My Son, My Moon: Son Preference and Demand for Male Child in Pakistan

Abstract:

Purpose

Son preference is widespread in Pakistan. This study examines the prevalence and strength of the phenomenon and its effect on Pakistani women's fertility choices.

Methodology

Data from two representative nationwide Demographic and Health Surveys were used and a number of econometric techniques were employed. A variety of indicators were generated to chart the change in revealed and stated preference for male children over time.

Findings

The analysis suggests strong evidence for both the revealed and the stated preference for male offspring. Son preference persists in Pakistan and its impact on actual and stated fertility is still strong. Although the country's overall sex ratio has fallen, the sex ratio at birth and sex ratio at last birth have increased indicating an increased reliance on differential birth stopping. Son preference decreases with couple's level of education. It is more intense among middle-class and rural households. The stated desire for sons has also come down. The likelihood of second birth does not vary with the sex of the first-born. In contrast, women with one or more sons at higher parities are upto 14% less likely to pursue additional fertility compared with women with no sons. The probability of continuing childbearing also decreases with the number of sons born. Women with one or more sons are 29 to 34% more likely to desire no more children.

Originality

The findings of this comprehensive analysis help explain the demographic effects of Pakistan's skewed sex ratios and the country's slow rate of demographic transition.

Keywords: Son preference; Subsequent birth; Fertility; parity progression; Pakistan.

JEL codes: D13; J13; O15; C13; Z13.

1. Introduction:

"Early harvest and early sons are always better".
(A Pakistani proverb)

The practice of preferring sons over daughters is widespread in South and East Asia. In the patriarchal societies of Asia, sons are considered an asset: sons carry forward the family name, take up family business, care for parents in their old age and protect and provide for the dependent members in the extended family. In societies with a dowry-based virilocal setup, sons add to family assets through marriage. Daughters, in contrast, are conceived as a financial liability as the family is required to prepare sufficient dowry for their wedding. They represent femininity and thus weakness and will one day belong to the home of another man and should thus be seen as a futile investment (N K Purewal 2010).

Once married, women in such traditional societies are expected to bear sons which could have important consequences for themselves and for existing girl children. Having a first-born son improves the mother's nutrition intakes and reduces her likelihood of being underweight in China and India (Kishore and Spears 2014; Li and Wu 2011). Likewise, women in Pakistan with at least one son are reported to have significantly more say in everyday household decisions (Javed and Mughal 2018).

Son preference manifests itself in abnormally high sex ratios through sex-selective abortions, female infanticide and benign neglect of girl child's health and nutritional needs (A. Sen 1990). (World Bank 2011) reported that around two million girls under the age of five were estimated to be missing every year, most of them in Asia.

In societies where sex-selective abortion is not deemed acceptable, parents continue their fertility as long as the desired number of sons is not attained (Basu and De Jong 2010).

In this study, we examine the phenomenon of son preference and its fertility implications for women of childbearing age in one such society, namely that of Pakistan. Pakistan is the world's sixth most populous country with a population of 207 million according to the 2017 population census (Government of Pakistan 2017). The country has a skewed sex ratio of 105 male per 100 female. This ratio, though lower than the high level of 116 reported in the 1951 census, still remains above the world average of 101.

Using data from two rounds of Pakistan Demographic and Health Survey carried out in 1990-91 and 2012-13, we look to answer the questions as to what is the extent and strength of son preference in the country? what are its effects on women's childbearing? and to what extent does it impact the couple's desire to continue fertility thereby determining the size of the family?

We examine various aspects of both the revealed and stated preference for son prevalent in the country. We study the country's sex ratio, sex ratio at birth (SRB), parity progression ratio (PPR) and sex ratio at last birth (SRLB) as well as the desired sex ratio (DSR) and the desired preference indicator.

We describe the prevalence of son preference among different demographic and geographical subgroups and chart its evolution over time. We employ Probit as well as three matching routines (PSM, IPW and AIPW) to estimate the role of son preference in determining Pakistani women's reproductive behaviour. Three indicators of son preference (presence of at least one son at parity n, proportion of sons at parity n and number of sons at parity n) are used to determine the incidence and strength of son preference's impact on subsequent fertility at the first four parities. We also determine the probability of differential birth-stopping decision resulting from actual and stated preference for male offspring.

We find that the probability to have a second child does not depend on the sex of the first-born. In Pakistan's high-fertility environment, voluntary birth stopping after the first birth is not a common occurrence. The sex of preceding children is a significant factor in driving subsequent births at higher parities. Women with one or more sons at higher parities are significantly less likely to continue childbearing. The probability of discontinuing childbearing also increases in the number of sons born. Furthermore, women with at least one son are significantly more likely to want no more children than women with no son. This differential stopping behavior has grown in strength over time.

In the following, we briefly overview the historical background of the son preference phenomenon in Pakistan and report relevant literature in Section 2. Data and empirical methodology are discussed in Section 3. Section 4 describes son preference in light of revealed and stated preference measures. Section 5 presents our empirical analysis: parity-wise effects of son preference on additional fertility are reported and the role of son preference in determining the desire for having no more children is estimated. The final section interprets the results and draws conclusions.

2. Background and relevant literature

Written accounts of female infanticide in the Indian Subcontinent go as far back as the late eighteenth century (Bhatnagar et al. 2005). From the mid-nineteenth century, officers of the British East India Company began identifying Indian tribes and castes practicing traditions of female infanticide. The 1921 population census carried out by the colonial British India government classified castes into two categories, namely, castes having “a tradition” of female infanticide and castes without such a tradition’ (S. Vishwanath 2004).

The province of Punjab, which extends over large parts of today's central Pakistan and north-western India, was considered the land of missing girls (Navtej K Purewal 2010). In 1851, it was reported that 400 Sikh Khatri families had destroyed all their female children from the last 400 years[1]. Female infanticide was reported to be common among the Kharral tribe in Montgomery district (present-day Sahiwal in Pakistani Punjab).

The practice of female infanticide was considered to be less common among Muslims. M. Gubbins, a British colonial official, stated: “The Mussulman is found to sympathize least with child-murder" (S. Sen 2002). The 1870 Female infanticide act declared the practice of female infanticide as illegal.

Although female infanticide is practically inexistent in present-day Pakistan, other manifestations of son preference persist. In an early empirical study on the country, (Khan and Sirageldin 1977) analysed data from a national survey conducted in 1968-1969 and reported the presence of strong son preference both among men and women.

(Ali 1989) employed the Pakistan national survey 1979-80 for his analysis and suggested that having at least one son in the family influenced the demand for additional children. In the same vein, (Hussain et al. 2000) concluded that sex of surviving children in Karachi, Pakistan was strongly correlated with subsequent fertility and contraceptive behaviour.

(Zaidi and Morgan 2016) found no significant evidence for large-scale sex-selective abortion in Pakistan and suggested that couples mainly relied on continuing fertility to attain the desired number of sons.

[1]In the words of Purewal (2010): “The Bedis, a Sikh khatri caste who claimed direct des cendancy to Guru Nanak and who were ranked highly among other Sikh khatri families, received girls from other lower- ranking khatri families but refused to marry their daughters to boys from lower-ranked families and hence resorted to female infanticide”

In a recent study, Javed and Mughal (2018b) analysed data from the 1990-91, 2006-07 and 2012-13 rounds of Pakistan Demographic and Health Survey (PDHS) using a set of parametric, semi- and non-parametric estimation techniques, and found strong evidence for differential behaviour at early parities throughout the examined period. Besides, they reported a higher probability of risky births resulting from disproportionate preference for sons.

In another recent study, (Hafeez & Domeque (2018) examined gender-biased breastfeeding patterns in Pakistan and showed that breastfeeding duration increased monotonically with the birth order of the child and at every birth order, boys were breastfed longer than girls. (Saeed 2015) concluded that agricultural or non-agricultural nature of household, family type, urban or rural residence, women's education and inter-cousin marriages were the major factors determining son preference in Pakistan.

Although some of the aforementioned studies discuss fertility outcomes of son preference, there is need for a comprehensive analysis of the son preference phenomenon prevalent in Pakistan and its effect on fertility based on detailed nation-wide data.

3. Data and methodology

3.1 Data description

Data for this study come from two rounds of the nationally representative Pakistan Demographic and Health Survey (PDHS). The survey contains comprehensive data on reproductive behaviour of ever-married Pakistani women aged 15-49. The first round (PDHS 1990-91) is based on interviews with 6,611 women from 7,193 households. A two-stage stratified sample design was adopted with 407 primary sample units (PSU), 225 of which were from urban areas and 182 from rural areas. The latest round (PDHS 2012-13) covers 13,558 women from 12,943 households. This sample contains data from 500 PSU, 248 from urban areas and 252 from rural areas. The survey data is described in the online appendix.

For the purpose of our analysis, we restrict the sample to women who have completed their childbearing and have at least one child. Women with multiple births are excluded from the sample.

Table A2 (given in the online appendix) describes relevant variables in the dataset. In 2012-13, 50% of the women reported their first-born to be a boy. 76% of the women reported having at least one son at parity 2, 89% had at least one son at parity 3 and 95% had at least one son at parity 4. The figures for the 1990-91 dataset are similar: 52% of the women had a first-born son, 77% had at least one son at parity 2, 89% had at least one son at parity 3 and 95% had at least one son at parity 4.

In 2012-13, 13% of the women at parity 3 reported having three sons, 37% having two sons while 37% reported having one son. Corresponding figures in 1990-91 were 15%, 38% and 35% respectively. At parity 4, 7% of the women in 2012-13 report having sons only, 26% having three sons, 38% having two sons and 22% having just one son. Corresponding figures in 1990-91 were 8%, 25%, 40% and 20% respectively.

Majority of the women in the samples possessed no formal education (61% in 2012-13, 77% in 1990-91). In contrast, a lower proportion of husbands (35% in 2012-13, 48% in 1990-91) reported possessing no formal education. Likewise, 7% of the women in 2012-13 reported having acquired tertiary-level education compared with only 1% in 1990-91. In comparison, 15% and 5% of the husbands in 2012-13 and 1990-91 possessed higher education. Average household size during the period was over eight (8.3 in 2012-13, 8.4 in 1990-91). About two-thirds of the households (64% in 2012-13, 64% in 1990-91) lived in rural areas, while over 80% were reported to be nuclear families.

3.2 Methodology

The analysis proceeds as follows:

In the first step, we present measures of revealed and stated son preference. Revealed preference is measured through population sex ratio (i.e. the number of males per 100 females), sex ratio at birth (the number of boys born alive per 100 girls born alive), sex ratio at last birth (SRLB) and parity progression ratio (i.e. the proportion of women at a given parity who proceed to a higher parity).

Stated son preference is measured using two indicators: desired sex ratio (ideal number of sons to ideal number of daughters) and desired son preference (indicates son preference if the ideal number of sons given by the woman exceeds the ideal number of daughters, suggests equal desired preference if the two numbers are equal, and suggests no son preference if the ideal number of daughters exceeds the ideal number of sons).

The stated preference indicators are based on the following survey questions pertaining to desired fertility: “If you could go back to the time you did not have any children and could choose exactly the number of children to have in your whole life, how many would that be?" and " How many of these children would you like to be boys and how many would you like to be girls?"

In the second step, we estimate the impact of son preference on the probability of subsequent birth at parity n. Here, three indicators are used to represent son preference, namely presence of at least one son, proportion of sons in the total number of children at parity n and the number of sons at parity n. The three indicators each pertain to a different aspect of son preference. We restrict our parity-wise analysis to the first four live births. The outcome variable is subsequent birth at the parity n. This binary variable takes the value of 1 if a women has more than n children and 0 otherwise.

Finally, we estimate the impact of having one or more sons on the stated desire to discontinue reproduction. Here, the outcome variable is complete fertility which is based on the response “want no more” to the question: "After the child you are expecting now, would you like to have another child, or would you prefer not to have any more children"?

In both sets of estimations, we control for individual, household and locational factors which influence fertility decisions. The control factors considered include the respondent woman's age, age difference with husband, woman's and husband's education level, woman's employment status, exposure to electronic media, family structure[2], household size, household wealth status[3], and the region and area of residence. The base line model can be given as,

$$Y_{ij} = \alpha + \beta\ (SP)_{ij} + \delta \mathrm{X}_j + \varepsilon_{ij}$$

[2] A household whose head is neither the woman nor her husband is considered an extended household, nuclear otherwise.

[3] The household wealth variable is generated by constructing a principal component analysis index of household assets such as home ownership, floor type, water source, electricity availability, durable consumer goods etc. The quintiles of the generated variable indicate the economic status of the household.

Where Y_{ij}represents fertility choice (subsequent birth at parity i / complete fertility) for woman j, SP stands for son preference at parity i for woman j, X_j represents the set of household characteristics that can affect reproductive behaviour and ε_{ij} is the error term.

3.3 Techniques employed

Our baseline estimations are carried out using Probit model. Additionally, we use three matching techniques, namely Propensity Score Matching (PSM), Inverse Probability Weighting (IPW) and Augmented Inverse Probability Weighting (AIPW) to account for the possibility that households with sons may differ from those without in ways that could be considered non random. These matching estimators are based on the Rubin Causal Model with assumptions of unconfoundedness and overlap (Rosenbaum and Rubin 1983). For this purpose, the sample is divided into two groups: treatment (based on the variable of interest) and control (non-treatment).

The first matching technique PSM matches the treated individuals to the non-treated based on a propensity score for participation given observable characteristics of the individual.

The second technique IPW improves on PSM by according a higher weight to individuals receiving an unlikely treatment. This reweighting helps assign higher weights to individuals lying in the middle of the probability distribution and lower weights to those at the extremes (Wooldridge 2007) .

The last matching technique AIPW combines both the properties of the regression based estimator and the IPW estimator, requiring either the propensity or outcome model (but not necessarily both) to be correctly specified (Cao et al. 2009).

For each of the three matching routines, we obtain average treatment effect (ATE) which provides difference between the expected outcomes with and without treatment. We use appropriate weights to ensure the representativeness of the sample.

After the PSM estimations, balancing of the treatment groups is checked using Kernel density plots. Plots for the first set of estimations (based on the presence or otherwise of at least one son at parity n) are given in the online appendix. The covariates of the two groups are found to be well balanced.

4. Son preference

4.1 Sex ratio

Pakistan's sex ratio for total population is 105 males per 100 females according to the 2017 population census. This figure, though lower than that found in some other countries of South Asia (for example, Bhutan: 116, India: 107, Afghanistan: 106), is largely above the worldwide average of 101 males per 100 females (figure 1). The country's sex ratio has steadily come down over the decades from a high of 116 recorded in 1951 in the country's first census to 105 today (Figure 2).

Please insert Figure 1 & 2 here

If we limit our sample to women of childbearing age with complete fertility[4] , we trace child sex ratios: 114 in 1990-91, 115 in 2012-13 (Table 2). In 2012-13, women with primary or secondary education had a higher sex ratio compared to those without any schooling. Likewise, sex ratios among women without a job and those living in joint families are higher compared to those found among working women or those living in nuclear families. The ratio is the highest among middle-income households (those lying in the third or the fourth quantile of the household wealth distribution). At the regional level, the ratio is more biased in rural areas (118 male births per 100 female births) compared with urban areas (107 in 1990-91, 111 in 2012-13). The most populous province of Punjab has the highest sex ratio of all the country's provinces and territories.

Sex ratio for women respondents with one to four living children shown in Table 2 ranges from 126 to 191 in 1990-91 and from 125 to 174 in 2012-13. These abnormally high sex ratio figures give a strong indication of differential birth stopping[5]. The ratio is the highest among women with two children (191 in 1990-91, 174 in 2012-13) suggesting that women stop child-bearing more often when one or both of their two children are boys compared to the situation where they only have girls. This behaviour does not depend on women's

[4] This corresponds to the subsample of women who gave the answer "want no more children" in response to the question "Do you desire more children?"

[5] An alternative explanation could be under reporting of girls in the survey. See for reference (Sathar et al. 2015).

employment status or whether they live in a nuclear or joint family setup. Women living in urban areas have comparatively lower sex ratios than those living in rural areas. Besides, women with some education often have lower sex ratios compared with women with little or no education.

The figures for the 2012-13 sample are generally lower than those for the 1990-91 sample reflecting a declining preference for sons.

Please insert Table 1, 2 & 3 here

Table 4 shows sex ratios for the subsamples of women who suffered the death of one or more of their children and those who did not. Sex ratios for the former group of women are considerably below those belonging to the latter group. Women with one or more deceased children had an overall sex ratio of 107 boys per 100 girls in 1990-91 and 111 boys per 100 girls in 2012-13. In contrast, women with no child death had a higher sex ratio of 117.

These differences persist regardless of women's level of education, employment status, family type or place of residence and point to low gender preference among women with child loss.

4.2 Sex ratio at birth

Sex ratio at birth (SRB) is another useful indicator of son preference. Pakistan's SRB, at 109 male births per 100 female births, is the second highest in the region after India's 110.9 (Figure 3). This ratio is above the normal biological ratio of 105 male per 100 female births.

According to PDHS data, the country's SRB increased from 105 in 1990-91 to 109 in 2012-13 (Figure 4).

Please insert Figure 3 & 4 here

Please insert Table 3 here

4.3 Sex ratio at last birth

Another way of looking at the prevalence of son preference is the sex ratio at last birth (SRLB). The ratio would be above the normal biological ratio of 105 in societies where son preference reflects in differential birth-stopping.

Overall and group-wise SRLB figures shown in Table 4 highlight this feature of son preference. Overall SRLB increased from 117 in 1990-91 to 133 in 2012-13 suggesting that Pakistani couples are increasingly resorting to differential birth-stopping in the presence of persistent preference for male offspring.

Location-wise differences in this context have evolved over time. In 1990-91, women living in rural areas had a higher SRLB compared with women living in urban areas (124 vs 108). This difference had disappeared by 2012-13 with women in both locations showing a high SRLB of about 133.

The ratios with respect to women's employment status show interesting variation: In 1990-91, women with no employment had a sex ratio at last birth of 118 compared with 114 for working women. This trend reversed in 2012-13 with the latter now showing a higher ratio than the former (141 vs 131).

SRLB with respect to household wealth has also evolved: In 1990-91, households belonging to the middle (third) wealth quintile had the highest ratio at last birth (153) of all the wealth groups. In 2012-13 in contrast, the highest ratio of 150 male births per 100 live female births was found among the wealthier group of households (second quintile).

Please insert Table 4 here

4.4 Parity progression ratio

In societies with higher preference for sons, the decision to continue fertility depends on the sex of children present. Couples having attained the desired number of sons are therefore less likely to proceed to next parity. This effect can be observed in skewed values of parity progress ratio (PPR) shown in Table 5.

While women with or without a son both have similar PPR at parity 1, their ratios are substantially different at higher parities. For example, women at parity 2 with no son had a PPR of 0.97 in 2012-13 compared with a much lower value of 0.9 for women with one or two sons.

Please insert Table 5 here

4.5 Desired sex ratio

The aforementioned indicators measured revealed dimension of son preference. Now we focus on the desire for sons stated by the women. Table 6 presents desire sex ratio (DSR) for women with complete fertility. We can again see strong preference for boys: overall desired sex ratio, which was 113 in 1990-91 is estimated to be 108 in 2012-13. The ratio diverges sharply by education and location of women, and shows divergent trends over time.

In 1990-91, the DSR was highest among women with no education (120) while in 2012-13, it was highest among women with higher education (121).

The ratio for women living in rural areas in 1990-91 was much higher compared with those living in urban areas (130 vs 106). The difference between the two groups of women had diminished by 2012-13 with ratios of 109 and 108 for women living in rural and urban areas respectively.

Previously strong province-wise variations too have decreased. In 1990-91, the values of DSR ranged from a high of 150 in the province of KPK (then called NWFP) to a low of 106 in Sindh. In contrast, the range had narrowed in 2012-13 with a maximum of 121 found in Balochistan and a minimum of 107 in Punjab. Wealth-wise difference in the desired sex ratio and those in terms of women’s employment status have also narrowed over time.

Please insert Table 6 here

4.6 Desired preference

Table 7 shows aggregate and group-wise figures for the desired preference indicator divided into three categories of women: those with equal preference for boys and girls, those with preference for sons, and those with no son preference.

Overall, majority of the women report having equal preference for boys and girls. Two thirds of the women (66%) report having equal preference followed by 31% preferring sons.

Desired son preference is less prevalent among younger women (those between 15 and 24 years old) than older women. Stated son preference also decreases with increasing female education attainment and household wealth. Women with work show lower desired son preference (31%) than those not working (40%).

Table A-2 reported in the online appendix presents desired gender preference by ideal family size. Majority of women who report wanting one or three children indicate preference for sons (60% for the former, 76% for the latter). In contrast, women who report two or four as their ideal number of children mostly report equal preference (92% among the former, 89% among the latter).

Please insert Table 7 here
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5. Son preference and subsequent childbearing

5.1 Actual fertility

Now we focus our attention on the fertility consequences of son preference. Three indicators of son preference are used for this purpose, namely presence of at least one son at parity n, proportion of sons at parity n and the number of sons at parity n.

Tables 8 to 10 report results of estimations for first of these three indicators. Table 8 shows Probit estimates of the effect of having one or more son at a given parity on the probability of proceeding to subsequent birth while tables 9 and 10 show the ATE for the three corresponding sets of matching estimations.

We find no significant effect of the sex of the first child on the probability of the subsequent birth. This finding is in line with the parity progress ratio for women at first parity shown in Table 6 which does not vary regardless of the sex of the first-born.

We find negative and mostly significant impact of having one or more sons on the likelihood of proceeding to next parity. Marginal effects evaluated at means given at the bottom of Table 8 show that women at parities 2, 3 and 4 having at least one son were 5%, 9% and 10% less likely to continue childbearing compared with women with no son (2012-13 sample). Corresponding ATE for these three parities given in Tables 9 and 10 ranged from 5% to 13% (PSM), 5% to 12% (IPW) and 5% to 12% (AIPW).

Findings of the baseline Probit and the three matching estimates are highly similar in significance, direction and magnitude, and give strong evidence in favour of son preference's birth-stopping effect. Results for the 1990-91 dataset are analogous to those of the 2012-13 dataset with the exception that estimates for parity 3 are invariably found to be insignificant.

Overall, our findings corroborate the conclusion of (Ben-Porath and Welch 1976; Knodel and Prachuabmoh 1976) that son preferring couples with one or more sons at a given parity are more likely to have less additional children.

Please insert Table 8- 10 here

Estimates for son ratio, the second indicator of son preference are reported in Table 11. The results are similar to those of the first indicator and point to strengthening of son preference's fertility effect with increasing parity. While no significant effect of son ratio could be observed on the likelihood of proceeding to subsequent birth at parity 1, the effect is significant at higher parities and grows in birth order (2012-13 sample). A 1% increase in son ratio is associated with a 6% lower probability of proceeding to next birth. This likelihood increases to 14% at the third and fourth parities.

Results of estimates of the 1990-91 (columns 1 – 4) are weak[6]. The son ratio – subsequent birth relationship is found to be significant only at parity 2 and 3, both with a marginal effect of 4%.

Please insert Table 11 & 12 here

Next we test the hypothesis that the probability of having an additional child depends upon the number of boys in the first n children. Table 12 reports results for the impact of number of sons at a given parity on the probability of continuing childbearing for the first four parities. These results, while similar to those discussed so far, add another dimension to the son preference – fertility relationship. We find that women with more sons at a given parity are more likely to stop child-bearing compared with women with fewer sons. For example, while the likelihood of subsequent birth for women with one son at parity 4 does not significantly differ from that of women without a son, it does so significantly at the higher parities. Women with two or three sons are 12% less likely to proceed to fifth birth, those whose four children all are boys, are 14% less likely to do so.

5.2 Stated fertility intentions

The estimations reported so far have determined the impact of son preference on actual fertility outcomes. Now we focus on the couple's stated fertility intentions.

Table 13 shows results of Probit estimates for women's intention to discontinue fertility. We find a significant association between the presence of one or more son and intention to stop child-bearing. Women with at least one son are found to be 34% more likely to state no desire to have an additional child compared with women with no son (2012-13).

The corresponding figure for the 1990-91 sample is 29%. These results contrast with those pertaining to husband's stated intention to stop fertility (Table 14) which are not found statistically different from zero. Existance or otherwise of sons does not seem to affect husbands' decision on family size.

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[6] A possible reason for these weak results could be the smaller effective sample size of the 1990-91 dataset.

Please insert Table 13 & 14 here
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6 Discussion and conclusion

In this study, we examined son preference and its fertility effects in Pakistan. We based our analysis on two rounds of Pakistan Demographic and Health Survey (PDHS). We began by presenting different aspects of revealed and stated preference for sons by using a number of indicators. Following this descriptive analysis, we studied the impact of son preference on actual and desired fertility outcomes. We used presence of at least one son at parity n, proportion of sons at parity n and the number of sons at parity n as indicators of son preference and considered first four birth parities. We obtained estimations for the two sets of datasets in order to gauge the temporal dimension of the impact of son preference.

We find strong evidence for both the revealed and stated preference for male offspring. Son preference decreases in couple's level of education. It is more intense among middle-class and rural households. Besides, parity progression slows with number of sons born. We found that the age-old preference for boys still persists in Pakistan even though its strength has somewhat waned over time. At the same time, reliance over differential birth-stopping has increased.

We found that the likelihood of second birth does not appear to vary with the sex of the first-born. In contrast, women with one or more sons are found to be upto 14% less likely to pursue additional fertility compared with women with no son. This probability is greater at higher parities and among women with more sons. These findings corroborate the evidence from Bangladesh and India supporting strong effect of the sex of the previous children on women's subsequent fertility (Chowdhury and Bairagi 1990); (Das 1987). Our findings are also in line with those of Javed and Mughal (2018b) who report strong evidence for differential birth-spacing behaviour occurring in Pakistan as a result of disproportionate preference for male children.

In addition to these actual differential birth-stopping effects, we also found support for stated desire for stopping child-bearing among women with one or more sons.

We can conclude that son preference continues in Pakistan, its strength has somewhat weakened over the past two decades, and it remains a strong predictor of women's fertility behaviour. Pakistan's continuing skewed sex ratio and the country's slow rate of demographic transition can be understood in light of these findings. Policy measures that promote equal treatment of boys and girls can therefore help curb the rapid rate of increase in the country's population.

Conflict of interest:

The authors declare that they have no conflict of interest.

References

Ali, S. M. (1989). Does son preference Matter? *Journal of Biosocial Science*, *21*(4), 399–408.

Basu, D., & De Jong, R. (2010). SON TARGETING FERTILITY BEHAVIOR: SOME CONSEQUENCES AND DETERMINANTS. *Demography*, *47*(2), 521–536. doi:https://doi.org/10.1353/dem.0.0110

Ben-Porath, Y., & Welch, F. (1976). Do Sex Preferences Really Matter? *The Quarterly Journal of Economics*, *90*(2), 285–307. http://www.jstor.org/stable/1884631

Bhatnagar, R. D., Dube, R., & Dube, R. (2005). *Female infanticide in India: a feminist cultural history.* (R. D. Bhatnagar, R. Dube, & R. Dube, Eds.). Albany, USA: State University of New York Press.

Cao, W., Tsiatis, A. A., & Davidian, M. (2009). Improving efficiency and robustness of the doubly robust estimator for a population mean with incomplete data. *Biometrika*, *96*(3), 723–734. doi:10.1093/biomet/asp033

Chowdhury, M. K., & Bairagi, R. (1990). Son Preference and Fertility in Bangladesh. *Population and Development Review*, *16*(4), 749–757. http://www.jstor.org/stable/1972966

Das, N. (1987). Sex Preference and Fertility Behavior: A Study of Recent Indian Data. *Demography*, *24*(4), 517–530. http://www.jstor.org/stable/2061389

Government of Pakistan. (2017). *Census division, Federal Bureau of Statistics*.

Hafeez, N., & Domeque, C. Q. (2018). Son Preference and Gender-Biased Breastfeeding in Pakistan. *Economic Development and Cultural Change*, *66*(2), 179–215. doi:https://doi.org/10.1086/695137

Hussain, R., Fikree, F. F., & Berendes, H. W. (2000). The role of son preference in reproductive behaviour in Pakistan. *Bulletin of the World Health Organization*, *78*(3), 379–388. doi:10.1590/S0042-96862000000300014

Javed, R., & Mughal, M. (2018). *Have a son , gain a voice : Son preference and female participation in household decision making*. *CATT WP No. 5*. http://gtl.univ-pau.fr/travaux/2337F_2017_2018_5docWCATT_Son_preference_and_decisionmaking_RJaved_MMughal.pdf

Javed, R., & Mughal, M. (2018b). *Son Preference, Parity transition and Birth spacing in Pakistan*. *Unpublished Manuscript*

Khan, M. A., & Sirageldin, I. (1977). Son Preference and the Demand for Additional Children in Pakistan. *Demography*, *14*(4), 481–495. doi:10.2307/2060591

Kishore, A., & Spears, D. (2014). Having a Son Promotes Clean Cooking Fuel Use in Urban India: Women's Status and Son Preference. *Economic Development and Cultural Change*, *62*(4), 673–699. doi:10.1086/676330

Knodel, J., & Prachuabmoh, V. (1976). Preferences for Sex of Children in Thailand: A Comparison of Husbands' and Wives' Attitudes. *Studies in Family Planning*, *7*(5), 137–

143. http://www.jstor.org/stable/1964858

Li, L., & Wu, X. (2011). Gender of Children, Bargaining Power, and Intrahousehold Resource Allocation in China. *Journal of Human Resources*, *46*(2), 295–316. doi:10.3368/jhr.46.2.295

Purewal, N. K. (2010). *Son Preference: Sex Selection, Gender and Culture in South Asia*. Berg Publishers. https://books.google.fr/books?id=S3dMJZlVUfMC

Purewal, N. K. (2010). *Son Preference: Sex Selection, Gender and Culture in South Asia*.

Rosenbaum, P. R., & Rubin, D. B. (1983). The central role of the propensity score in observational studies for causal effects. *Biometrika*, *70*(1), 41–55. doi:10.1093/biomet/70.1.41

S. Vishwanath, L. (2004). Female Infanticide: The Colonial Experience. *Economic and Political Weekly*, *39*, 2313–2318.

Saeed, S. (2015). Toward an Explanation of Son Preference in Pakistan. *Social Development Issues*, *37*(2).

Sathar, Z. A., Rashida, G., Hussain, S., & Hassan, A. (2015). *Evidence of Son Preference and Resulting Demographic and Health Outcomes in Pakistan*. Islamabad.

Sen, A. (1990). More Than 100 Million Women Are Missing. *New York Review Of Books*, *37*(20), 61–66. http://ucatlas.ucsc.edu/gender/Sen100M.html

Sen, S. (2002). The Savage Family: Colonialism and Female Infanticide in Nineteenth-Century India. *Journal of Women's History*, *14*, 53–79.

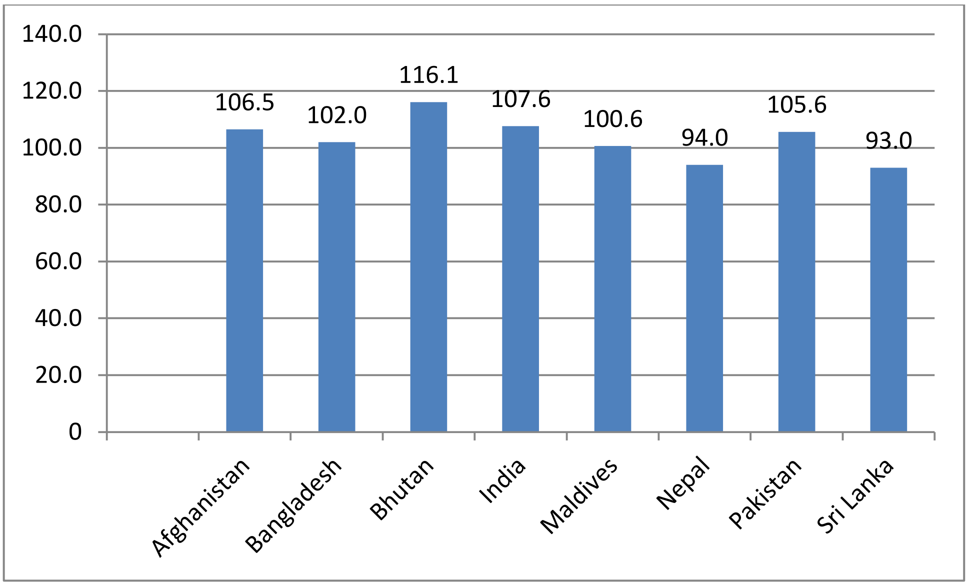
Wooldridge, J. M. (2007). Inverse probability weighted estimation for general missing data problems. *Journal of Econometrics*, *141*(2), 1281–1301. doi:10.1016/j.jeconom.2007.02.002

World Bank. (2011). *World Development Report 2012. Gender equality and women's empowerment. Gender & Development* (Vol. 13). Washington DC 20433. doi:10.1596/978-0-8213-8825-9

Zaidi, B., & Morgan, S. P. (2016). In the Pursuit of Sons: Additional Births or Sex-Selective Abortion in Pakistan? *Population and Development Review*, *42*(4), 693–710. doi:10.1111/padr.12002

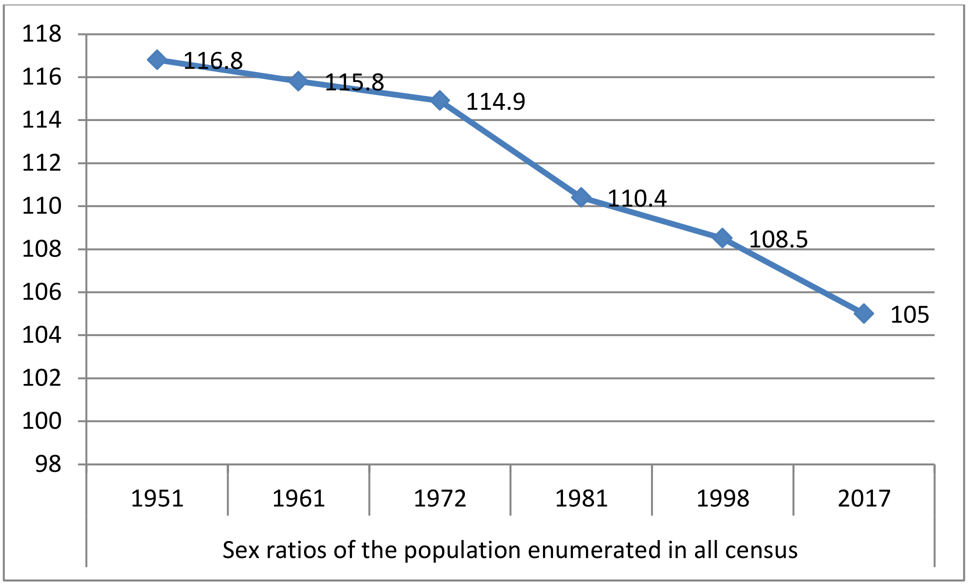
Figures and tables:

Figure 1: Sex ratio of South Asian countries



Source: United Nations, Department of Economic and Social Affairs, Population Division (2017). World Population Prospects: The 2017 Revision, DVD Edition.

Figure 2: Evolution of population sex ratio



Sources: Pakistan Bureau of Statistics. Population Association of Pakistan

Table 1: Child sex ratio

	PDHS 1990-91			PDHS 2012-13		
	Total Sons	**Total Daughters**	**Sex Ratio**	**Total Sons**	**Total Daughters**	**Sex Ratio**
Overall	8027	7065	113.62	17560	15233	115.28
Education						
No Education	6516	5719	113.94	12042	10501	114.67
Primary	676	603	112.11	2494	2091	119.27
Secondary	777	686	113.27	2198	1909	115.14
Higher	-	-	-	835	732	114.07
Spouse Education						
No Education	4127	3724	110.82	7084	6114	115.87
Primary	1304	1078	120.96	2867	2444	117.31
Secondary	2224	1957	113.64	5334	4600	115.96
Higher	335	287	116.72	2262	2056	110.02
Woman employed						
No	6736	5799	116.16	12178	10396	117.14
Yes	1288	1264	101.90	5371	4795	112.01
Family type						
Joint	1047	754	138.86	2735	2246	121.77
Nuclear	6979	6311	110.58	14834	12986	114.23
Place of Residence						
Rural	5113	4339	117.84	12051	10251	117.56
Urban	2913	2726	106.86	5519	4981	110.80
Province/Region						
Punjab	5076	4438	114.38	10414	8720	119.43
Sindh	1771	1584	111.81	3738	3464	107.91
KPK	1092	963	113.40	2607	2328	111.98
Balochistan	86	78	110.26	591	521	113.44
Economic status						
Poorest	1194	1090	109.54	3425	3024	113.26
Poorer	1225	1035	118.36	3684	3117	118.19
Middle	1420	1224	116.01	3894	3316	117.43
Richer	1877	1669	112.46	3404	3009	113.13
Richest	2309	2045	112.91	3161	2765	114.32

Source: Authors' calculations using PDHS 1990-91 and 2012-13. Sample is restricted to women with complete fertility. Sample weights are used. Subgroups with less than 100 observations are omitted.

Table 2: Sex ratio by number of children born

	PDHS 1990-91			PDHS 2012-13		
	Total Children			Total Children		
	2	**3**	**4**	**2**	**3**	**4**
Overall	191.18	144.64	126.26	174.10	149.12	125.44
Education						
No Education	252.83	151.74	132.03	158.74	165.57	130.73
Primary	125.00	137.21	126.67	177.19	166.85	136.08
Secondary	120.69	137.97	112.75	200.00	127.56	117.63
Higher	-	-	-	170.41	126.78	99.16
Spouse Education						
No Education	184.62	171.84	132.51	151.58	142.58	138.28
Primary	-	-	134.21	135.94	179.76	143.29
Secondary	170.27	150.38	118.33	208.62	154.02	120.49
Higher	-	104.69	121.82	177.88	127.48	107.33
Woman employed						
No	202.35	155.08	128.38	168.06	154.36	121.77
Yes	-	-	144.28	193.07	133.80	137.43
Family type						
Joint	-	186.41	144.73	168.28	167.60	114.29
Nuclear	200	131.93	120.47	177.14	143.04	128.72
Place of Residence						
Rural	257.14	157.40	136.09	183.67	156.36	135.29
Urban	145.76	132.57	114.39	162.76	140.68	111.76
Province/Region						
Punjab	253.19	158.41	134.00	179.91	159.29	130.47
Sindh	-	110.23	113.74	160.58	121.74	108.93
KPK	-	147.50	109.72	177.78	148.89	126.23
Balochistan	-	-	-	-	-	-
Economic status						
Poorest	-	147.82	127.43	-	125.45	141.47
Poorer	-	-	120.83	200.00	188.97	148.38
Middle	-	-	165	163.83	148.41	138.82
Richer	-	143.22	104.45	179.21	136.55	120.99
Richest	-	158.58	120.26	177.33	150.40	103.66

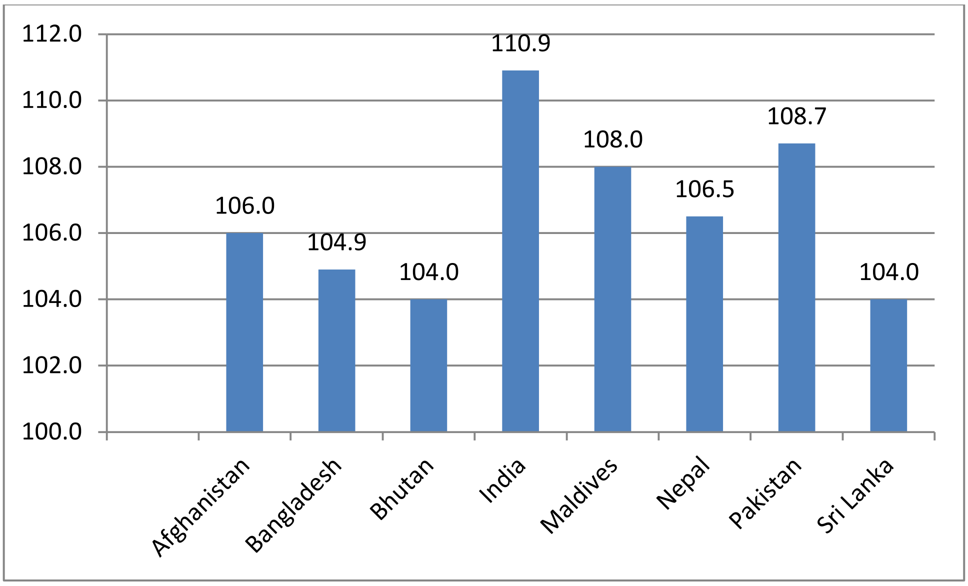
Source: Authors’ calculations using PDHS 1990-91 and 2012-13. Sample is restricted to women with complete fertility. Sample weights are used. Subgroups with less than 100 observations are omitted.

Table 3: Sex ratio by child loss

	PDHS 1990-91		PDHS 2012-13	
	No	**Yes**	**No**	**Yes**
Overall	117.41	106.76	117.02	110.96
Education				
No Education	118.09	107.17	116.32	111.46
Primary	118.70	99.50	120.40	115.18
Secondary	113.26	113.28	118.94	84.98
Higher	102.08	75.00	111.52	210.53
Spouse Education				
No Education	116.18	102.53	117.02	113.79
Primary	121.84	119.45	124.52	101.69
Secondary	118.32	102.73	117.09	111.59
Higher	110.57	190.91	109.85	111.11
Woman employed				
No	119.96	108.97	117.97	114.55
Yes	104.41	98.26	115.46	105.62
Family type				
Joint	144.36	124.88	123.49	114.98
Nuclear	113.77	105.08	115.75	110.47
Place of Residence				
Rural	106.12	108.14	113.51	100.84
Urban	124.66	105.87	118.92	114.43
Province/Region				
Punjab	118.21	107.96	121.44	114.54
Sindh	112.73	109.79	106.42	112.01
KPK	121.49	94.88	116.36	96.06
Balochistan	115.52	90.00	120.50	96.88
Economic status				
Poorest	111.08	106.91	111.71	115.65
Poorer	123.76	108.38	121.73	111.37
Middle	123.52	102.10	120.40	108.40
Richer	115.61	106.86	116.21	104.17
Richest	115.55	108.12	114.27	114.40

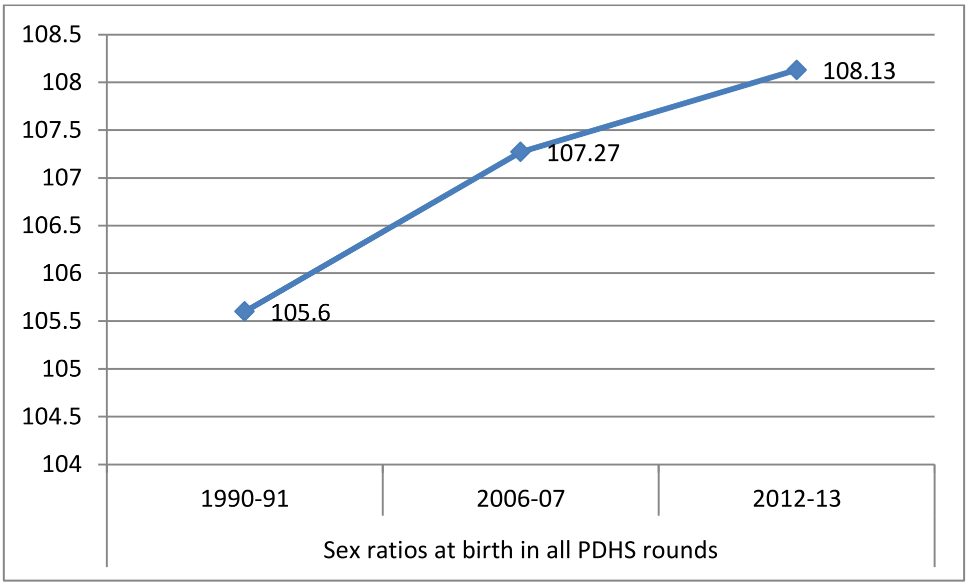
Source: Authors' calculations using PDHS 1990-91 and 2012-13. Sample is restricted to women with complete fertility. Sample weights are used.

Figure 3: Sex ratio at birth - South Asian countries



Source: United Nations, Department of Economic and Social Affairs, Population Division (2017). World Population Prospects: The 2017 Revision, DVD Edition.

Figure 4: Sex ratios at birth - 1990-91 – 2012-13



Sources: Authors' calculations using PDHS 1990-91, 2006-07 and 2012-2013.

Table 4: Sex ratio at last birth

	PDHS 1990-91			PDHS 2012-13		
	Total Sons	**Total Daughters**	**Sex Ratio**	**Total Sons**	**Total Daughters**	**Sex Ratio**
Overall	1399	1191	117.46	3628	2720	133.38
Education						
No Education	1085	906	119.76	2193	1685	130.15
Primary	128	108	118.52	565	405	139.51
Secondary	169	156	108.33	597	421	141.81
Higher	-	-	-	272	209	130.14
Spouse Education						
No Education	650	596	109.06	1293	962	134.41
Primary	228	163	139.88	568	427	133.02
Secondary	444	343	129.45	1173	916	128.06
Higher	69	81	85.19	586	414	141.55
Woman employed						
No	1176	994	118.31	2544	1944	130.86
Yes	223	196	113.78	1081	769	140.57
Family type						
Joint	238	191	124.61	723	481	150.31
Nuclear	1160	999	116.12	2904	2239	129.70
Place of Residence						
Rural	874	707	123.62	2341	1753	133.54
Urban	524	483	108.49	1287	967	133.09
Province/Region						
Punjab	893	749	119.23	2212	1581	139.91
Sindh	290	264	109.85	771	578	133.39
KPK	201	162	124.07	497	438	113.47
Balochistan	-	-	-	100	85	117.65
Economic status						
Poorest	194	195	99.49	609	455	133.85
Poorer	206	161	127.95	660	547	120.66
Middle	277	181	153.04	773	578	133.74
Richer	336	282	119.15	790	526	150.19
Richest	384	370	103.78	795	612	129.90

Source: Authors' calculations using PDHS 1990-91 and 2012-13. Sample is restricted to women with complete fertility. Sample weights are used. Subgroups with less than 100 observations are omitted.

Table 5: Parity progression ratio

Number of children	Number of boys	PDHS 1990-91			PDHS 2012-13		
		Number of families with n children	Number of Families with n+1 Children	Parity Progression ratio (PPR)	Number of families with n children	Number of Families with n+1 Children	Parity Progression ratio (PPR)
1	0	1185	1156	0.98	2916	2869	0.98
	1	1405	1370	0.98	3432	3362	0.98
2	0	526	513	0.98	1283	1241	0.97
	1	1208	1130	0.94	3168	2862	0.90
	2	791	732	0.93	1779	1593	0.90
3	0	231	216	0.94	542	509	0.94
	1	823	747	0.91	2053	1799	0.88
	2	942	796	0.85	2320	1793	0.77
	3	377	334	0.89	777	649	0.84

Source: Authors' calculations using PDHS 1990-91 and 2012-13. Sample is restricted to women with complete fertility.

Table 6: Desired sex ratio

	PDHS 1990-91			PDHS 2012-13		
	Total Sons	**Total Daughters**	**Sex Ratio**	**Total Sons**	**Total Daughters**	**Sex Ratio**
Overall	6356	5614	113.22	43696	40307	108.41
Education						
No Education	3519	2944	119.53	32769	30327	108.05
Primary	1322	1257	105.17	5036	4621	108.98
Secondary	1316	1225	107.43	4839	4489	107.80
Higher	199	187	106.42	1051	869	120.94
Spouse Education						
No Education	1693	1363	124.21	15294	13724	111.44
Primary	1478	1375	107.49	8842	8311	106.39
Secondary	2631	2381	110.50	14480	13620	106.31
Higher	546	490	111.43	4871	4442	109.66
Woman employed						
No	5195	4546	114.28	30719	28291	108.58
Yes	1161	1068	108.71	12639	11678	108.23
Family type						
Joint	1283	1130	113.54	4990	4396	113.51
Nuclear	5073	4484	113.14	38706	35911	107.78
Place of Residence						
Rural	2113	1621	130.35	30949	28489	108.63
Urban	4243	3993	106.26	12747	11818	107.86
Province/Region						
Punjab	3602	3160	113.99	26663	24913	107.02
Sindh	2226	2100	106.00	6236	5556	112.24
KPK	501	333	150.45	9240	8560	107.94
Balochistan	26	21	123.81	1196	991	120.69
Economic status						
Poorest	1069	981	108.97	8164	7283	112.10
Poorer	378	263	143.73	8384	7688	109.05
Middle	883	718	122.98	10875	10210	106.51
Richer	1484	1311	113.20	9128	8494	107.46
Richest	2540	2339	108.59	7144	6631	107.74

Source: Authors' calculations using PDHS 1990-91 and 2012-13. Sample is restricted to women with complete fertility. Sample weights are used.

Table 7: Desired preference (PDHS 2012-13)

	Equal Preference	**Son Preference**	**No Preference**
	%	**%**	**%**
Overall	66.34	31.37	2.29
Education			
No Education	65.02	33.16	1.83
Primary	67.44	30.08	2.48
Secondary	67.66	28.87	3.47
Higher	71.98	24.91	3.11
Spouse Education			
No Education	62.02	36.28	1.70
Primary	67.00	31.81	1.19
Secondary	69.93	26.89	3.17
Higher	67.66	29.54	2.80
Woman employed			
No	56.68	40.18	3.13
Yes	66.77	31.46	1.77
Family type			
Joint	69.09	28.71	2.21
Nuclear	65.68	32.03	2.29
Place of Residence			
Urban	68.45	28.19	3.35
Rural	65.17	33.12	1.71
Region			
Punjab	67.10	30.17	2.73
Sindh	67.49	30.34	2.16
KPK	64.13	34.83	1.04
Balochistan	60.82	38.37	0.80
Economic Status			
Poorest	58.66	40.73	0.61
Poorer	68.85	30.42	0.72
Middle	66.36	30.82	2.82
Richer	66.73	30.78	2.49
Richest	69.55	26.23	4.22
Age			
15-24	73.36	24.90	1.73
25-34	65.58	32.35	2.07
35-49	66.23	31.33	2.45

Source: Authors' calculations using PDHS 2012-13. Sample is restricted to women with complete fertility. Sample weights are used

Table 8: Presence of at least one son and subsequent birth – probit estimation

	PDHS 1990-91				PDHS 2012-13			
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 1**	**Model 2**	**Model 3**	**Model 4**
VARIABLES	**Subsequent birth**	**Subsequent birth**	**Subsequent birth**	**Subsequent birth**	**Subsequent birth**	**Subsequent birth**	**Subsequent birth**	**Subsequent birth**
Parity 1 (ref: no son)								
At least one son	0.175(0.171)				-0.071(0.102)			
Parity 2 (ref: no son)								
At least one son		-0.456***(0.150)				-0.543***(0.109)		
Parity 3 (ref: no son)								
At least one son			-0.236(0.165)				-0.538***(0.124)	
Parity 4 (ref: no son)								
At least one son				-0.857***(0.307)				-0.450**(0.199)
Age	0.042***(0.014)	0.059***(0.010)	0.044***(0.008)	0.072***(0.008)	0.039***(0.009)	0.060***(0.006)	0.047***(0.005)	0.061***(0.005)
Age difference	-0.016*(0.009)	0.003(0.012)	0.017(0.011)	0.004(0.008)	-0.033***(0.008)	0.019***(0.007)	0.004(0.006)	0.010*(0.005)
Woman education (ref: none)								
Primary	0.631*(0.341)	0.083(0.211)	-0.012(0.162)	0.338*(0.186)	0.132(0.169)	-0.021(0.113)	-0.078(0.088)	-0.330***(0.086)
Secondary	-0.369*(0.203)	-0.209(0.170)	-0.167(0.144)	-0.512***(0.157)	-0.184(0.157)	-0.214*(0.112)	-0.324***(0.089)	-0.427***(0.097)
Higher	-0.897**(0.429)	-0.894**(0.360)	-0.740**(0.327)	-1.108***(0.429)	-0.390*(0.205)	-0.666***(0.139)	-0.733***(0.118)	-0.913***(0.139)
Spouse education (ref: none)								
Primary	0.454(0.354)	-0.076(0.187)	0.153(0.156)	0.119(0.147)	0.136(0.170)	0.038(0.115)	-0.200**(0.098)	-0.059(0.092)
Secondary	-0.072(0.177)	0.034(0.139)	-0.155(0.130)	-0.094(0.125)	0.194(0.153)	0.178*(0.103)	-0.110(0.085)	-0.075(0.082)
Higher	0.261(0.322)	-0.061(0.257)	-0.592***(0.223)	-0.256(0.210)	0.289(0.189)	0.077(0.125)	-0.008(0.102)	-0.021(0.101)
Woman employed (ref: none)								
Yes	0.150(0.251)	0.040(0.162)	0.172(0.128)	0.141(0.138)	0.221(0.145)	-0.163*(0.088)	0.055(0.077)	0.091(0.073)
Media exposure (ref: none)								
Yes	-0.129(0.168)	0.067(0.137)	-0.168(0.119)	-0.105(0.111)	0.028(0.127)	0.053(0.091)	0.161**(0.080)	-0.221***(0.072)
Family structure (ref: joint)								
Nuclear family	1.382***(0.173)	0.876***(0.137)	0.924***(0.152)	1.237***(0.166)	1.009***(0.118)	0.822***(0.112)	0.778***(0.103)	0.711***(0.099)
Household size	0.174***(0.035)	0.087***(0.024)	0.142***(0.027)	0.166***(0.026)	0.110***(0.022)	0.125***(0.022)	0.114***(0.015)	0.105***(0.014)
Place of residence (ref: rural)								
Urban	0.284**(0.142)	-0.262*(0.138)	0.078(0.117)	-0.024(0.108)	-0.239*(0.141)	0.158*(0.096)	-0.017(0.077)	0.082(0.079)
Province/ Region (ref: Balochistan)								
Punjab	1.032**(0.417)	0.118(0.371)	-0.065(0.268)	0.343(0.282)	0.813***(0.162)	0.109(0.152)	0.218*(0.122)	-0.099(0.124)
Sindh	1.246***(0.426)	0.115(0.371)	0.014(0.273)	0.417(0.288)	0.491***(0.177)	-0.063(0.153)	0.229*(0.125)	-0.073(0.126)
KPK region	0.491(0.413)	-0.316(0.367)	-0.085(0.274)	0.420(0.289)	0.665***(0.169)	0.079(0.149)	0.298**(0.128)	-0.248*(0.128)
Islamabad					0.562***(0.215)	0.224(0.173)	0.033(0.142)	-0.246*(0.146)
Gilgit-Baltistan					0.477**(0.216)	0.022(0.183)	0.288**(0.145)	0.051(0.147)
Economic status (ref: poorest)								
Poorer	0.067(0.338)	-0.091(0.226)	0.088(0.208)	0.336*(0.176)	-0.442**(0.214)	-0.249*(0.137)	-0.276**(0.125)	0.022(0.102)
Middle	0.529(0.340)	-0.259(0.207)	0.265(0.191)	0.081(0.174)	-0.241(0.219)	-0.099(0.154)	-0.372***(0.122)	-0.065(0.112)
Rich	0.202(0.276)	-0.119(0.185)	-0.303*(0.164)	0.082(0.160)	-0.445*(0.257)	-0.612***(0.154)	-0.373***(0.136)	-0.274**(0.125)
Richest	0.145(0.286)	-0.154(0.180)	-0.057(0.167)	0.389**(0.154)	-0.192(0.289)	-0.785***(0.189)	-0.655***(0.153)	-0.424***(0.151)
Marginal effect	0.007(0.007)	-0.035***(0.009)	-0.034(0.021)	-0.115***(0.026)	-0.002(0.003)	-0.054***(0.008)	-0.092***(0.016)	-0.105**(0.039)
Constant	-2.813***(0.673)	-1.153**(0.550)	-1.891***(0.530)	-3.626***(0.592)	-0.932**(0.446)	-1.604***(0.405)	-1.562***(0.317)	-2.170***(0.359)
Observations	2,540	2,476	2,316	2,038	6,328	6,178	5,650	4,675

Source: Authors' calculations using PDHS 1990-91 and PDHS 2012-13. Sample is restricted to women with complete fertility. Adequate weights are employed. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 9: Presence of at least one son and subsequent birth - Propensity score matching

	PDHS 1990-91				PDHS 2012-13			
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 1**	**Model 2**	**Model 3**	**Model 4**
Propensity score match	**Subsequent birth**	**Subsequent birth**	**Subsequent birth**	**Subsequent birth**	**Subsequent birth**	**Subsequent birth**	**Subsequent birth**	**Subsequent birth**
ATE	0.102	-0.033***	-0.022	-0.102*	-0.003	-0.048***	-0.102***	-0.133**
	(0.008)	(0.012)	(0.025)	(0.032)	(0.004)	(0.008)	(0.015)	(0.028)
Observations	2,540	2,476	2,316	2,038	6,328	6,178	5,650	4,675

Source: Authors' calculations using PDHS 1990-91 and PDHS 2012-13. Sample is restricted to women with complete fertility.
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 10: Presence of at least one son and subsequent birth – IPW and AIPW estimates

	PDHS 1990-91								PDHS 2012-13							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
Inverse-Probability weights	**Subsequent birth**	**POmean**	**Subsequent birth**	**POmean**	**Subsequent birth**	**POmean**	**Subsequent birth**	**POmean**	**Subsequent birth**	**POmean**	**Subsequent birth**	**POmean**	**Subsequent birth**	**POmean**	**Subsequent birth**	**POmean**
ATE	0.000	0.974***	-0.038***	0.965***	-0.031	0.908***	-0.098***	0.927***	-0.004	0.978***	-0.049***	0.954***	-0.095***	0.914***	-0.123***	0.863***
	(0.006)	(0.004)	(0.010)	(0.008)	(0.020)	(0.019)	(0.025)	(0.024)	(0.003)	(0.002)	(0.007)	(0.006)	(0.013)	(0.012)	(0.024)	(0.024)
Observation	2,540	2,540	2,476	2,476	2,316	2,316	2,038	2,038	6,328	6,328	6,178	6,178	5,650	5,650	4,675	4,675
Augmented IPW																
ATE	0.000	0.974***	-0.038***	0.965***	-0.031	0.908***	-0.098***	0.927***	-0.004	0.978***	-0.049***	0.954***	-0.095***	0.914***	-0.123***	0.863***
	(0.006)	(0.004)	(0.010)	(0.008)	(0.020)	(0.019)	(0.025)	(0.024)	(0.003)	(0.002)	(0.007)	(0.006)	(0.013)	(0.012)	(0.024)	(0.024)
Observation	2,540	2,540	2,476	2,476	2,316	2,316	2,038	2,038	6,328	6,328	6,178	6,178	5,650	5,650	4,675	4,675

Source: Authors' calculations using PDHS 1990-91 and PDHS 2012-13. Sample is restricted to women with complete fertility.
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 11: Son ratio and subsequent birth – probit estimation

	PDHS 1990-91				PDHS 2012-13			
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 1**	**Model 2**	**Model 3**	**Model 4**
VARIABLES	**Subsequent birth**	**Subsequent birth**	**Subsequent birth**	**Subsequent birth**	**Subsequent birth**	**Subsequent birth**	**Subsequent birth**	**Subsequent birth**
Parity 1								
Son ratio	0.175(0.171)				-0.071(0.102)			
Parity 2								
Son ratio		-0.462***(0.156)				-0.483***(0.099)		
Parity 3								
Son ratio			-0.278*(0.168)				-0.678***(0.103)	
Parity 4								
Son ratio				-0.180(0.185)				-0.547***(0.124)
Age	0.042***(0.014)	0.059***(0.010)	0.044***(0.008)	0.073***(0.008)	0.039***(0.009)	0.061***(0.006)	0.047***(0.005)	0.061***(0.005)
Age difference	-0.016*(0.009)	0.003(0.012)	0.017(0.011)	0.005(0.008)	-0.033***(0.008)	0.019***(0.007)	0.003(0.006)	0.009*(0.005)
Woman education (ref: none)								
Primary	0.631*(0.341)	0.072(0.206)	-0.018(0.161)	0.330*(0.184)	0.132(0.169)	-0.016(0.113)	-0.078(0.089)	-0.338***(0.087)
Secondary	-0.369*(0.203)	-0.228(0.168)	-0.167(0.143)	-0.518***(0.157)	-0.184(0.157)	-0.222**(0.112)	-0.338***(0.090)	-0.436***(0.097)
Higher	-0.897**(0.429)	-0.910**(0.357)	-0.741**(0.326)	-1.136***(0.428)	-0.390*(0.205)	-0.679***(0.140)	-0.746***(0.118)	-0.929***(0.140)
Spouse education (ref: none)								
Primary	0.454(0.354)	-0.068(0.183)	0.145(0.157)	0.124(0.149)	0.136(0.170)	0.040(0.115)	-0.198**(0.098)	-0.064(0.092)
Secondary	-0.072(0.177)	0.034(0.139)	-0.167(0.129)	-0.094(0.124)	0.194(0.153)	0.181*(0.104)	-0.121(0.086)	-0.082(0.082)
Higher	0.261(0.322)	-0.068(0.249)	-0.598***(0.225)	-0.242(0.208)	0.289(0.189)	0.090(0.127)	-0.028(0.103)	-0.039(0.101)
Woman employed (ref: none)								
Yes	0.150(0.251)	0.018(0.160)	0.155(0.128)	0.132(0.137)	0.221(0.145)	-0.156*(0.089)	0.046(0.078)	0.083(0.073)
Media exposure (ref: none)								
Yes	-0.129(0.168)	0.073(0.136)	-0.167(0.119)	-0.106(0.111)	0.028(0.127)	0.055(0.091)	0.169**(0.081)	-0.216***(0.072)
Family structure (ref: joint)								
Nuclear family	1.382***(0.173)	0.876***(0.139)	0.906***(0.154)	1.226***(0.166)	1.009***(0.118)	0.823***(0.111)	0.782***(0.103)	0.713***(0.099)
Household size	0.174***(0.035)	0.086***(0.024)	0.143***(0.027)	0.166***(0.026)	0.110***(0.022)	0.125***(0.022)	0.115***(0.015)	0.105***(0.014)
Place of residence (ref: rural)								
Urban	0.284**(0.142)	-0.264*(0.139)	0.072(0.117)	-0.022(0.109)	-0.239*(0.141)	0.151(0.095)	-0.027(0.078)	0.072(0.080)
Province/ Region (ref: Balochistan)								
Punjab	1.032**(0.417)	0.132(0.379)	-0.072(0.268)	0.367(0.284)	0.813***(0.162)	0.093(0.152)	0.205*(0.124)	-0.108(0.124)
Sindh	1.246***(0.426)	0.106(0.380)	0.007(0.274)	0.453(0.289)	0.491***(0.177)	-0.082(0.152)	0.205(0.126)	-0.090(0.127)
KPK region	0.491(0.413)	-0.318(0.376)	-0.099(0.275)	0.437(0.291)	0.665***(0.169)	0.060(0.148)	0.281**(0.128)	-0.266**(0.128)
Islamabad					0.562***(0.215)	0.216(0.172)	0.024(0.143)	-0.264*(0.146)
Gilgit-Baltistan					0.477**(0.216)	-0.007(0.183)	0.272*(0.145)	0.038(0.147)
Economic status (ref: poorest)								
Poorer	0.067(0.338)	-0.091(0.225)	0.086(0.206)	0.326*(0.176)	-0.442**(0.214)	-0.252*(0.138)	-0.276**(0.126)	0.013(0.102)
Middle	0.529(0.340)	-0.270(0.205)	0.264(0.193)	0.096(0.173)	-0.241(0.219)	-0.118(0.155)	-0.380***(0.123)	-0.065(0.111)
Rich	0.202(0.276)	-0.146(0.183)	-0.300*(0.164)	0.081(0.160)	-0.445*(0.257)	-0.624***(0.155)	-0.394***(0.138)	-0.286**(0.124)
Richest	0.145(0.286)	-0.169(0.178)	-0.053(0.166)	0.385**(0.153)	-0.192(0.289)	-0.790***(0.191)	-0.653***(0.154)	-0.428***(0.151)
Marginal effect	0.007(0.007)	-0.043***(0.015)	-0.044*(0.268)	-0.033(0.034)	-0.002(0.003)	-0.059***(0.012)	-0.139***(0.021)	-0.143***(0.032)
Constant	-2.813***(0.673)	-1.238**(0.553)	-1.924***(0.509)	-4.394***(0.546)	-0.932**(0.446)	-1.793***(0.394)	-1.670***(0.302)	-2.273***(0.290)
Observations	2,540	2,476	2,316	2,038	6,328	6,178	5,650	4,675

Source: Authors' calculations using PDHS 1990-91 and PDHS 2012-13. Sample is restricted to women with complete fertility. Adequate weights are employed. Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 12: Number of sons and subsequent birth – probit estimation

	PDHS 1990-91				PDHS 2012-13			
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 1**	**Model 2**	**Model 3**	**Model 4**
VARIABLES	**Subsequent birth**	**Subsequent birth**	**Subsequent birth**	**Subsequent birth**	**Subsequent birth**	**Subsequent birth**	**Subsequent birth**	**Subsequent birth**
Parity 1 (ref: 0)								
1	0.175(0.171)				-0.071(0.102)			
Parity 2 (ref: 0)								
1		-0.401**(0.157)				-0.510***(0.112)		
2		-0.541***(0.169)				-0.601***(0.120)		
Parity 3 (ref: 0)								
1			-0.123(0.182)				-0.272**(0.131)	
2			-0.329*(0.169)				-0.742***(0.129)	
3			-0.226(0.204)				-0.535***(0.146)	
Parity 4 (ref: 0)								
1				-0.859***(0.322)				-0.213(0.207)
2				-0.854***(0.311)				-0.500**(0.203)
3				-0.900***(0.318)				-0.525**(0.206)
4				-0.715**(0.348)				-0.592***(0.227)
Age	0.042***(0.014)	0.059***(0.010)	0.043***(0.008)	0.072***(0.008)	0.039***(0.009)	0.061***(0.006)	0.047***(0.005)	0.061***(0.005)
Age difference	-0.016*(0.009)	0.003(0.012)	0.017(0.011)	0.004(0.008)	-0.033***(0.008)	0.019***(0.007)	0.003(0.006)	0.008(0.005)
Woman education (ref: none)								
Primary	0.631*(0.341)	0.073(0.208)	-0.000(0.162)	0.345*(0.186)	0.132(0.169)	-0.019(0.113)	-0.066(0.090)	-0.340***(0.087)
Secondary	-0.369*(0.203)	-0.220(0.167)	-0.166(0.143)	-0.514***(0.158)	-0.184(0.157)	-0.217*(0.112)	-0.352***(0.090)	-0.448***(0.097)
Higher	-0.897**(0.429)	-0.907**(0.357)	-0.756**(0.326)	-1.095**(0.432)	-0.390*(0.205)	-0.671***(0.139)	-0.756***(0.119)	-0.939***(0.141)
Spouse education (ref: none)								
Primary	0.454(0.354)	-0.069(0.184)	0.138(0.156)	0.115(0.148)	0.136(0.170)	0.037(0.115)	-0.205**(0.098)	-0.061(0.092)
Secondary	-0.072(0.177)	0.034(0.139)	-0.167(0.129)	-0.099(0.125)	0.194(0.153)	0.180*(0.103)	-0.121(0.085)	-0.074(0.082)
Higher	0.261(0.322)	-0.064(0.253)	-0.589***(0.226)	-0.270(0.211)	0.289(0.189)	0.079(0.125)	-0.039(0.104)	-0.030(0.101)
Woman employed (ref: none)								
Yes	0.150(0.251)	0.023(0.160)	0.151(0.128)	0.138(0.138)	0.221(0.145)	-0.161*(0.088)	0.044(0.078)	0.087(0.073)
Media exposure (ref: none)								
Yes	-0.129(0.168)	0.070(0.137)	-0.162(0.119)	-0.099(0.112)	0.028(0.127)	0.054(0.091)	0.181**(0.081)	-0.216***(0.073)
Family structure (ref: joint)								
Nuclear family	1.382***(0.173)	0.873***(0.139)	0.911***(0.154)	1.244***(0.168)	1.009***(0.118)	0.821***(0.112)	0.776***(0.102)	0.714***(0.099)
Household size	0.174***(0.035)	0.086***(0.024)	0.142***(0.027)	0.166***(0.026)	0.110***(0.022)	0.125***(0.022)	0.115***(0.015)	0.105***(0.014)
Place of residence (ref: rural)								
Urban	0.284**(0.142)	-0.268*(0.138)	0.072(0.118)	-0.024(0.109)	-0.239*(0.141)	0.156(0.096)	-0.015(0.078)	0.075(0.080)
Province/ Region (ref: Balochistan)								
Punjab	1.032**(0.417)	0.124(0.376)	-0.083(0.264)	0.345(0.283)	0.813***(0.162)	0.100(0.151)	0.242**(0.123)	-0.101(0.124)
Sindh	1.246***(0.426)	0.105(0.377)	-0.000(0.270)	0.420(0.288)	0.491***(0.177)	-0.074(0.152)	0.232*(0.126)	-0.082(0.126)
KPK region	0.491(0.413)	-0.326(0.373)	-0.116(0.271)	0.416(0.290)	0.665***(0.169)	0.069(0.149)	0.306**(0.130)	-0.261**(0.128)
Islamabad					0.562***(0.215)	0.215(0.172)	0.045(0.143)	-0.266*(0.146)
Gilgit-Baltistan					0.477**(0.216)	0.010(0.183)	0.308**(0.144)	0.052(0.147)
Economic status (ref: poorest)								
Poorer	0.067(0.338)	-0.092(0.225)	0.087(0.207)	0.336*(0.176)	-0.442**(0.214)	-0.245*(0.138)	-0.275**(0.125)	0.025(0.102)
Middle	0.529(0.340)	-0.265(0.206)	0.267(0.192)	0.081(0.173)	-0.241(0.219)	-0.101(0.154)	-0.376***(0.122)	-0.059(0.112)
Rich	0.202(0.276)	-0.132(0.183)	-0.290*(0.164)	0.083(0.159)	-0.445*(0.257)	-0.615***(0.155)	-0.396***(0.137)	-0.275**(0.125)
Richest	0.145(0.286)	-0.164(0.178)	-0.050(0.166)	0.388**(0.153)	-0.192(0.289)	-0.783***(0.190)	-0.653***(0.154)	-0.427***(0.151)
Marginal effect: 1	0.007(0.007)	-0.029**(0.010)	-0.016(0.024)	-0.115***(0.032)	-0.002(0.003)	-0.050***(0.009)	-0.040**(0.017)	-0.045(0.041)
2		-0.044***(0.013)	-0.050*(0.023)	-0.114***(0.028)		-0.062***(0.011)	-0.138***(0.018)	-0.118**(0.041)
3			-0.032(0.029)	-0.123***(0.031)			-0.090***(0.023)	-0.125**(0.042)
4				-0.089**(0.038)				-0.144***(0.050)
Constant	-2.813***(0.673)	-1.124**(0.553)	-1.824***(0.524)	-3.622***(0.595)	-0.932**(0.446)	-1.600***(0.405)	-1.564***(0.319)	-2.140***(0.361)
Observations	2,540	2,476	2,316	2,038	6,328	6,178	5,650	4,675

Source: Authors' calculations using PDHS 1990-91 and PDHS 2012-13. Sample is restricted to women with complete fertility. Adequate weights are employed. Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 13: Presence of at least one son and stated completed fertility -probit estimation

VARIABLES	PDHS 1990-91	PDHS 2012-13
Sons (ref: none)		
At least one son	1.104***(0.078)	1.272***(0.060)
Age	0.073***(0.004)	0.089***(0.003)
Age difference	0.014***(0.004)	0.023***(0.004)
Woman education (ref: none)		
Primary	0.103(0.089)	0.033(0.059)
Secondary	0.143(0.087)	0.062(0.060)
Higher	0.099(0.216)	-0.086(0.083)
Spouse education (ref: none)		
Primary	-0.048(0.069)	-0.057(0.058)
Secondary	0.086(0.068)	-0.091(0.057)
Higher	-0.017(0.121)	-0.176**(0.068)
Woman employed (ref: none)		
Yes	0.022(0.068)	0.147***(0.048)
Media exposure (ref: none)		
Yes	0.130**(0.058)	0.025(0.047)
Family structure (ref: joint)		
Nuclear family	0.470***(0.076)	0.534***(0.051)
Household size	0.052***(0.007)	0.037***(0.005)
Place of residence (ref: rural)		
Urban	0.399***(0.055)	0.038(0.050)
Province/ Region (ref: Balochistan)		
Punjab	1.315***(0.112)	0.550***(0.068)
Sindh	0.955***(0.113)	0.306***(0.066)
KPK region	1.315***(0.116)	0.728***(0.070)
Islamabad		0.630***(0.088)
Gilgit-Baltistan		0.619***(0.082)
Economic status (ref: poorest)		
Poorer	-0.151(0.097)	0.166**(0.069)
Middle	-0.022(0.097)	0.333***(0.074)
Rich	-0.010(0.089)	0.291***(0.082)
Richest	0.008(0.084)	0.338***(0.098)
Marginal effect	0.288***(0.017)	0.338***(0.014)
Constant	-5.649***(0.198)	-5.295***(0.149)
Observations	6,106	12,445

Source: Authors' calculations using PDHS 1990-91 and PDHS 2012-13.
Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 14: Presence of at least one son and completed fertility (husband's statement) - probit estimation

VARIABLES	PDHS 1990-91	PDHS 2012-13
Sons (ref: none)		
At least one son	-0.048(0.133)	0.087(0.096)
Husband Age	0.049***(0.005)	0.102***(0.005)
Age difference	-0.013(0.010)	0.004(0.007)
Husband education (ref: none)		
Primary	0.145(0.160)	0.051(0.111)
Secondary	0.018(0.145)	0.078(0.106)
Higher	0.030(0.203)	-0.045(0.182)
Woman education (ref: none)		
Primary	-0.022(0.151)	-0.146(0.113)
Secondary	-0.031(0.142)	-0.114(0.137)
Higher	-0.096(0.265)	0.077(0.162)
Woman employed (ref: none)		
Yes	-0.149(0.167)	-0.175*(0.090)
Family structure (ref: joint)		
Nuclear family	0.018(0.126)	-0.141(0.098)
Household size	-0.037**(0.017)	-0.009(0.010)
Place of residence (ref: rural)		
Urban	0.586***(0.141)	-0.061(0.094)
Economic status (ref: poorest)		
Poorer	0.162(0.464)	-0.217(0.145)
Middle	0.777**(0.381)	-0.339**(0.146)
Rich	0.710**(0.343)	-0.425***(0.153)
Richest	0.593*(0.340)	-0.385**(0.181)
Marginal effect	-0.015(0.042)	0.025(0.027)
Constant	-3.051***(0.448)	-3.455***(0.277)
Observations	1,268	2,910

Source: Authors' calculations using PDHS 1990-91 and PDHS 2012-13.
Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Online Appendix

Table A1: Summary of the two datasets

	1990-91	2012-13
Household sample size	7,193	12,943
Number of women (ever married, age 15 to 49)	6,611	13,558
Women with complete fertility	2,732	6,849
Number of men	1,354	3,134
Number of births	27,369	50,238
Total fertility rate	5.4	3.8
Sex ratio at birth	105.60	108.13

Source: Authors' calculations using PDHS 1990-91 and PDHS 2012-13.

Table A2: Data description

Variables	Description	Proportion/Mean PDHS 1990-91	Proportion/Mean PDHS 2012-13
Birth			
1	Dummy variable, takes the value of 1 if the woman has more than one children, 0 otherwise	0.96	0.96
		0.03	0.03
2	Dummy variable, takes the value of 1 if the woman has more than two children, 0 otherwise	0.90	0.88
		0.09	0.11
3	Dummy variable, takes the value of 1 if the woman has more than 3 children, 0 otherwise	0.79	0.73
		0.20	0.26
4	Dummy variable, takes the value of 1 if the woman has more than four children, 0 otherwise	0.66	0.54
		0.33	0.45
Son Preference			
1	Dummy variable, takes the value of 1 if female have at least 1 son at parity 1, 0 otherwise	0.52	0.50
		0.47	0.49
2	Dummy variable, takes the value of 1 if female have at least 1 son at parity 2, 0 otherwise	0.77	0.76
		0.22	0.23
3	Dummy variable, takes the value of 1 if female have at least 1 son at parity 3, 0 otherwise	0.89	0.89
		0.10	0.10
4	Dummy variable, takes the value of 1 if female have at least 1 son at parity 4, 0 otherwise	0.95	0.95
		0.04	0.04
Son Ratio			
1	Proportion of sons in total number of children at parity 1	0.52	0.50
2	Proportion of sons in total number of children at parity 2	0.53	0.51
3	Proportion of sons in total number of children at parity 3	0.53	0.51
4	Proportion of sons in total number of children at parity 4	0.53	0.52
Number of sons			
1	Dummy variable, takes the value of 1 if the woman has a son at parity 1, 0 otherwise	0.52	0.50
		0.47	0.49
2	Categorical variable, takes the value of 0 if the woman has no son at parity 2, 1 if 1 son, 2 if 2 sons	0.22	0.23
		0.48	0.50
		0.29	0.26
3	Categorical variable, takes the value of 0 if the woman has no son at parity 3, 1 if 1 son, 2 if 2 sons, 3 if 3 sons	0.10	0.10
		0.35	0.37
		0.38	0.37
		0.15	0.13
4	Categorical variable, takes the value of 0 if the woman has no son at parity 4, 1 if 1 son, 2 if 2 sons, 3 if 3 sons, 4 if 4 sons	0.04	0.04
		0.20	0.22
		0.40	0.38
		0.25	0.26
		0.08	0.07

Age	Woman's age in completed years	35.92	36.77
Age difference	Age difference between husband and wife in years	7.07	5.71
Education	Categorical variable, takes the value of 0 if the woman has no education, 1 if the woman possesses primary education, 2 if the woman possesses secondary education, 3 if the woman possesses higher education	0.77 0.09 0.12 0.01	0.61 0.15 0.16 0.07
Spouse education	Categorical variable, takes the value of 0 if the husband possesses no education, 1 if the husband possesses primary education, 2 if the husband possesses secondary education, 3 if the husband possesses higher education	0.48 0.15 0.30 0.05	0.35 0.15 0.32 0.15
Women employed	Dummy variable, takes the value of 1 if the woman is employed, 0 otherwise	0.16 0.83	0.29 0.70
Media exposure	Dummy variable. PDHS 1990-91: takes the value of 1 if the woman listens radio or watches television once a week, 0 otherwise; PDHS 2012-13: takes the value of 1 if the woman watches television occasionally, weekly or daily, 0 otherwise	0.45 0.54	0.68 0.31
Family structure	Dummy variable, takes the value of 1 if the family is nuclear, 0 otherwise	0.83 0.16	0.80 0.19
Household size	Total number of family members in the household	8.40	8.33
Place of residence	Dummy variable, takes the value of 1 if the household resides in urban area, 0 otherwise	0.38 0.61	0.35 0.64
Region	Categorical variable (PDHS 1990-91: takes the value of 1 if the household lives in Balochistan, 2 if the household lives in Punjab, 3 if the household lives in Sindh, 4 if the household lives in KPK; PDHS 2012-13: takes the value of 1 if the household lives in Balochistan, 2 if the household lives in Punjab, 3 if the household lives in Sindh, 4 if the household lives in KPK, 5 if the household lives in Islamabad, 6 if the household lives in Gilgit-Baltistan	0.01 0.63 0.21 0.14	0.03 0.59 0.21 0.15 0.005 0.007
Wealth Status	Categorical variable, takes the value of 1-5 for households belonging to poorest, poorer, middle, rich and richest household wealth groups.	0.14 0.14 0.17 0.24 0.29	0.16 0.19 0.21 0.20 0.22

Source: Authors' calculations using PDHS 1990-91 and PDHS 2012-13. Sample is restricted to women with complete fertility. Sample weights are used.

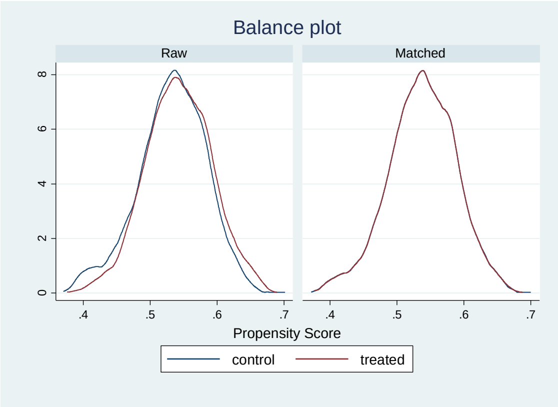
Table A3: Desired preference by ideal family size

Ideal Number of children	1			2			3			4		
Gender Preference	Equal Preference	Son Preference	No Preference	Equal Preference	Son Preference	No Preference	Equal Preference	Son Preference	No Preference	Equal Preference	Son Preference	No Preference
	%	%	%	%	%	%	%	%	%	%	%	%
Overall	23.14	60.22	16.63	91.59	8.25	0.16	18.05	76.36	5.59	88.83	10.38	0.78
Education												
No Education	24.60	40.80	34.59	91.71	8.29	0.00	18.52	76.28	5.19	88.97	10.80	0.23
Primary	3.66	96.33	0.00	85.23	14.77	0.00	15.73	80.28	3.99	89.38	10.00	0.62
Secondary	12.55	73.24	14.21	95.11	4.89	0.00	14.31	79.41	6.27	88.79	7.98	3.24
Higher	57.43	42.56	0.00	91.69	7.51	0.80	28.59	62.58	8.83	86.25	13.70	0.05
Spouse Education												
No Education	16.86	65.33	17.81	92.90	7.10	0.00	14.45	78.24	7.31	86.91	12.98	0.12
Primary	2	97.99	0.00	85.80	14.20	0.00	13.44	84.32	2.25	90.70	8.45	0.85
Secondary	22.22	67.20	10.58	92.56	7.43	0.01	17.88	76.77	5.35	89.99	8.32	1.69
Higher	39.13	31.00	29.86	92.27	7.13	0.60	26.03	67.73	6.24	88.17	11.83	0.00
Place of Residence												
Urban	24.80	58.16	17.04	93.38	6.31	0.31	18.04	75.19	6.77	89.52	8.84	1.63
Rural	19.78	64.00	16.22	89.66	10.34	0.00	18.05	77.19	4.77	88.42	11.28	0.29
Region												
Punjab	20.78	56.27	22.94	89.67	10.33	0.00	15.72	78.04	6.24	90.62	8.34	1.04
Sindh	20.02	71.07	8.91	95.91	3.42	0.67	19.96	75.34	4.70	89.71	9.75	0.54
KPK	32.19	67.80	0.00	92.53	7.47	0.00	26.93	69.68	3.39	81.10	18.82	0.08
Balochistan	-	-	-	92.59	6.79	0.62	10.10	82.25	7.65	82.39	17.52	0.09
Economic Status												
Poorest	0	0.00	100.00	94.05	5.95	0.00	8.52	89.80	1.68	81.87	18.13	0.00
Poorer	7.83	92.16	0.00	86.89	13.11	0.00	19.00	78.99	2.01	91.95	8.05	0.00
Middle	27.28	24.82	47.90	90.11	9.89	0.00	19.20	72.60	8.19	89.81	10.18	0.01
Richer	8.74	91.26	0.00	92.42	7.58	0.00	16.20	81.03	2.77	89.42	9.35	1.23
Richest	38.23	46.75	15.02	92.99	6.57	0.44	21.31	69.33	9.37	88.96	8.83	2.21

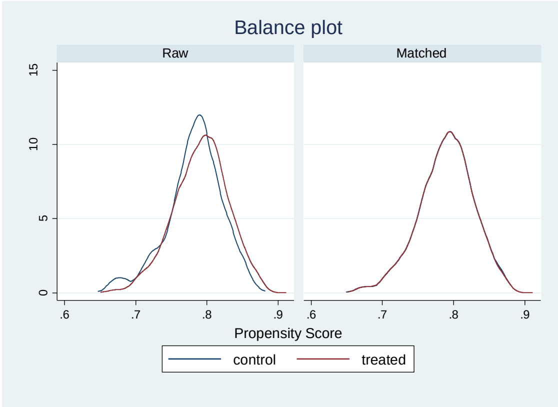
Source: Authors' calculations using PDHS 2012-13. Sample is restricted to women with complete fertility.

Figure B1: Kernel density plots after Propensity score matching (PDHS 1990-91)

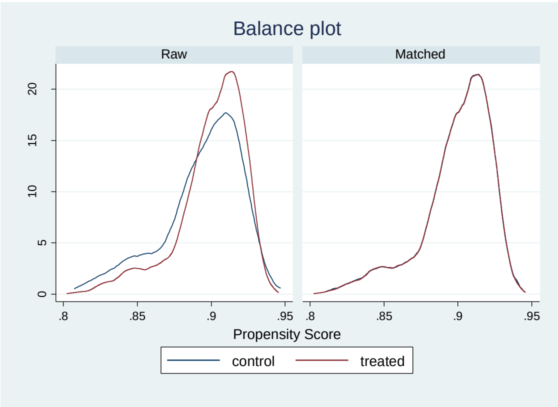
a) Model 1



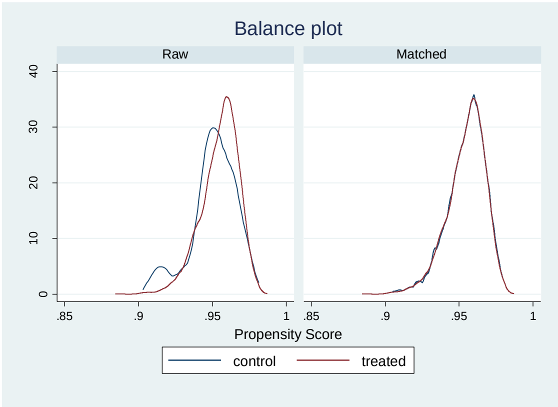
b) Model 2



c) Model 3



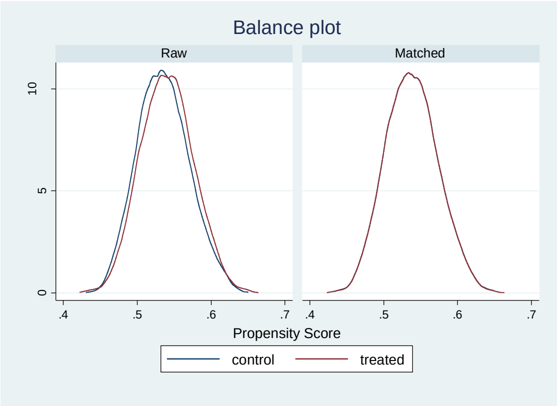
d) Model 4



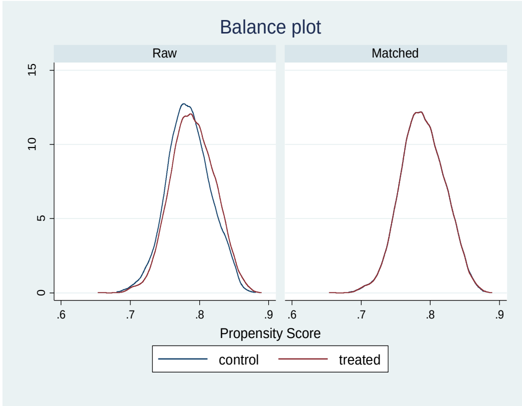
Source: Authors' calculations using PDHS 1990-91.

Figure B2: Kernel density plots after Propensity score matching (PDHS 2012-13)

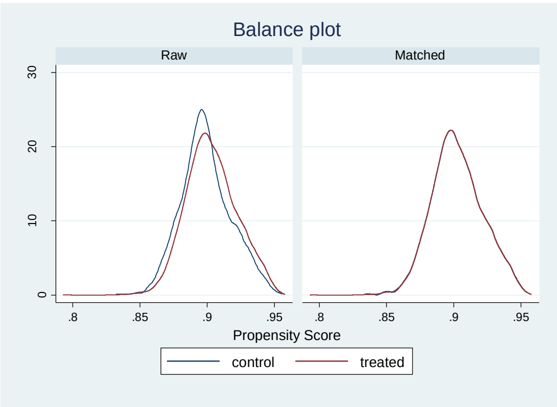
b) Model 1



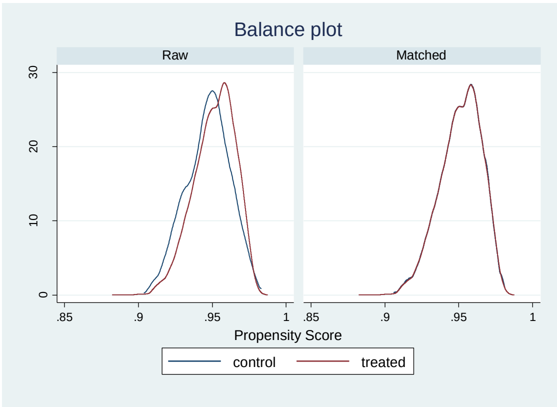
b) Model 2



d) Model 3



d) Model 4



Source: Authors' calculations using PDHS 2012-13.