health: A predictor of mortality among the elderly. *American Journal of Public Health*, 72(8), 800-808.
- Moulasha, K., & Rao, G. R. (1999). Religion-specific differentials in fertility and family planning. *Economic and Political Weekly*, 34(42/43), 3047-3051.
- Annapurna scheme, (2000).
- Indira gandhi national old age pension scheme, 32803, (2007). Retrieved from <http://pib.nic.in/newsite/erelease.aspx?relid=32803>
- Indira gandhi national widow pension scheme, (2009).

- Murtagh, K., & Hubert, H. (2004). Gender differences in physical disability among an elderly cohort. *American Journal of Public Health, 94*(8), 1406-1411. doi:- 10.2105/AJPH.94.8.1406
- Nair, H. (2014,). Aadhar cards take a new twist in supreme court as petitioners seek to 'opt out'. *India Today*
- Nath, D., Land, K., & Goswami, G. (1999). Effects of the status of women on the first-birth interval in indian urban society. *Journal of Biosocial Science, 31*(01), 55-69.
- Nath, D., Singh, K., Land, K., & Talukdar, P. (1993). Age of marriage and length of the first birth interval in a traditional indian society: Life table and hazards model analysis. *Human Biology, 65*(5), 783-797.
- Naufal, G., & Vargas-Silva, C. (2009). Influencing fertility preferences one dollar at a time: The impact of migrants' remittances on the home country fertility rate. *IZA Discussion Paper, 4066*
- National social assistance program, Government of india. (2014).
- Palmer, M., & Harley, D. (2012). Models and measurement in disability: An international review. *Health Policy and Planning, 27*(5), 357-364. doi:10.1093/heapol/czr047
- Patel, V., & Prince, M. (2001). Ageing and mental health in a developing country: Who cares? qualitative studies from goa, india. *Psychological Medicine, 31*(1), 29-38.
- Ponce, J., Olivie, I., & Onofa, M. (2011). The role of international remittances in health outcomes in ecuador: Prevention and response to Shocks1. *International Migration Review, 45*(3), 727-745. doi:10.1111/j.1747-7379.2011.00864.x
- Rabe-Hesketh, S., & Skrondal, A. (2012). *Multilevel and longitudinal modeling using stata* (3rd ed.). College Station, Texas: Stata Press.
- Rajan, S. I., & Kumar, S. (2003). Living arrangements among indian elderly: New evidence from national family health survey. *Economic and Political Weekly, 38*(1), 75-80.
- Reddy, K. S., Patel, V., Jha, P., Paul, V. K., Kumar, A. S., & Dandona, L. (2011). Towards achievement of universal health care in india by 2020: A call to action. *The Lancet, 377*(9767), 760-768. doi:[http://dx.doi.org/10.1016/S0140-6736\(10\)61960-5](http://dx.doi.org/10.1016/S0140-6736(10)61960-5)
- Retherford, R. D., & Mishra, V. (1997). Media exposure increases contraceptive use. *National Family Health Survey Bulletin, (7)*(7), 1-4.
- Rindfuss, R. R., Bumpass, L., & John, C. S. (1980). Education and fertility: Implications for the roles women occupy. *American Sociological Review, 45*(3), 431-447.
- Rindfuss, R. R., & Morgan, S. P. (1983). Marriage, sex, and the first birth interval: The quiet revolution in asia. *Population and Development Review, 9*(2), 259-278.
- Salomon, J., Tandon, A., & Murray, C. (2004). Comparability of self rated health: Cross sectional multi-country survey using anchoring vignettes. *BMJ, 328*(7434), 258. doi:10.1136/bmj.37963.691632.44

- Santhya, K. G., Ram, U., Acharya, R., Jejeebhoy, S. J., Ram, F., & Singh, A. (2010). Associations between early marriage and young women's marital and reproductive health outcomes: Evidence from india. *International Perspectives on Sexual and Reproductive Health*, 36(3), 132-139.
- Shelkey, M., & Wallace, M. (2012). *Katz index of independence in activities of daily living*. (No. Hartford Institute of Geriatric Nursing, New York University).
- Singh, A., Ogollah, R., Ram, F., & Pallikadavath, S. (2012). Sterilization regret among married women in india: Implications for the indian national family planning program. *International Perspectives on Sexual and Reproductive Health*, 38(4), 187-195.
- Stephenson, R. (2006). District-level religious composition and adoption of sterilization in india. *Journal of Health and Population Nutrition*, 24(1), 100-106.
- Subaiya, L. (2008). Premarital sex in india: Issues of class and gender. *Economic and Political Weekly*, XLIII(48)
- Subramanian, S. V., Subramanyam, M. A., Selvaraj, S., & Kawachi, I. (2009). Are self-reports of health and morbidities in developing countries misleading? evidence from india. *Social Science & Medicine*, 68(2), 260-265.
doi:<http://dx.doi.org/10.1016/j.socscimed.2008.10.017>
- Sudha, S., Suchindran, C., Mutran, E. J., Rajan, S. I., & Sarma, P. S. (2006). Marital status, family ties, and self-rated health among elders in south india. *Journal of Cross-Cultural Gerontology*, 21(3-4), 103-120. doi:10.1007/s10823-006-9027-x
- Tohme, R., Yount, K., Yassine, S., Shideed, O., & Sibai, A. (2011). Socioeconomic resources and living arrangements of older adults in lebanon: Who chooses to live alone? *Ageing & Society*, 31(01), 1. doi:10.1017/S0144686X10000590
- Trussell, J., & Menken, J. (1978). Early childbearing and subsequent fertility. *Family Planning Perspectives*, 10(4, A Special Issue on Teenage Pregnancy), 209-214+216-218.
- UN. (2010). United nations, department of economic and social affairs, population division (2011): World population prospects: The 2010 revision. new york.
- Zhenzhen, Z. (2000). SOCIAL-DEMOGRAPHIC INFLUENCE ON FIRST BIRTH INTERVAL IN CHINA, 1980-1992. . *Journal of Biosocial Science*, 32, 315-327.