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Influence of Older Generation's Fertility Behaviours on Daughter's Desired Family Size in Bihar, India

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Abstract

This paper investigates the associations between preferred family size of married women aged 16-34 in rural Bihar (India) and the fertility behaviours of their biological mother and mother-in-law. This information is based on scheduled interviews of 450 pairs of index women (i.e. women central in our analysis) and their mother-in-laws conducted in 2011. Preferred family size is first measured by Coombs scale, allowing us to capture latent desired number of children, and then categorized into three categories (low, medium, and high). Ordered logistic regression is employed to estimate the preferred family size of index women. We find that family size preferences of index woman is not associated with mother's fertility but with mother's education. Mother-in-law's desired number of grandchildren is positively associated with preferred family size of index woman and remains significant even after controlling for relevant socioeconomic characteristics. However, in the case where index woman has higher education than her mother-in-law, her preferred family size gets smaller. This suggests that education may provide women with greater autonomy in their decision making on childbearing.

Keywords

Coombs scale, desired family size, India, intergenerational transmission, mother-in-law.

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Influence of Older Generation's Fertility Behaviours on Daughter's Desired Family Size in Bihar, India

Abhishek Kumar, Valeria Bordone, Raya Muttarak[1]

1. Introduction

It is well documented that parents are of great importance in shaping preferences and behaviours of young adults. A wide array of studies, mainly on Western developed countries has shown such an intergenerational transmission with respect to fertility preferences (Axinn et al. 1994; Bühler and Philipov 2005) and number of children ever born (Murphy and Knudsen 2002; Murphy and Wang 2001). Continuities in parent-child fertility have implications for population size and structure since people born into large families are themselves more likely to make an above-average contribution to succeeding generations. According to the principle of linked lives (Elder 1977; 1994), parental behaviours during the children's life course significantly influences both desires and behaviours of children in adulthood. Empirical evidence has confirmed that individuals learn and incorporate the preferences and behaviours of relevant others in order to make the own decisions. Likewise, research on less developed countries has shown that living in an extended family is associated with higher fertility (Easterlin 1978), but so far very little is known about intergenerational transmission of fertility preferences in such contexts (see Murphy 2013 for a review of the rare studies on intergenerational transmission of fertility in non-Western countries).

This paper contributes to this line of research by studying the influence of mother's and mother-in-law's fertility behaviour on young women's fertility preferences in rural Bihar, a north-eastern state of India, using primary data collected in 2011. According to the socialisation of value's perspective (Preston 1976), ideals and preferences on childbearing in the parent generation are important determinants of their children's fertility. However, in Indian society, especially in the north where the practice of patrilineal descent and patrilocal residence is widespread, commonly young married women move to live with their husband's family and are absorbed into their husband's lineage (Jejeebhoy and Sathar 2001). In such context, men hold a central position in the family while older women (i.e. mother-in-law of the young bride) wield the main authority over household affairs (Das Gupta et al. 2003). This leaves a young bride little autonomy over her family life which in turn translates into a likely different intergenerational transmission of fertility from that of Western societies. This study hence aims to shed light on intergenerational transmission mechanisms in rural areas of north-eastern India, where fertility remains well above the replacement rate, contraception use is not widespread, and young women are rather confined in the secluded environment of their husband's family. From now on the women under study are referred to as Index Woman (IW).

[1] All authors contributed equally to the paper except for data collection which was carried out by Abhishek Kumar.

The remainder of the paper is organized as follows. We first outline our hypotheses derived from the theoretical and empirical literature. The next section describes the data and the study sample. After explaining our empirical strategy, we present descriptive and multivariate results. In the last section, we conclude with a discussion of our findings.

2. Theoretical Framework and Hypotheses

The concept of "linked lives" (Elder 1977; 1994) from the life course perspective is useful in summarizing how the experiences of one generation affect the experiences of successive generations. In particular, the literature on intergenerational transmission of fertility has mainly focused on the family of origin effect in terms of sib-ship size, that is women with more siblings are expected to have more children than their counterparts with lower number of brothers and sisters (e.g., Murphy, 2007; Murphy and Knudsen 2002). While the role of genetic in the transmission of both the desire for children and the ability to have children was emphasized in early works (e.g., Inmaizumi et al. 1970), later studies also showed how the intergenerational transmission of socioeconomic conditions such as education, income, standard of living, and pattern of consumption shape opportunities as well as constraints related to childbearing behaviours (Bengtson 1975; Ben-Porath 1975). Parents can therefore influence fertility preferences of children via both direct and indirect channels throughout the life course.

With respect to preferences for family size, socialization and social pressure are two main mechanisms explaining transmission across generations. Children are likely to replicate their parents' fertility behaviour according to the values and norms related to marriage and family into which they are socialized (e.g. Anderton et al. 1987; Keim et al. 2009; Preston 1976; see also Kolk 2014 for a review). According to the theory of planned behaviour, people also experience social pressure from social environment to engage in certain rather than other behaviours and this leads to the formation of subjective norms (Ajzen 1991).

While intergenerational transmission of social status is often driven by social origin of fathers (Graaf and Kalmijn 2001), mothers appear to have a more important role in transferring fertility-related characteristics such as timing of childbearing, family size preference and number of children ever born (Axinn et al. 1994; Barber 2001; Barber and Axinn 1998). Typically, in Western societies mothers serve as significant others from whom daughters learn and observe. Moreover, mothers are providing immediate care, advise on reproductive issues, and social support to young women after marriage (Chan and Elder 2000; Dubas 2001; Pollet at al. 2009). Following the previous evidence, we therefore expect a positive association between the number of children ever born to the mother (mother's CEB) and a woman's fertility preferences. We derive the first hypothesis as follows:

H1: Fertility of biological mother is positively associated with IW's fertility preferences.

Social interaction with others outside the family of origin may also be a crucial source of transmission and diffusion of innovations such as modern contraceptives

(Bernardi 2003; Kohler 2001). Indeed, empirical evidence from developed societies has shown a positive correlation between fertility behaviours among siblings (Kuziemko 2006; Lyngstad and Prskawetz 2010), co-workers (Ciliberto et al. 2010; Hensvik and Nilsson 2010; Pink et al. 2014), and peers (Balbo and Barban 2014; Manski and Mayshar 2003), pointing to both direct and indirect influence of social networks on women's fertility. However, the composition of social network members may vary according to socio-cultural contexts. While going to college or participation in the labour force enables a woman to build up her networks beyond close kin, in cultural settings such as those in north-eastern India considered in this study, female mobility is often limited (Self and Grabowski 2013). Subsequently, women's social interactions are constrained within the domestic domain. Unlike the south of India, where endogamous marriage within the community and extended family is commonly practiced, Bihar and the north-eastern states in general are characterised by exogamous marriage in which the new bride is isolated from her kinship network and becomes dependent on her in-laws (Dyson and Moore 1983). Accordingly, a newly married young woman who moves into the in-laws house becomes "re-socialized" so that she will identify her own interests with those of her husband and, in particular, of his mother. Indeed, it is in close proximity with the mother-in-law that she will spend most of the day (Jejeebhoy and Sathar 2001). Given the relatively young age at marriage for women in this state (about 20 years in 2011, according to the Sample Registration System Statistical Report[2]), a young wife's fertility preference is likely to be shaped by what she observes in her husband's family. Therefore, in such context, the fertility behaviour of mother-in-law (i.e. MIL's CEB) may highly influence women's family size preference. We thus derive the following hypothesis:

H2: In the rural Indian context under focus in this analysis, fertility of mother-in-law is expected to have greater influence on IW's fertility preferences than mother's fertility.

Individuals not only learn from their significant others, but they also try to respect the social norms shared within their social environment in order to get approval and avoid conflict with their kin and peers. These norms are defined as "what is typical or normal, thus, what most people do" (Cialdini et al. 1990). Subsequently, this becomes what is most "sensible to do". Individuals whose significant others have many children may thus be more prone to prefer a large family. Although social norms constructed and perpetuated in large social groups can be considered as an independent mechanism of social influence, the small scale of the villages we investigate allows us to consider social norms as part of the social pressure dynamic (for a similar argument, see Balbo and Barban 2014). The strength of such social pressure depends on the homogeneity of the networks. In highly connected, homogenous networks as the one we are looking at, the ability of the woman to decide freely or deviate from prevailing norms is likely to be low. In the northern Indian context where women have limited control over their lives, the in-law family may serve as a medium for the enforcement of norms related to fertility because it possesses considerable sanctioning power (e.g., disapproval). Close interactions between mothers-in-law and young wives may therefore channel decisions on household matters, including procreation, through a particularly prominent social pressure from the in-laws (Saavala 2001). Indeed,

[2] Source: http://www.censusindia.gov.in/vital_statistics/srs/Chap_2_-_2010.pdf (downloaded on 1 October 2014).

previous studies have documented a dominant role mothers-in-law play in young women's contraceptive use decisions (Char et al. 2010) and in exerting a strong pressure to bear sons (Bhat and Zavier 2003). We expect a woman's family size preference to be strongly influenced by that of mother-in-law. The third hypothesis thus is described as follows:

H3: The number of grandchildren that the mother-in-law would like to have from IW strongly influences IW's fertility preferences.

Apart from the influence of significant others on women's preferred family size, among other characteristics such as age, religion, and caste, education has been underscored as the key to fertility decline during the so-called demographic transition both at population (Bongaarts 2003, 2010) and individual level (Buyinza and Hisali 2014; Kravdal 2002). Since higher educated women tend to marry later and bear higher opportunity costs of childbearing than their lower educated counterparts, they may in turn have lower fertility than the latter. Meanwhile, education is also negatively associated with infant mortality (Pamuk et al. 2011). The increase in the chances of infant surviving consequently reduces the necessity to bear many children.

In countries undergoing development, education also enables women to have control over resources and their own lives (Basu 2002). Indeed, a recent literature review on the association between women's empowerment and fertility in a less developed country context confirms a robust relationship between the two factors (Upadhyay et al. 2014). In general, it is found that empowerment (measured as women's participation in household decision-making, freedom of mobility, and educational attainment) is associated with lower fertility, longer birth intervals, lower rates of unintended pregnancy, and smaller ideal family size. Since men generally desire a higher number of children than women e.g. in Sub-Saharan Africa (Tilahun et al. 2014), women's empowerment may increase a wife's negotiation power over childbearing issues, including smaller family size. Likewise, in the South Asian context, it has been documented that mothers-in-law are often the main barrier to the utilization of modern contraceptive methods (Kadir et al. 2003; Stephenson and Hennink 2004). Accordingly, an increase in female autonomy may allow women to make their fertility choices as they wish. Given that education is one of the key factors contributing to women's empowerment, the fourth hypothesis expects the following:

H4: Social pressure from mother-in-law and husband is lower when IW has higher education.

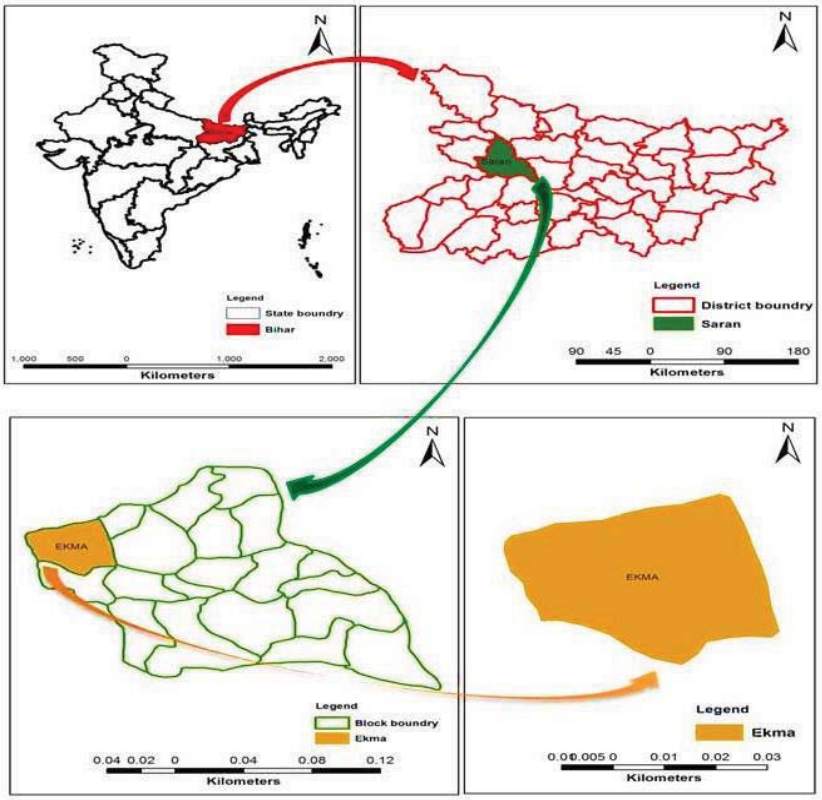
3. Data and Method

3.1. The Primary Data on IW and MIL

The present study is based on primary data from pairs of IW and MIL collected in 2011 by one of the authors in a rural area of India. Each IW-MIL pair was co-residing and sharing the same kitchen at the time of interview. The three villages from which the sample was selected, as we will explain later, are located in the *Ekma* block (administrative unit in

which districts are divided) of the Saran district. The Saran district belongs to the state of Bihar and is located in the north-eastern part of India (Figure 1).

Figure 1: Location map of the study area.



Within India, Bihar ranks fairly low in terms of socioeconomic indicators and is considered to be the least developed state based on its demographic characteristics. Bihar is the third most populous state of India and has experienced the highest population growth rate in the last decade (Census of India 2011). Bihar's total fertility rate (TFR = 3.7 in 2012) is one of the highest in India (Sample Registration System 2012). Meanwhile, contraceptive prevalence rate in Bihar (34 percent in 2007-08) is one of the lowest among the major states (IIPS and Ministry of Health and Family Welfare 2010).

The sample was selected using three-stage sampling design. In the first stage, the *Ekma* block within the Saran district was chosen because its socioeconomic characteristics are very close to Bihar's average. We focus on rural villages because the vast majority of population (90 percent) in Bihar resides in rural areas (Census of India 2011). In the second stage, the three villages with the highest number of households were selected in order to ensure socioeconomic heterogeneity in the sample. Villages were considered as Primary Sampling Units (PSUs). In order to obtain the desired sample size (N = 450), a complete house-listing of the selected PSUs was drawn up. In the third stage, only those households with the following characteristics were selected for interview: IW 1) was

married; 2) had at least one child[3]; and 3) was residing and sharing the same kitchen with MIL at the time of interview.

In the three PSUs, there were 1,040 households in total at the time of interview, with 690 households where married IW and MIL were living together and sharing the same kitchen. Among them, about 25 percent (171 households) were not eligible according to the selection criterion of IW having at least one living child. This led to 519 households eligible for interview. Out of these 519 households, 59 were not interviewed because either IW or MIL was not present at the time of interview (41 cases) or they refused to be interviewed (18 cases). From the remaining households (460), a total of 450 pairs of IW and MIL were interviewed in order to fulfil the target sample of the survey. The interview process stopped when the sample of 450 households was achieved.

Interviews were conducted at the respondents' home in order to offer a familiar and comfortable environment to interviewees. IW and MIL were interviewed at the same time, but in different places in order to avoid misreporting. Typically, IW was interviewed in the house while MIL was interviewed in the so-called *Baranda*, a connecting area between the main entrance of the house and the outside courtyard.

Each of the 450 IW-MIL pairs was interviewed using semi-structured questionnaires. The questionnaires contained a mix of closed and open-ended questions. IW's questionnaire asked information on household characteristics, husband's socioeconomic and demographic profiles, individual demographic characteristics as well as fertility-related information e.g., fertility preferences, fertility history, and interaction with MIL on fertility issues. Information on IW's mother (i.e. age, education, and CEB) was also collected during interviews to IW. MIL's questionnaire asked information on MIL's characteristics (e.g., age and education), fertility history (i.e. CEB), and fertility preference for IW (i.e. desired number of grandchildren from IW).

The interview data were coded and computerized in CSPro 4.0 software. The sample used for the following analysis is reduced to 440 IW-MIL pairs since we excluded the cases (n=10) where MIL's preference for grandchildren was not reported or reported as "up to God". Although this latter case would be interesting to investigate, the number of observations was too little to perform a meaningful statistical analysis.

3.2. Dependent Variable

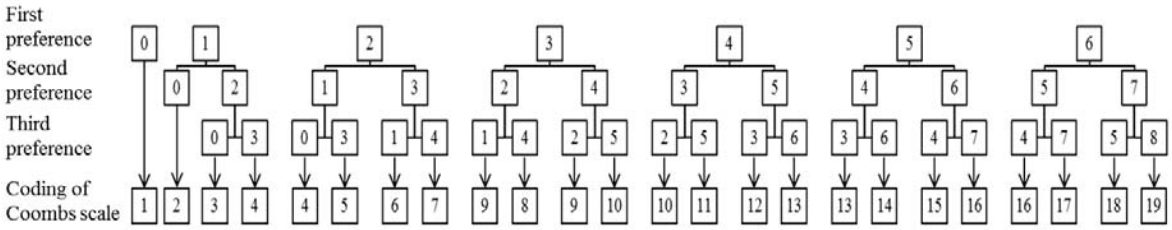
Desired family size of IW is the dependent variable in this study and it is classified into three categories: low, medium, and high. This variable is derived from the Coombs scale, a latent measure of desired family size considered to produce the most accurate indicator of fertility preferences (Coombs 1974, 1978, 1979). This scale is based on three follow-up

[3] Given a common practice in rural India for married women to bear a child immediately after marriage, there might be a selection e.g. due to health problem of those who did not have a child at the time of interview. To avoid such selection bias that could also affect their desired family size, the sample selected for interview comprised only married women with at least one living child.

survey questions. First, respondents were asked "If you could have the number of children you would like to have, what number of children would you want to have when your family size is completed?" They were then asked two more questions, indicating whether the interviewed woman would prefer fewer or more children if she was unable to have the exact number previously indicated. The Coombs scale produces variance in responses, pushing respondents who, for example, reported they desire three children, to report whether they would prefer a minimum of three children or a maximum of three children. This variance allows for high accuracy in estimating family size preference.

Responses were coded, in agreement to previous literature (Axinn et al. 1994; Coombs 1974; Jennings et al. 2012), into a scale with values ranging from 1–19, with a higher value indicating a preference for more children. For example, a respondent who says she prefers three children in the first question, and three is the maximum number of children she would prefer, receives a code of seven, as compared to a code of 10 for a respondent who says that three is the minimum number of children she would prefer. Figure 2 illustrates the answers in three steps and the coding scheme.

Figure 2: Response alternatives and coding scheme for Coombs Scale of family size preference



Source: Authors' adaptation from Axinn *et al.* (1994, p 70).

In our sample, responses to the first question varied from 1 to 6. Accordingly, the responses to the following two questions could range from 0 to 7 and 0 to 8, respectively. This would correspond to Coombs scale's coding of 1-19. However, in our sample, none of the IWs gave 0 as their "alternative" desired number of children. Hence, the actual codes of the Coombs scale in our study range from 4-19, with a higher value indicating a preference for more children. Based on the tertile distribution of the codes, we created three categories for the dependent variable IW's preferred family size: low; medium; and high. The low category corresponds to the codes 4-7, the medium category corresponds to 8-10, and the high category includes values 11-19.

As shown in Table 1, on average IW desires 3.2 children when first asked about the number of children she would want to have when her family size is completed. On the Coombs scale, IW's preferred family size equals to the average of 9.2, suggesting that three may not be the maximum number of children that she would prefer.

Table 1: Sample characteristics (% and sample size).

	Percent	N
IW's characteristics		
Preferred family size (Mean (s.d.))	3.2 (1.1)	440
Preferred family size (Mean Coombs scale (s.d.))	9.3 (3.0)	440
Age		
16-24 years	27.3	120
25-29 years	28.2	124
30-34 years	44.5	196
Education		
Uneducated	15.5	68
1-5 years of schooling	21.4	94
6-10 years of schooling	49.5	218
11+ years of schooling	13.6	60
Working status		
Not working	90.5	398
Working	9.5	42
Husband's characteristics		
Education		
Uneducated	9.1	40
1-5 years of schooling	9.8	43
6-10 years of schooling	49.6	218
11+ years of schooling	31.6	139
Activity status		
Not working	31.4	138
Working	68.6	302
Household's characteristics		
Economic status		
Low	33.0	145
Middle	33.0	145
High	34.1	150
Caste		
SC/ST	17.0	75
OBC	34.3	151
Other caste	48.6	214
Religion		
Hindu	90.2	397
Muslims	9.8	43
MIL's characteristics		
CEB (Mean (s.d.))	5.4 (1.6)	440
Preferred no. grandchildren from IW (Mean (s.d.))	4.1 (1.0)	440
Age		
41-49 years	20.0	88
50-54 years	44.1	194
55-60 years	35.9	158
Education		
Uneducated	81.1	357
1-5 years of schooling	4.8	21
6+ years of schooling	14.1	62
Interaction with IW on childbearing issues		
Never	25.9	114
Sometimes	51.6	227
More often	22.5	99
Mother's characteristics		
CEB (Mean (s.d.))	5.3 (1.6)	440

	Percent	N
Education		
Uneducated	84.3	371
1-5 years of schooling	8.4	37
6+ years of schooling	7.3	32
Educational gap between IW and husband		
Years education husband - years education IW (Mean (s.d.))	2.2 (4.8)	440
IW's education=Husband's education - both literate	15.0	66
IW's education=Husband's education - both illiterate	2.5	11
IW's education>Husband's education	19.8	87
IW's education<Husband's education	62.7	276
Educational gap between of IW and MIL		
Years education IW - years education MIL (Mean (s.d.))	5.5 (4.8)	440
IW educated ≤ MIL education	23.6	104
IW educated > MIL education	76.4	336
Total	**100**	**440**

3.3. Explanatory Variables

We use four key explanatory variables in order to test our hypotheses (H1, H2 and H3) on the influence of biological mother's and MIL's fertility patterns and MIL's preference for grandchildren on desired family size of IW. In addition, IW's education and the educational gaps between IW and MIL and between IW and husband are included to test the fourth hypothesis (H4). The distribution of the explanatory variables is presented in Table 1.

i) Mother's number of children ever born (asked to IW). In our sample, mother's number of children ever born (CEB) is on average 5.3.

ii) Mother's education (asked to IW) was classified into three categories: uneducated (84.3 percent); 1-5 years of schooling (8.4 percent); and 5 years of schooling and above (7.3 percent).

iii) Mother-in-law's number of children ever born. On average, MIL's CEB in our sample is 5.4, similar to mother's CEB.

iv) Mother-in-law's preferred number of grandchildren. MIL was asked "How many children, boys and girls, do you want your daughter-in-law to have?" On average, the interviewed MILs replied they want about 4 grandchildren from IW.

v) IW's education. Based on the number of years of schooling reported by IW, we constructed four education categories: uneducated (15.5 per cent); 1-5 years of schooling (21.4 percent); 6-10 years of schooling (19.5 percent); and 11 years of schooling and above (13.6 percent).

vi) Education gap between IW and husband. On average, husband has 2.2 years of schooling more than IW and his education was classified, as for IW's education, into four categories. Husband's education is controlled for in the models where education gap

between IW and husband was not included. As for couple's relative educational attainments, we considered whether IW's education is higher (19.8 percent of couples), lower (62.7 percent of couples) or equal to her husband's education based on the original continuous variables indicating the number of years IW and her husband spent in education. In the case of equal number of years IW and husband spent in education, we additionally distinguished between couples where both IW and husband were literate (15 percent) and couples where they were both illiterate (2.5 percent).

vii) Education gap between IW and MIL. On average, IW has 5.5 years of schooling more than MIL. A dummy variable was created taking the value of 0 if IW's education (measured as years of education) was less or equal to MIL's education; and taking the value of 1 if IW's education was greater than MIL's education. Alternative categories of IW-MIL education have also been tested and the results are consistent with those reported in this paper.

3.4. Control Variables

A range of characteristics of IW, her spouse, her mother and MIL were controlled for. Table 1 shows their distributions. For IW's individual characteristic, age at the time of the survey was grouped into three categories based on the sample distribution (16-24 years; 25-29 years; and 30-34 years). Husband's characteristics included education (classified into four categories: uneducated; 1-5 years of schooling; 6-10 years of schooling; and 11 or more years of schooling) and current activity status (which equals 1 if the husband was working at the time of the interview; 0 otherwise). Mother's and MIL's educational attainments were on average lower than the attainment of the younger generation (i.e. IW and her husband), therefore we classified them into three categories: uneducated; 1-5 years of schooling; and more than 5 years of schooling. MIL's age was grouped into three categories (41-49 years; 50-54 years; and 55-60 years). The frequency of interaction between IW and MIL on childbearing was reported as never; sometimes; and often.

We also controlled for household characteristics: household economic status (low; medium; and high); caste (Scheduled caste (SC); Other Backward Caste (OBC); and Other caste[4]), and religion (which equals1 if being Hindu; 0 otherwise, with 9.8 percent of the latter being Muslim). Principal Component Analysis (PCA) was used to construct a wealth index (α=0.84) based on information on the type of housing[5], household durable assets,

[4] SC includes "untouchables" or *Dalits* – a group that is socially segregated and economically disadvantaged; OBC is an intermediate caste, considered at a low level in the traditional caste society but above the SC; and "Other caste" (also called as upper caste or generals) is the remaining population and it is characterized by better socioeconomic status than the SC and OBC populations. The Hindu society in India also includes the Scheduled tribe (ST) that lives geographically isolated, with limited economic and social interactions with the rest of the population, and therefore it was not present in the villages considered in this study. Our survey asked all respondents to identify their caste, independently of whether the respondent was Hindu or not.

[5] Type of housing distinguishes between *Pucca* (roof, wall, and floor are made of bricks, cement and rod), *Semi-pucca* (roof or wall or floor are made of bricks, cement and rod), and *Kaccha* (roof, wall, and floor are not made of bricks, cement and rod). In the survey, this information is collected by observation of the interviewers.

livestock, land ownership, and size of agricultural land (as in Filmer and Pritchett 2001; Gwatkin et al. 2007). The index was then divided into three categories based on tertiles.

In alternative model specifications, we controlled for the age difference between IW and husband. A large age gap between husband and wife, with the husband being older than the wife, has been interpreted as a necessary mechanism for giving husband sufficient dominance to resist his wife sexual demand (Caldwell et al. 1983). In order to account for generational differences, we also controlled for the age difference between IW and MIL. These additional controls did not improve our models and we therefore decided not to include these variables in the models reported in the paper (results available on request).

3.5. Method

Commonly, previous studies using the Coombs scale as an outcome variable used ordinary least squares approach to estimate family size preference (e.g. Axinn et al. 1994). However, the codes of the Coombs scale are not on a continuous scale and do not follow a normal distribution, a necessary condition for ordinary least squares regression. Therefore, using the three categories (low, medium, and high preferred family size) that we created based on the tertiles of the Coombs scale as explained above, we carried out ordered logistic regression analysis. The ordered logistic approach is indeed an appropriate method for an ordinal response variable like ours. The likelihood-ratio test showed that the proportional odds assumption was not violated by our data, i.e. the coefficients that describe the relationship between any two pairs of the outcome groups are statistically the same. Thus, the use of ordered logistic estimation is justified.

4. Results

4.1. Descriptive Results

First, we examine descriptively whether IW's desired family size is associated with fertility of her mother and MIL and/or with MIL's fertility preference. Since, as explained above, the Coombs scale is not a continuous variable, we use the desired number of children reported by IW in the first question on family size preference for visualisation purpose. Figures 3 and 4 present the scatter plot and the fitted regression line with 95 percent confidence interval of the relationship between IW's desired number of children and the CEB of her biological mother and MIL, respectively. We observe a slightly positive correlation between biological mother's total fertility and preferred family size of index women ($r = 0.10$, p-value<0.05) in Figure 3. The association between IW's desired family size and MIL's total fertility (Figure 4) is also positive and stronger than that with biological mother's total fertility ($r = 0.24$, p-value<0.001). This result hints to an important role of MIL in shaping IW's preferences in the context analysed.

Figure 3: IW's preferred family size by mother's Children ever born.

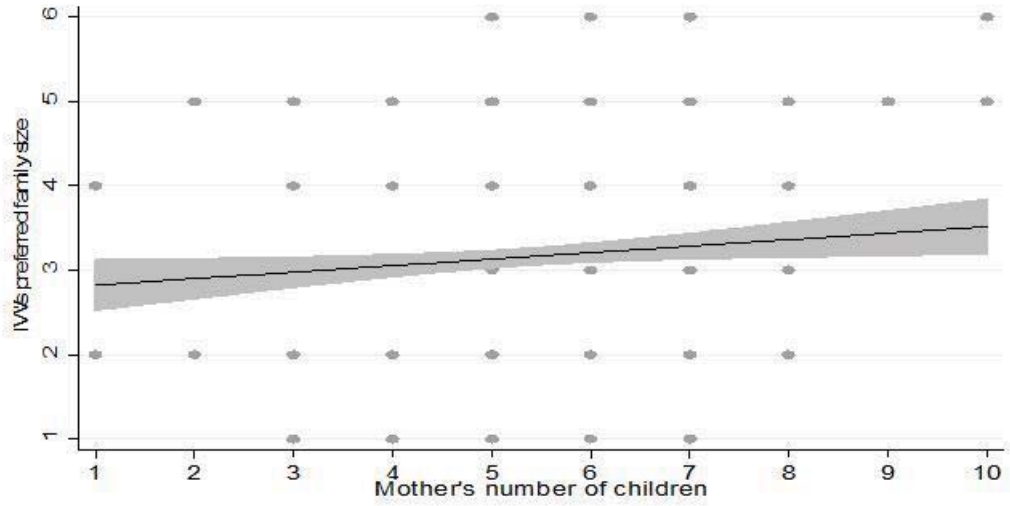


Figure 4: IW's preferred family size by MIL's Children ever born.

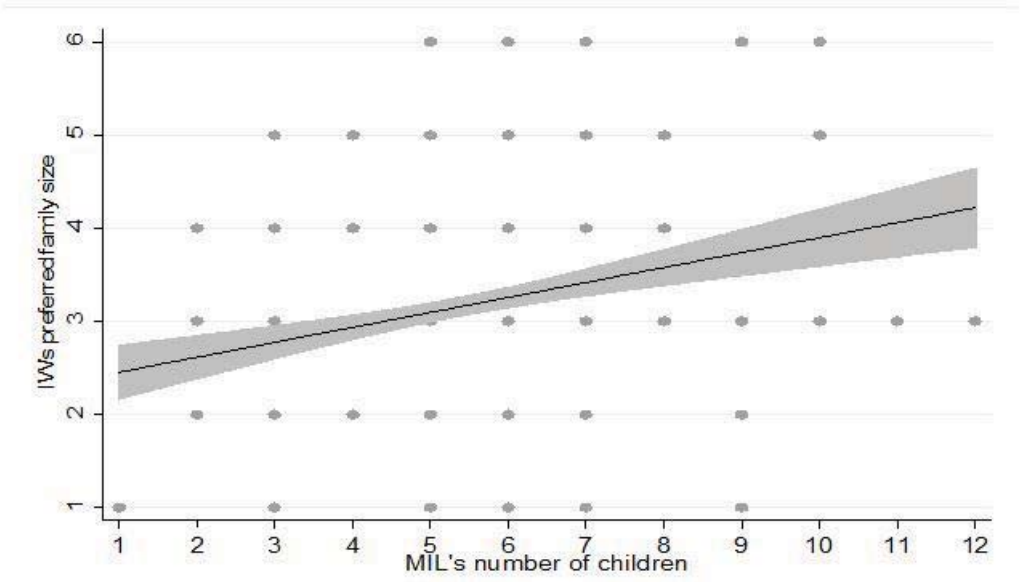
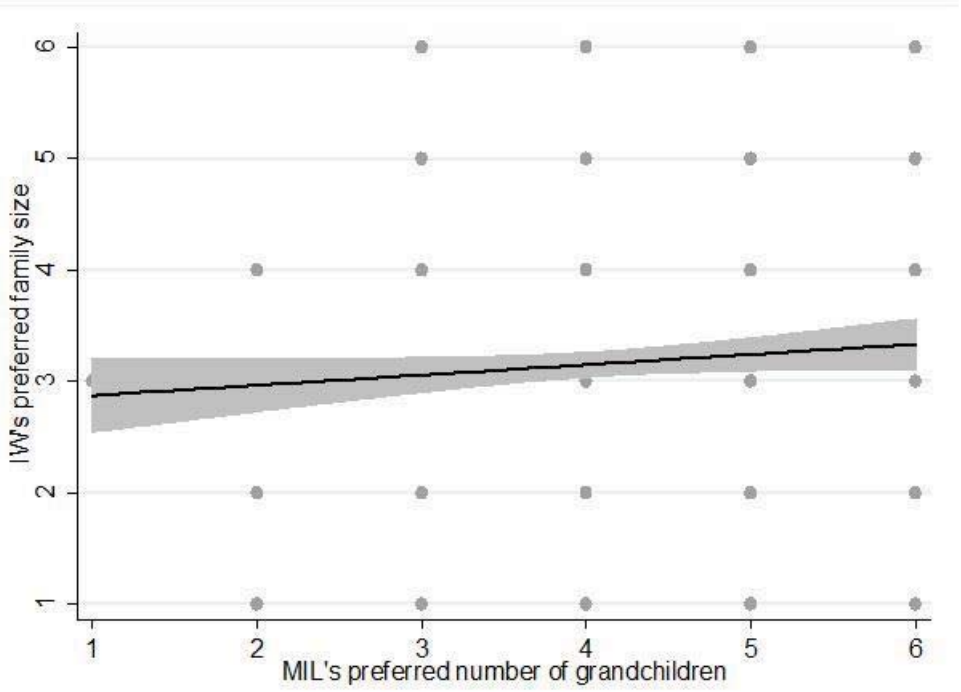


Figure 5 shows the association between IW's preferred family size and MIL's preferred number of grandchildren. The linear association is positive, i.e. the higher the desired number of grandchildren of MIL from IW, the higher the IW's desired number of children, but significant only at 10 percent level ($r = 0.09$, p-value<0.1).

Figure 5: IW's preferred family size by MIL's preferred number of grandchildren.



Next, we examine the relationships between IW's preferred family size and the other relevant characteristics. Unlike in Figures 3-5, which considered the preferred family size reported by IW at the first question, the dependent variable of interest here is family size preference as a latent outcome extracted from Coombs scale. Table 2 presents IW's family size preference constructed as tertiles of the Coombs scale across relevant demographic and socioeconomic characteristics of IW and her significant others. Chi-square test (or ANOVA in case of continuous variables) was employed to test the level of significance of the differences between categories.

Unsurprisingly, age of IW is positively correlated with family size preference, with older IW expressing higher preference for larger family size. Education, both of IW and of her husband, is negatively associated with preference for larger family size. The desire for a smaller family grows with increasing years of education: 48.3 percent of women in the most highly educated group (i.e. with more than 10 years of schooling) preferred a small family as compared to only 17.6 percent of women with no schooling. Interestingly, IW's family size preference is also significantly associated with biological mother's education. About two-thirds of women whose mother has more than 6 years of schooling would like to have small family size.

When considering the difference in educational attainment between IW and her husband, it appears that if both IW and husband are illiterate the preference is mainly for a large family size. For couples where both partners are literate, on the other hand, IW's preference is for a small family size. In particular, if IW is more educated than the husband, she reports more often a preference for a small family size. Unlike the association found in the case of educational attainment of biological mothers, education of MIL is not

significantly associated with IW's family size preference. However, when considering MIL's education relative to that of IW, we find that when IW is more educated than MIL, she is more likely to express a desire for a small family size.

Table 2: IW's family size preference across background characteristics (row %) and p-value[1].

	IW's family size preference			*P-value*
	Small	**Medium**	**Large**	
IW's characteristics				
Age				
16-24 years	42.5	45.8	11.7	
25-29 years	38.7	33.1	28.2	0.001
30-34 years	29.6	39.8	30.6	
Education				
Uneducated	17.6	42.6	39.7	
1-5 years of schooling	30.9	44.7	24.5	0.003
6-10 years of schooling	39.9	38.1	22.0	
11+ years of schooling	48.3	33.3	18.3	
Husband's characteristics				
Education				
Uneducated	25.0	32.5	42.5	
1-5 years of schooling	34.9	21.6	32.6	0.130
6-10 years of schooling	35.3	39.4	25.2	
11+ years of schooling	39.6	43.9	16.5	
Activity status				
Not working	32.6	43.5	23.9	0.502
Working	37.1	37.7	25.2	
Household's characteristics				
Economic status				
Low	30.3	37.9	31.7	
Middle	35.9	40.0	24.1	0.113
High	40.7	40.7	18.7	
Caste				
SC/ST	36.0	36.0	28.0	
OBC	35.8	31.8	32.5	0.243
Other caste	35.5	46.3	18.2	
Religion				
Hindu	36.5	39.5	23.9	0.373
Muslims	27.9	39.5	32.6	
MIL's characteristics				
CEB (Mean (s.d.))	4.9 (1.7)	5.5 (1.5)	5.8 (1.5)	0.000
Preferred no. grandchildren (Mean (s.d.))	3.9 (1.0)	4.1 (1.1)	4.2 (1.0)	0.045
Age				
41-49 years	35.2	47.7	17.0	
50-54 years	36.1	35.1	28.9	0.199
>55 years	35.4	40.5	24.1	
Education				
Uneducated	35.9	38.1	26.1	
1-5 years of schooling	28.6	52.4	19.0	0.575
6+ years of schooling	37.1	43.5	19.4	
Interaction with IW on childbearing issues				
Never	28.9	43.0	28.1	
Sometimes	39.2	40.1	20.7	0.164
More often	35.4	34.3	30.3	
Mother's characteristics				

	IW's family size preference			*P-value*
	Small	**Medium**	**Large**	
CEB (Mean (s.d.))	5.1 (1.5)	5.4 (1.6)	5.4 (1.7)	0.119
Education				
Uneducated	33.2	39.1	27.8	
1-5 years of schooling	37.8	48.6	13.5	0.002
6+ years of schooling	62.5	34.4	3.1	
Education IW - husband				
IW's education=Husband's education - both literate	43.9	36.4	19.7	
IW's education=Husband's education - both illiterate	18.2	18.2	63.6	0.037
IW's education>Husband's education	36.8	34.5	28.7	
IW's education<Husband's education	34.1	42.8	23.2	
Education IW - MIL				
IW's education ≤ MIL's education	20.2	46.2	33.7	0.001
IW's education > MIL's education	40.5	37.5	22.0	
Total (N = 440)	**35.7**	**39.6**	**24.8**	

Note: 1. p-value is obtained from chi-square tests for categorical variables and ANOVA test for continuous variables.

4.2. Multivariate Analysis

In Tables 3 and 4, we report the results from a series of ordered logistic models run to test the four hypotheses raised above. Model I aims to understand the direct relationship between biological mothers' total fertility and desired family size of IW, taking into account only mother's education. In Model II, we further added MIL's characteristics (i.e. total fertility, age, education, and frequency of interaction with IW on childbearing issues). In Model III, husband's characteristics (i.e. education and current activity status) and household's characteristics (i.e. household economic status, caste, and religion) were added. The final model (Model IV) additionally includes individual characteristics (i.e. age and education) along with the variables included in Models I, II, and III.

Odds ratios (OR) are presented with 95 percent confidence intervals and corresponding significance level. OR > 1 indicates higher odds of preference for a larger family size while OR < 1 indicates lower odds of preference for a larger family size. The percentage change in odds for each unit increase in the independent variable is calculated using the formula: $100*(exp\beta - 1)$. The results can be interpreted as follows: an OR is the proportional odds ratio for a one unit increase in a particular independent variable on preference for a large versus the combined medium and small family size, given that the other variables in the model are held constant. Likewise, we can interpret the OR as the odds of the combined categories large and medium versus small family size preference, under the constraint that the coefficients from each individual analysis (i.e. high vs. medium and low; high and medium vs. low) are equal while leaving the intercepts free to vary. Therefore, ordered logit can be interpreted as a logistic regression with binary outcome.

Similar to the descriptive findings, CEB of biological mother has no significant relationship with IW's family size preference across the four multivariate models. However, in the case of MIL, while CEB is not significantly associated with IW's preferred family size, her preferred number of grandchildren is. For one additional

grandchild wanted by MIL for the IW, the odds of IW wanting a larger family size increase by about 1.2 times.

Educational attainment of biological mother and of IW, but not those of MIL and husband, has inverse significant association with IW's family size preference. The higher the education of biological mother, the lower the size of family that IW would like to have. This effect remains statistically significant even in Model IV where IW's education is controlled for. Likewise, the odds of wanting a larger family size are reduced by 53 percent and 61 percent (Model IV) for IW with 6-10 years and 11 and more years of schooling, respectively, compared with their counterparts who have no schooling.

IW's age and other predictors such as frequency of interaction between MIL and IW, husband's activity status and household characteristics do not appear to have significant relationships with IW's preferred family size.

Table 3: Odds ratio (95% confidence intervals in parentheses) from ordered logistic regression models predicting IW's family size preference.

	Model-I	Model-II	Model-III	Model-IV
Mother				
CEB	1.051	1.045	1.036	0.996
	[0.942 1.171]	[0.936 1.167]	[0.926 1.159]	[0.888 1.116]
Education *(Ref: Uneducated)*				
1-5 years	0.658	0.661	0.795	0.858
	[0.357 1.213]	[0.348 1.253]	[0.409 1.547]	[0.437 1.684]
6+ years	0.259***	0.285***	0.344**	0.417*
	[0.126 0.533]	[0.136 0.599]	[0.160 0.762]	[0.189 0.925]
MIL				
CEB		0.986	0.964	0.975
		[0.884 1.099]	[0.863 1.078]	[0.871 1.092]
Preferred no. grandchildren		1.214*	1.227*	1.242*
		[1.026 1.436]	[1.035 1.454]	[1.043 1.479]
Age *(Ref: 41-49)*				
50-54		1.247	1.219	1.055
		[0.781 1.991]	[0.759 1.957]	[0.645 1.727]
55-60		1.111	1.027	0.898
		[0.674 1.831]	[0.614 1.715]	[0.530 1.520]
Education *(Ref: Uneducated)*				
1-5 years		1.297	1.565	1.789
		[0.579 2.907]	[0.677 3.617]	[0.767 4.168]
6+ years		1.047	1.138	1.316
		[0.602 1.820]	[0.641 2.020]	[0.732 2.367]
Interaction IW *(Ref: Never)*				
Sometimes		0.723	0.73	0.745
		[0.472 1.107]	[0.473 1.128]	[0.481 1.156]
More often		0.927	0.888	0.918
		[0.556 1.548]	[0.526 1.498]	[0.540 1.562]
Husband				
Education *(Ref: Uneducated)*				
1-5 years			0.635	0.691
			[0.272 1.482]	[0.293 1.626]
6-10 years			0.532+	0.547+
			[0.268 1.055]	[0.275 1.088]
11+ years			0.487+	0.541

	Model-I	Model-II	Model-III	Model-IV
			[0.225 1.055]	[0.248 1.180]
Activity status *(Ref. not working)*				
Working			1.107	1.113
			[0.748 1.638]	[0.749 1.653]
Household				
Economic status *(Ref: Low)*				
Middle			0.822	0.872
			[0.516 1.310]	[0.542 1.405]
High			0.825	0.863
			[0.484 1.406]	[0.495 1.506]
Caste *(Ref: SC/ST)*				
OBC			1.19	1.141
			[0.687 2.062]	[0.652 1.994]
Other caste			0.981	0.929
			[0.573 1.677]	[0.539 1.603]
Religion *(Ref: Hindu)*				
Muslims			1.317	1.413
			[0.713 2.432]	[0.744 2.685]
IW				
Age *(Ref: 16-24)*				
25-29				1.718*
				[1.035 2.851]
30-34				2.018**
				[1.272 3.204]
Education *(Ref: Uneducated)*				
1-5 years				0.594+
				[0.326 1.083]
6-10 years				0.471**
				[0.271 0.819]
11+ years				0.392*
				[0.185 0.828]
Constant-1	0.619	*1.181*	0.587	0.452
Constant-2	*3.544***	*6.958***	*3.555+*	*2.937*
N	*440*	*440*	*440*	*440*

Note: ***p<0.001; **p<0.01; *p<0.05; †p<0.10.

The subsequent analysis in Table 4 examines how educational gaps between IW and husband and between IW and MIL mediate IW's family size preference. Extending from Model IV in Table 3, Model I in Table 4 assesses the effect of educational gap between IW and her husband on IW's family size preference. With respect to the influence of educational gap between IW and her husband on preferred family size, we do not find any significant relationship with IW's family size preference. Model II includes a dummy variable indicating whether IW has higher education than MIL. The significant effect of IW's own education on family size preference observed earlier in Table 3 is not included here as it is accounted for in the dummy variable "Education IW vs. MIL"[6]. We find that when IW has higher education than MIL, she would prefer to have a smaller family size.

[6] We also excluded the variables education of husband in Model I as well as education of MIL in Model II.

Table 4: Odds ratio (95% of confidence intervals in parentheses) from ordered logistic regression models predicting IW's family size preference.

	Model-I		Model-II	
Mother				
CEB	1.072		1.058	
	[0.955	1.204]	[0.941	1.188]
Education *(Ref: Uneducated)*				
1-5 years of schooling	0.848		0.814	
	[0.431	1.671]	[0.415	1.594]
6+ years of schooling	0.376*		0.391*	
	[0.170	0.832]	[0.178	0.857]
MIL				
CEB	1.280***		1.290***	
	[1.139	1.438]	[1.148	1.449]
Preferred no. of grandchildren	1.220*		1.225*	
	[1.024	1.453]	[1.029	1.459]
Age *(Ref: 41-49 years)*				
50-54 years	0.978		0.97	
	[0.596	1.603]	[0.590	1.596]
55-60 years	0.908		0.869	
	[0.539	1.530]	[0.520	1.455]
Education *(Ref: Uneducated)*				
1-5 years of schooling	1.560			
	[0.654	3.724]		
6+ years of schooling	1.244			
	[0.698	2.215]		
Interaction with IW *(Ref: Never)*				
Sometimes	0.716		0.739	
	[0.461	1.113]	[0.475	1.152]
More often	0.990		0.991	
	[0.581	1.687]	[0.580	1.693]
Husband				
Education *(Ref: Uneducated)*				
1-5 years of schooling			0.690	
			[0.292	1.629]
6-10 years of schooling			0.537+	
			[0.268	1.074]
11+ years of schooling			0.54	
			[0.248	1.178]
Activity status *(Ref. not working)*				
Working	1.096		1.154	
	[0.738	1.629]	[0.775	1.718]
Household				
Economic status *(Ref: Low)*				
Middle	0.794		0.916	
	[0.501	1.260]	[0.573	1.463]
High	0.681		0.899	
	[0.407	1.137]	[0.522	1.549]
Caste *(Ref: SC/ST)*				
OBC	1.263		1.252	
	[0.715	2.231]	[0.707	2.217]
Other caste	1.072		1.101	
	[0.621	1.850]	[0.638	1.902]
Religion *(Ref: Hindu)*				
Muslims	1.356		1.159	
	[0.714	2.575]	[0.608	2.208]

	Model-I		Model-II	
IW				
Age *(Ref: 16-24 years)*				
25-29 years	2.005**		1.863*	
	[1.212	3.316]	[1.128	3.077]
30-34 years	2.196***		2.104**	
	[1.386	3.480]	[1.327	3.334]
Education IW - husband *(Ref: both literate)*				
IW's education=Husband's education - both illiterate	3.418+			
	[0.852	13.717]		
IW's education>Husband's education	1.019			
	[0.522	1.989]		
IW's education<Husband's education	1.074			
	[0.624	1.849]		
Education IW - MIL *(Ref: IW ≤ MIL)*				
IW's education > MIL's education			0.494**	
			[0.316	0.771]
Constant-1	*8.903***		*2.962*	
Constant-2	*60.031****		*20.525****	
N	*440*		*440*	

Note: ***p<0.001; **p<0.01; *p<0.05; †p<0.10.

Interestingly, when controlling for educational differences between IW and MIL in Model II as well as between IW and her husband in Model I, the number of children ever born to MIL became statistically significant and positive. This shows that the educational difference variables may be interpreted as negative confounders. That is, the sensitivity to MIL's CEB on IW's family size preference depends on educational differences between IW and MIL, but also between IW and her husband. In other words, without considering these educational gaps, it seemed that MIL's fertility has no significant relationship with IW's family size preference. However, when the educational gap is adjusted for, we find a significant relationship. This means that a subgroup of IW is particularly sensitive to MIL's fertility and it is likely to be the one with lower education than MIL. The same explanation applies to the case of controlling for the educational gap between IW and her husband in Model I.

5. Discussion

Using original interview data collected from a sample of 450 IW-MIL pairs in rural areas of north-eastern India, we analysed how much the family size preference of IW is influenced by intergenerational transmission of fertility behaviours. Based on ordered logistic regression analysis adjusting for relevant individual, family members' and household socioeconomic characteristics, the main findings from this paper are discussed below in correspondence to the hypotheses explicated above.

First, biological mother's fertility behaviour has no significant association with IW's preferred family size, but fertility of MIL does. This finding rejects *H1*, which followed the literature on Western societies and predicted a relationship between biological mother's CEB and IW's family size preference, but supports *H2*, which assumed that in the rural Indian context fertility of MIL has greater influence than biological mother's fertility in

shaping a young woman's fertility preferences. Our finding differs from the few previous studies on intergenerational fertility transmission which considered both biological mother and MIL. These extant studies commonly found that the correlation between biological mother's CEB and IW's CEB was stronger than that between MIL's CEB and IW's CEB (Reher et al. 2008). Nevertheless, this previous literature was carried out mainly in the Western context with different kinship systems and living arrangements from rural India. In our context, where IW moved to cohabit with her husband's family at young age after marriage, socialization within the in-law family appears to be more influential than within her natal family[7].

Second, as predicted by *H3*, the number of grandchildren that MIL would like IW to have is positively associated with IW's preferred family size. It may be thought that the strong correlation observed is a result of assortative mating, whereby MIL chose a daughter-in-law who is likely to have a similar fertility preference. Indeed, not only did almost all these marriages occur at young ages, but they were also often arranged without the participation of young people themselves, as typically practiced in Bihar (IIPS and Population Council 2010). However, in rural Bihar, the initiative for arranged marriages is commonly taken by the family of the bride, who usually brings a dowry to the husband's family. This consequently reduces the likelihood that the similarity between IW and her MIL is a pre-marriage condition. We argue that the association between the desired number of grandchildren of MIL and IW's family size preference is rather a product of social pressure by MIL. In rural Bihar's kinship practice, as explained above, there is little room for young women's autonomy over their own life and childbearing decisions (Char et al. 2010; Das Gupta et al. 2003). Accordingly, family size preference of IW tends to correspond to the desired number of grandchildren of her MIL.

Nevertheless, upon testing our last hypothesis (*H4*), we find that when IW is more educated than her MIL, the preferred family size becomes smaller. This effect is statistically significant net of IW individual education effect. Although we do not have a direct measure of women's empowerment such as participation in household decision-making or mobility, comparing the relative level of education between IW and MIL allows us to proxy the degree of autonomy that IW may have within the family, relying on previous evidence that women with little education are more subject to the traditional pattern of subordination vis-à-vis husband and in-laws (Mason 1997). This suggests that when IW has some schooling and in particular when her educational attainment is greater than that of her MIL, her relative power is enhanced and she may more successfully negotiate for and execute her preferences related to childbearing decisions.

Although we also expected to see a propensity for smaller family size when IW has higher education than her husband, our results do not support this hypothesis. It is possible that family size preferences of IW and her husband are closer than those of IW and MIL. Indeed, some other studies suggested that young couples do follow their own decisions over certain issues such as the choice of contraceptive methods (Char et al. 2010). If this is

[7] The discrepancy between our findings and that of Reher et al. (2008) could also be due to the fact that they looked at CEB of IW while we considered family size preferences.

the case also for family size preferences, it may not matter much whether IW has greater autonomy as measured by the gap between IW's education and her husband's education.

The finding that biological mother's education but not her fertility is significantly associated with family size preference of IW is also worth discussing. We speculate that education may be a mediating factor between mother's fertility behaviour and IW's fertility preferences since higher educated mothers are also more likely to have lower number of children than their less educated counterparts. Furthermore, through social learning, education of significant others may have spill-over effects on individuals' behaviours. Evidence has shown, for example, that the presence of literate family members is a favourable factor for contraceptive use (McNay et al. 2003) and hints to the positive externality of education in communication and diffusion of ideas and knowledge through interpersonal networks.

Overall, our paper provides two main contributions to the literature. First, we consider and compare the influence of mother and mother-in-law on fertility preferences of young married women in rural Bihar. No study so far, to our knowledge, has compared how fertility behaviours of both mother and mother-in-law can influence a woman's preferred number of children. Moreover, our study setting is rather unique and it allows us to test the dynamics of socialization both in natal family and in the in-law family. Second, we propose an innovative approach to study fertility preferences, measuring desired family size of index women by Coombs scale and analysing it with an ordinal logistic approach. Such measurement allows us to capture latent desires about having a smaller or larger family (Coombs 1974). The Coombs scale is not a linear continuous variable with normal distribution, thus OLS estimation used by previous studies (e.g. Axinn et al. 1994) could yield a biased result. For the first time to our knowledge, the ordinal categorical nature of the Coombs scale is addressed with a more appropriate estimation procedure.

We acknowledge that this study has two main limitations. First, due to the sample selection of the survey used, we can only consider women who have at least one child. We however believe that such selection does not lead to biased results because in the rural northern Indian context considered, childbearing is concentrated at age 20-29 (IIPS and ORC Macro 2000) and childless women are socially stigmatized and face grave personal and social consequences. At the turn of the century, only about 5 percent of women aged 21-49 were childless in Bihar (Agrawal et al. 2012). Second, the survey contains no information on family size preference of the husband, which other studies have shown to also be important (Mason and Smith 2000; Tilahun et al. 2014).

We also recognize that fertility preferences may not be the same as fertility behaviour. Since women interviewed in our survey are still in reproductive age, we focused on their fertility preferences. Young women's preferences of family size are, nevertheless, recognized to be one of the main determinants of achieved fertility (e.g. Barber 2001). Thus, looking at family size preferences rather than the actual number of children ever born should not be problematic.

6. Conclusions

In such a unique social setting where a married woman lives and shares a kitchen with her mother-in-law like in our study, we found that both fertility and preference for the number of grandchildren of MIL are associated with the preferred family size of IW, but not the fertility of biological mother. This shows how socio-cultural differences in family values and norms shape the patterns of intergenerational fertility transmission in non-Western societies.

Likewise, our findings show that several forces driving down the preference for large families operate beyond the individual circumstances. Our data show that the socio-economic environment where the women grew up, proxied by the level of education of the mother, has a persistent effect on the woman's preferences. Moreover, the effect of both socialisation with and social pressure from the husband's family on IW's preferences is clear when looking at the positive effect of mother-in-law's preferred number of grandchildren on IW's family size preferences. On the other hand, even after accounting for these factors, the repressive effect of women's education (and of their educational attainment relative to those of husband and MIL) on their preferred family size remains significant, indicating that women's education plays an important part. Improvements in the status and empowerment of women are central to the process of sustainable development. It is likely that when the level of women's education increases, they will achieve autonomy to manage the resources available to them as well as play an active and effective role in family planning. Improved education and possibly job opportunities outside in-laws' home may boost women's status and consequently reduce the overall fertility rate in rural India.

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