

Missing Girl-Only Families in India: A New Demographic Indicator to Measure Son Preference

Amresh Senapati

amresh20phd@gmail.com

Centre For Development Studies

Udaya Shankar Mishra

International Institute for Population Sciences

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Abstract

The most widely used indicators of son preference in India have been the child sex ratio, sex ratio at birth, and measures derived from stated fertility preference, such as ideal numbers of sons and daughters. These indicators have provided valuable insights into the levels, pattern, and trends of gender bias. However, they often fail to capture an important demographic consequence of son preference: the relative absence of families composed exclusively of daughters. In societies where children's sex is determined naturally and parents do not exhibit and implement preferences regarding the sex composition of offspring, a substantial proportion of families would be expected to consist entirely of girls. In India, however, the proportion of such families is considerably lower than expected because many parents continue childbearing until the birth of a son or intervene prenatally via sex-selection to ensure the birth of a male child. Drawing on data from the National Family Health Survey (NFHS), this paper examines the extent of missing girl-only families in India by comparing the theoretically expected and empirically observed distributions of girl-only families across parity levels. It estimates the proportion of missing girl-only families and proposes this measure as a group-level indicator of son preference. The study further investigates the determinants of the odds of having a girl-only family. By moving beyond the focus on “missing women” and “missing girls” to “missing girl-only families,” the study offers a complementary demographic lens for identifying and comparing patterns of son preference across social groups and regions in India.

Keywords: Son preference, Girl-only families, Demographic indicators, Revealed preference, Sex composition, India.

1 Introduction

The phenomenon of “missing women” has long been recognised as one of the most striking manifestations of gender inequality in Asia. In his seminal contribution, Sen (1990) argued that millions of women were “missing” from the population due to excess female mortality resulting from discrimination in nutrition, healthcare, and social investments. Subsequent demographic research explained this phenomenon by including prenatal discrimination through sex-selective abortion, particularly in countries characterised by strong son preference and declining fertility (Coale, 1991; Guilmoto, 2009). India has occupied a central position in this literature because of its persistent preference for sons and the resulting distortions in population (and child) sex ratios.

The most widely used indicators of son preference in India have been the child sex ratio, sex ratio at birth, and measures derived from stated fertility intentions such as ideal numbers of sons and daughters (Miller 1981; Das Gupta et al 2003; Sen 1992; Arnold et al. 1998; Kabeer et al 2014; Jayachandran 2017; Kumari and Goli 2021; Goli et al 2022). These indicators have provided valuable insights into the levels, patterns, and trends of gender bias. However, they often fail to capture an important demographic consequence of son preference: the relative absence of families composed exclusively of daughters. In societies where children’s sex is determined naturally and parents do not exhibit preferences regarding the sex composition of offspring, a substantial proportion of families would be expected to consist entirely of girls. In other words, under natural fertility and absence of sex selection, the observed distribution of girl-only families should closely follow the theoretical distribution implied by the probability of female births. In India, however, the number of such families is considerably lower than expected because many parents continue childbearing until the birth of a son or intervene prenatally to ensure the birth of a male child.

This systematic deficit of daughter-only families has been described as the phenomenon of “missing girl-only families” or “missing daughter-only families” (John and Guilmoto 2024) and attributable to son preference. The concept shifts attention from missing individual girls to missing family configurations that would have existed in the absence of son preference. Rather than focusing solely on skewed sex ratios, this approach highlights the reproductive strategies adopted by families in pursuit of sons. It therefore provides a behavioural and demographic perspective on son preference and complements conventional demographic indicators.

The scarcity of girl-only families arises through multiple mechanisms. The first is the well-documented “stopping rule” behaviour, whereby couples continue childbearing after the birth of daughters until a son is born (Das Gupta, 1987; Clark, 2000). With such behaviour, families with only daughters become increasingly uncommon because the arrival of a son often signals the completion of childbearing, whereas daughters induce parity progression. The second mechanism is prenatal sex selection, facilitated by the diffusion of ultrasound technology and the availability of abortion services since the 1980s (Bhat and Zavier, 2007; Jha et al., 2011). Sex-selective abortion allows couples to achieve desired family composition with fewer births, further reducing the prevalence of daughter-only families. A third mechanism involves differential mortality and neglect of girls, although this channel has become relatively less important compared with prenatal discrimination in recent decades (Sen, 1990; Guilmoto, 2012).

The demographic significance of missing girl-only families has increased in the context of fertility decline. As family sizes shrink, parents who desire at least one son face stronger incentives to manipulate the sex composition of births because opportunities for achieving desired family composition through additional childbearing become limited (Bongaarts, 2013). This interaction between declining fertility and persistent son preference has been described as the “fertility squeeze” hypothesis and is widely regarded as a major driver of prenatal discrimination in Asia (Bhat, 1997; Guilmoto, 2009; Jayachandran, 2017). Consequently, daughter-only families become progressively rarer as societies move towards smaller family norms while retaining patriarchal kinship systems.

The persistence of son preference in India is deeply embedded in economic, social, and cultural institutions. Patrilineal inheritance systems, patrilocal residence after marriage, and the expectation that sons provide old-age support continue to increase the perceived value of male children relative to daughters (Miler 1981; Dyson and Moore, 1983; Das Gupta et al., 2003). Religious obligations associated with sons, including funeral rites and lineage continuation, further reinforce these preferences. In contrast, daughters are often viewed through the lens of dowry obligations and their eventual departure from the natal household after marriage. Although rapid social and economic changes have weakened some of these traditional norms, evidence suggests that son preference remains remarkably resilient across many regions of India (Pande and Astone, 2007; Jayachandran, 2017). Studying missing girl-only families offers several analytical advantages. First, it captures realised reproductive behaviour rather than stated preferences, thereby avoiding biases associated with survey responses regarding

ideal family size and composition. Second, it provides a direct measure of the consequences of parity progression and sex-selective behaviour operating jointly within households. Third, it shifts the analytical focus from missing girls as individuals to missing family forms, offering new insights into the demographic manifestations of gender inequality. Finally, the approach allows researchers to examine regional, socioeconomic, and temporal variations in son preference using an intuitively interpretable family-based indicator.

In this context, analysing the extent of missing girl-only families in India and the determinants of girl-only families can provide a richer understanding of contemporary son preference and its demographic consequences. Such an approach complements existing measures based on sex ratios and fertility preferences and contributes to a broader understanding of how gender norms continue to shape reproductive behaviour in modern India.

2 Methodology

2.1 Data

The data comes from National Family Health Survey (NFHS) i.e. the Indian version of the Demographic and Health Survey (DHS). This study uses data from the fifth round of the National Family Health Survey (NFHS-5), conducted during 2019–2021. The NFHS-5 is a nationally representative, cross-sectional household survey designed to provide reliable estimates of demographic, health, and socioeconomic indicators at the national, state, and district levels. The survey collected information from women aged 15–49 years, men aged 15–54 years, and children below five years of age using a stratified two-stage sampling design.

The analysis primarily draws on the women’s questionnaire, which contains complete birth histories, including information on the number of living sons and living daughters, birth order, and the survival status of each child. These detailed fertility histories make it possible to distinguish girl-only families from families with at least one son and to compare the observed distribution of family composition with the theoretical distribution expected under a natural sex ratio at birth across the parity levels. The resulting measure is used to examine variations in missing girl-only families across states and other population subgroups.

Table 1 presents the descriptive statistics of the study sample comprising 491,409 women with at least one living child from the NFHS-5 (2019–21). Approximately 17.4% of women belonged to girl-only families, while 27.3% had only sons. On average, women had 2.44

living children, including 1.16 daughters and 1.28 sons, indicating a slight predominance of sons among surviving children. The sample was relatively evenly distributed across wealth quintiles, although a slightly larger proportion of respondents belonged to the poorer (22.2%) and poorest (21.4%) quintiles. Nearly 44.7% of women had attained secondary education, whereas 30.9% had no formal schooling. Other Backward Classes (40.7%) constituted the largest social group, followed by Scheduled Castes (20.3%) and Scheduled Tribes (19.1%). The majority of respondents were Hindu (76.6%) and resided in rural areas (76.0%), reflecting the broad demographic profile of India captured by the NFHS-5.

Table 1: Descriptive Statistics of the Study Sample

Variables	Number	Mean/Percentage
Girl-only families	85,366	17.37
Son-only families	134,277	27.32
Mixed families	271,816	55.31
Number of living children	491,409	2.44
Number of living daughters	491,409	1.16
Number of living sons	491,409	1.28
Daughters living at home	491,409	0.93
Daughters living elsewhere	491,409	0.23
Sons living at home	491,409	1.11
Sons living elsewhere	491,409	0.17
Wealth Quintile		
Poorest	104,923	21.35
Poorer	109,089	22.20
Middle	102,474	20.85
Richer	93,418	19.01
Richest	81,505	16.59
Women's Education		
No education	151,780	30.89
Primary	72,410	14.74
Secondary	219,413	44.65
Higher	47,806	9.73
Social Group		
Scheduled Caste	94,806	20.27
Scheduled Tribe	89,261	19.08
Other Backward Class	190,301	40.68
Others	90,371	19.32
Don't know	3,062	0.65
Religion		
Hindu	376,191	76.55
Muslim	58,314	11.87
Christian	33,342	6.78
Sikh	11,058	2.25

Buddhist/Neo-Buddhist	5,970	1.21
Jain	581	0.12
Others ^a	5,953	1.21
Place of Residence		
Urban	118,078	24.03
Rural	373,331	75.97
Total Sample	491,409	100.00

Notes: The sample comprises women with at least one living child from NFHS-5 (2019–21). Continuous variables are summarized by their means, while binary and categorical variables are reported as frequencies and percentages. ^a Others include Jewish, Parsi/Zoroastrian, no religion, and other religions.

2.2 Variable Construction

Following the methodological framework of John and Guilmoto (2024), we operationalise the variable used in our analysis as follows.

Theoretical Distribution (TD) of girl-only families. The theoretical distribution of girl-only families is derived under the assumption of a natural sex ratio at birth (SRB) of 105 male births per 100 female births. Accordingly, the probability of a female birth is denoted by $p = 100/205 = 0.4878$, while the probability of a male birth is $(1 - p) = 105/205 = 0.5122$. Assuming that the sex of each birth is independent, the probability that a woman with parity n has only daughters is given by

$$P(\text{girl-only} \mid n) = p^n,$$

where n denotes the parity i.e., the total number of live births (or living children, depending on the definition adopted). Thus, the parity-specific theoretical distribution is given by $\{p, p^2, p^3, \dots, p^n\}$. For example, the probability of having only daughters is 0.4878 at parity one, 0.238 at parity two, 0.116 at parity three, and declines exponentially with increasing parity.

Observed Distribution (OD) of girl-only families. The observed distribution of girl-only families is obtained directly from the NFHS-5 data by calculating, for each parity level, the proportion of women who have one or more living daughters but no living sons. Let O_n denote the observed proportion of girl-only families at parity n . The observed distribution is therefore represented by the set $\{O_1, O_2, \dots, O_n\}$ and reflects the realised prevalence of girl-only families across parity levels.

Expected proportion (P_E) of girl-only families. The overall expected proportion of girl-only families is obtained by weighting the parity-specific theoretical probabilities by the observed parity distribution of women in the sample:

$$P_E = \sum_{n=1}^N w_n p_n$$

where w_n denotes the proportion of women at parity n , and $\sum_{n=1}^N w_n = 1$.

Observed proportion (P_O) of girl-only families. The overall observed proportion of girl-only families is computed by weighting the parity-specific observed proportions using the same parity distribution:

$$P_O = \sum_{n=1}^n w_n O_n$$

where O_n denotes the observed proportion of girl-only families at parity n . Comparing the observed proportion (P_O) with the expected proportion (P_E) provides an estimate of the deficit of girl-only families attributable to gender-biased reproductive behaviour, including fertility stopping behaviour following the birth of sons and prenatal sex selection.

3 Results

3.1 Internal Validation of Missing Girl-Only Families as a Measure of Son Preference

3.1.1 All-India

Figure 1 shows that the observed distribution of daughter-only families is consistently lower than the theoretical distribution expected under natural fertility, indicating a systematic deficit/missing of girl-only families in India. The difference is most pronounced among families with one and two daughters and gradually narrows with increasing family size. It suggests that at parity two, couples are more likely to avoid daughter-only family either by continuing childbearing or resorting to prenatal sex selection to achieve a son. The convergence of the two distributions among families with four daughters reflects no deficit of daughter-only family at parity four. This pattern provides compelling behavioural evidence that son preference significantly alters family composition beyond what would occur under natural fertility.

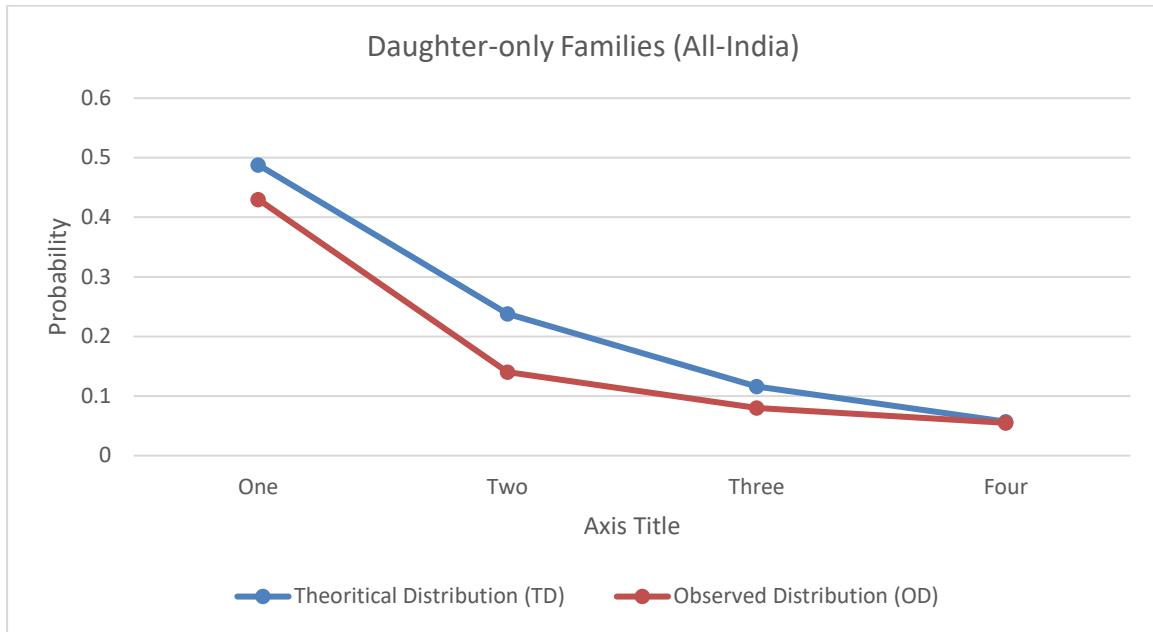


Figure 1: Observed and Theoretical Distributions of Girl-Only Families by Number of Children.

Figure 2 shows that the theoretical distribution and observed distribution of son-only families in India. At parity level one and two, there is excess of son-only families, indicating a family-building strategy driven by son preference. However, at parity three and four, observed distribution of son-only families is lower than its theoretical equivalent, indicating an apparent success in realizing preferential family building strategy in India.

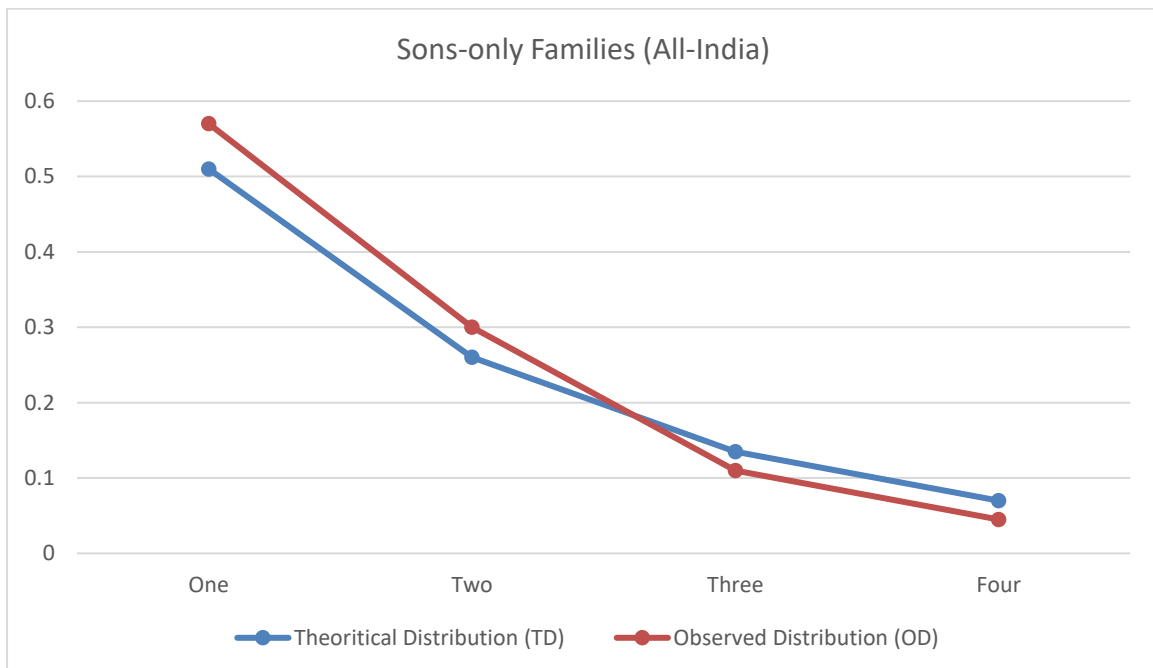


Figure 2: Observed and Theoretical Distributions of Sons-Only Families by Number of Children.

Figure 3 shows that the theoretical distribution and observed distribution of Mixed families (both sexes) in India. For most of the combinations of boy and girl, observed distribution dominates the theoretical distribution excepting for the three boys and a girl families. It indicates children-mix families are over represented vis-a-vis girl-only family. However, notable deviations emerge at higher parities. Families with two boys and two girls (2B2G) and three girls and one boy (3G1B) are overrepresented, whereas families with three boys and one girl (3B1G) are underrepresented relative to theoretical expectations. These differences suggest that reproductive behavior is influenced not only by the presence of sons but also by the desired balance in children's sex composition, reflecting complex fertility stopping patterns beyond a simple preference for sons.

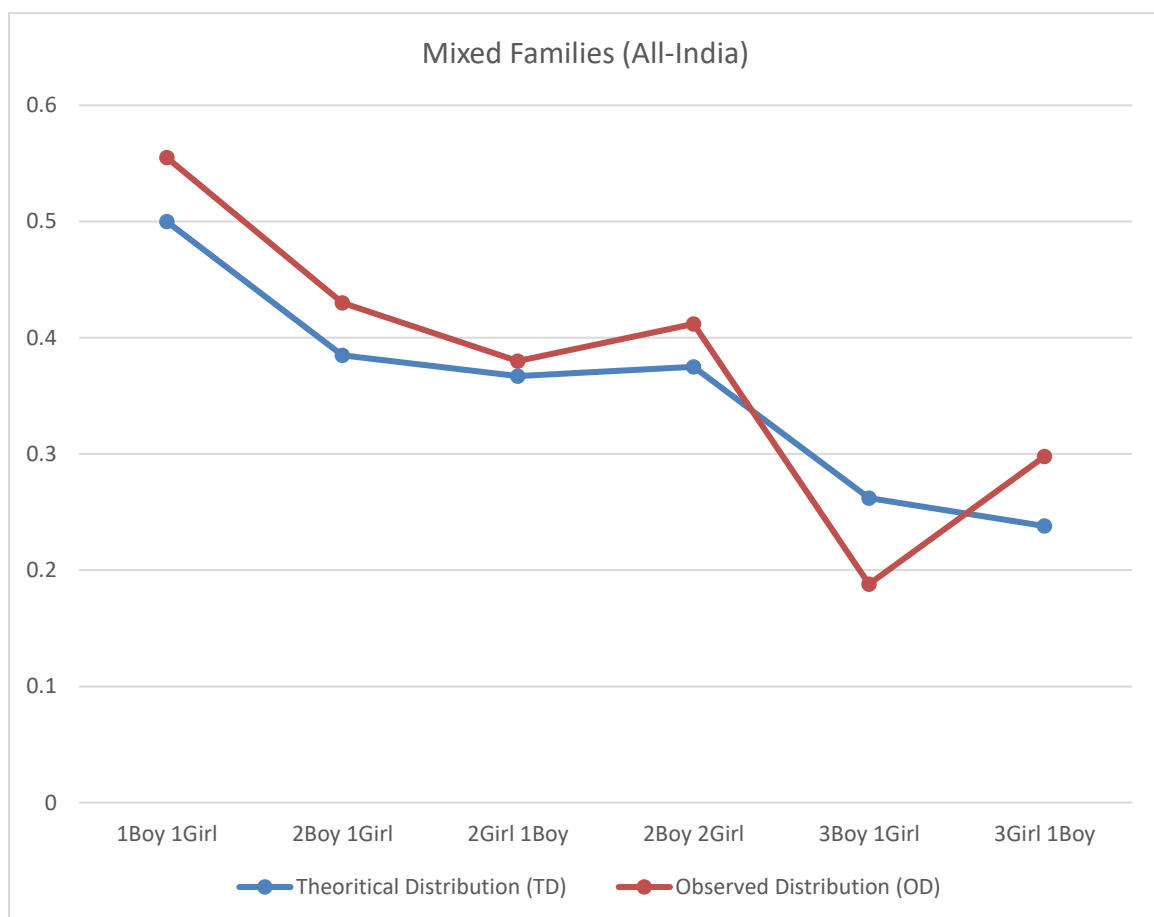


Figure 3: Observed and theoretical probability distributions by children sex composition among women with mixed-sex children.

3.1.2 By Region: North-West Vs South-East States

Figure 4 compares the theoretical distribution of daughter-only families with the observed distributions in the North-West and South-East regions of India. In both regions, the observed proportion of daughter-only families falls below the theoretical expectation, indicating a systematic deficit consistent with son preference. However, the magnitude of this deficit differs markedly across regions. The North-West exhibits a substantially larger shortfall relative to the theoretical benchmark across all family sizes, whereas the South-East displays distributions that are comparatively closer to the theoretical expectation. This regional contrast suggests that son preference is considerably stronger in the North-West than in the South-East, reflecting well-documented differences in kinship systems, patriarchal norms, and reproductive behaviour. These findings are consistent with the demographic literature documenting stronger patriarchal institutions, patrilineal inheritance, and son preference in North-West India, whereas the South-East India has historically exhibited relatively more gender-equitable family systems and less skewed demographic outcomes. Nevertheless, the persistence of daughter-only family deficits in both regions indicates that son preference remains a widespread demographic phenomenon, albeit with considerable regional variation in its intensity.

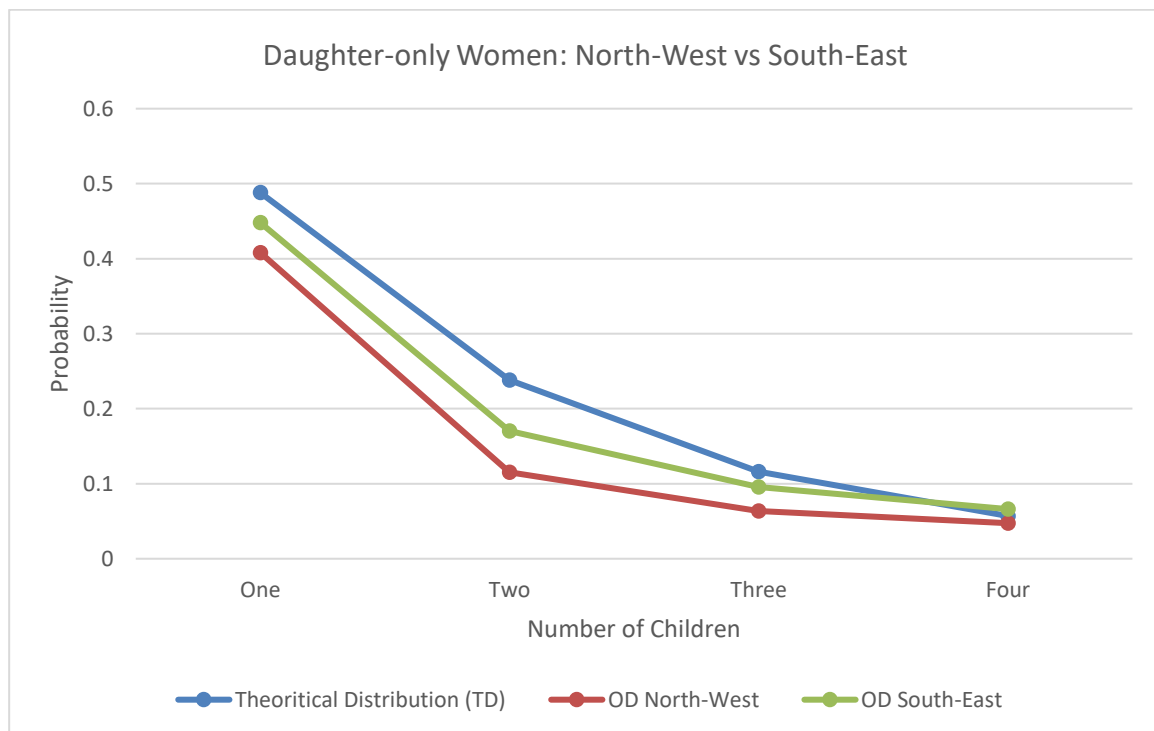


Figure 4: Observed and Theoretical Distributions of Girl-Only Families by Number of Children, by Region.

3.1.3 Select States

Figure 5 compares the theoretical distribution of daughter-only families with the observed distributions across select states. For almost all the select states the observed proportion of daughter-only families falls below the theoretical expectation, indicating a systematic deficit attributable to son preference, except Kerala. Women belonging to the Haryana and Punjab exhibit the largest shortfall relative to the theoretical distribution. Whereas women belonging to the Tamil Nadu display distributions that are comparatively closer to the theoretical benchmark.

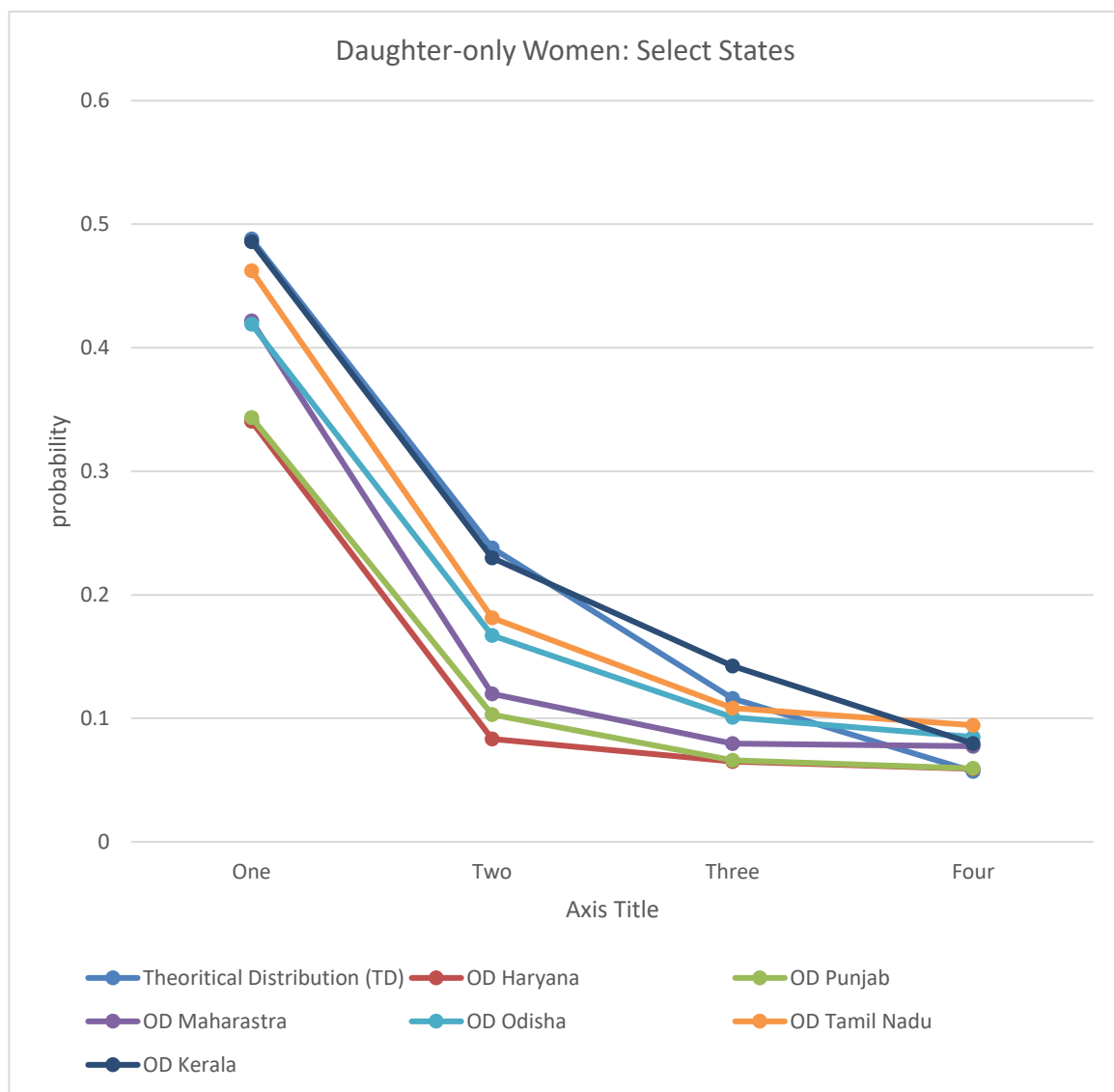


Figure 5: Observed and Theoretical Distributions of Girl-Only Families by Number of Children, by Select States.

3.1.4 By Caste

Figure 6 compares the theoretical distribution of daughter-only families with the observed distributions across caste groups. Across all caste categories, the observed proportion of daughter-only families falls below the theoretical expectation, indicating a systematic deficit attributable to son preference. However, the magnitude of this deficit varies by caste. Women belonging to the 'Others' category exhibit the largest shortfall relative to the theoretical distribution, followed by Other Backward Classes (OBCs), whereas Scheduled Castes (SCs) and Scheduled Tribes (STs) display distributions that are comparatively closer to the theoretical benchmark. This pattern is broadly consistent with evidence from the 2011 Census, which documented pronounced imbalance in the child sex ratio among 'Others' (910) relative to STs (957) and SCs (933). This pattern suggests that son preference is more pronounced among socially advantaged caste groups, while historically disadvantaged communities exhibit relatively weaker manifestations of son-preferring reproductive behaviour. Nevertheless, the persistence of deficits across all caste categories indicates that son preference remains a pervasive demographic phenomenon, transcending caste boundaries despite differences in its intensity.

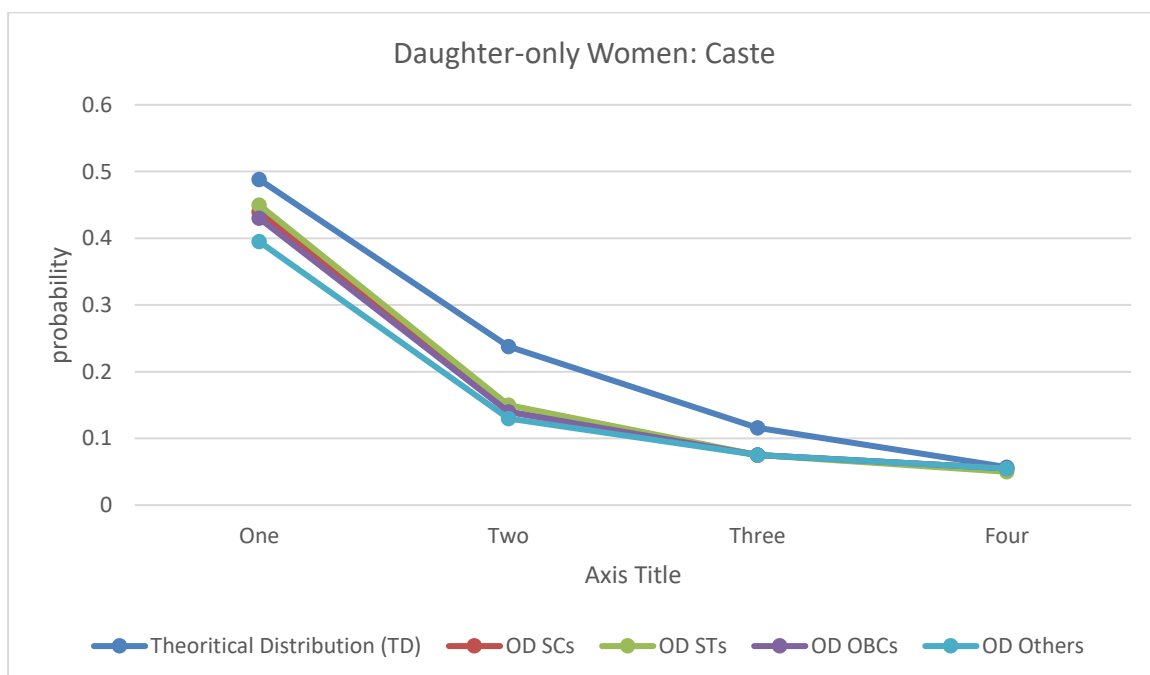


Figure 6: Observed and Theoretical Distributions of Girl-Only Families by Number of Children, by Caste.

3.1.5 By Religion

Figure 7 compares the theoretical distribution of daughter-only families with the observed distributions across religious groups. Across all religions, the observed proportion of daughter-only families remains below the theoretical expectation, indicating a persistent deficit consistent with son preference. However, the magnitude of this deficit varies markedly across religious communities. Sikhs exhibit the largest shortfall relative to the theoretical distribution, followed by Hindus, whereas Muslims and Christians display distributions that are comparatively closer to the theoretical benchmark. These findings suggest that son preference is most pronounced among Sikh and Hindu households, while it is relatively weaker among Muslims and Christians. These findings are consistent with the 2011 Census, which reported greater gender imbalance in child sex ratios among Sikhs (828) and Hindus (913) than among Muslims (943) and Christians (958), reinforcing the interpretation of missing girl-only families as an indicator of son preference. Nevertheless, the persistence of deficits across all religious groups indicates that son preference transcends religious boundaries, although its intensity varies according to the social and cultural norms governing family formation and reproductive behaviour.

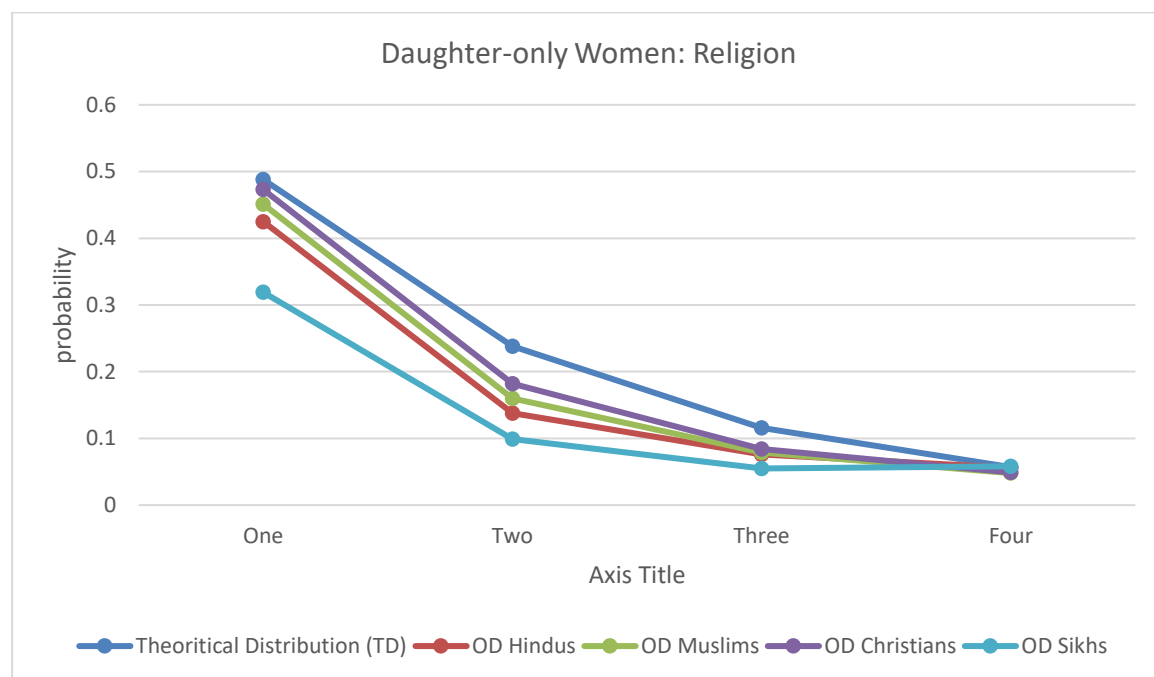


Figure 7: Observed and Theoretical Distributions of Girl-Only Families by Number of Children, by Religion.

3.1.6 By Education

Figure 8 compares the theoretical distribution of daughter-only families with the observed distributions across women's educational attainment. Across all education groups, the observed proportion of daughter-only families remains below the theoretical expectation, indicating a persistent deficit associated with son preference. The discrepancy is particularly pronounced among women with no education and primary education, while women with higher education exhibit distributions that more closely approximate the theoretical benchmark. This pattern suggests that educational attainment is associated with a weaker manifestation of son preference reducing reliance on parity progression and sex-selective behaviour, although the persistence of deficits across all educational groups indicates that education alone has not eliminated gender-biased reproductive behaviour. Nevertheless, the continued shortfall of daughter-only families even among the highly educated indicates that deeply rooted patriarchal norms continue to influence reproductive decisions despite improvements in women's educational attainment.

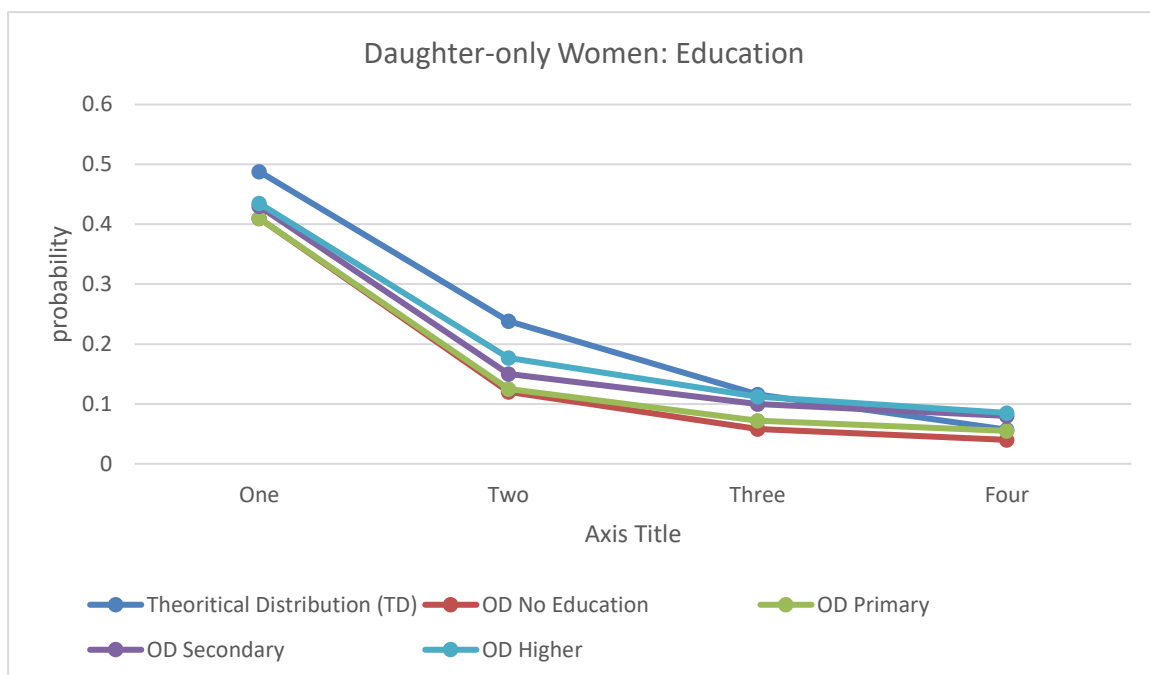


Figure 8: Observed and Theoretical Distributions of Girl-Only Families by Number of Children, by Education Level.

3.1.7 By Wealth

Figure 9 compares the theoretical distribution of daughter-only families with the observed distributions across household wealth quintiles. Across all wealth groups, the observed proportion of daughter-only families lies below the theoretical expectation, indicating a persistent deficit of daughter-only families consistent with son preference. The divergence is particularly pronounced among families with one and two daughters, while the distributions converge at higher parities due to the rarity of larger daughter-only families. The similarity of the observed patterns across wealth quintiles suggests that son preference is pervasive throughout the socioeconomic spectrum, although the deficit appears marginally greater among wealthier households, consistent with their greater ability to achieve desired family composition through access to prenatal sex determination and sex-selective abortion.

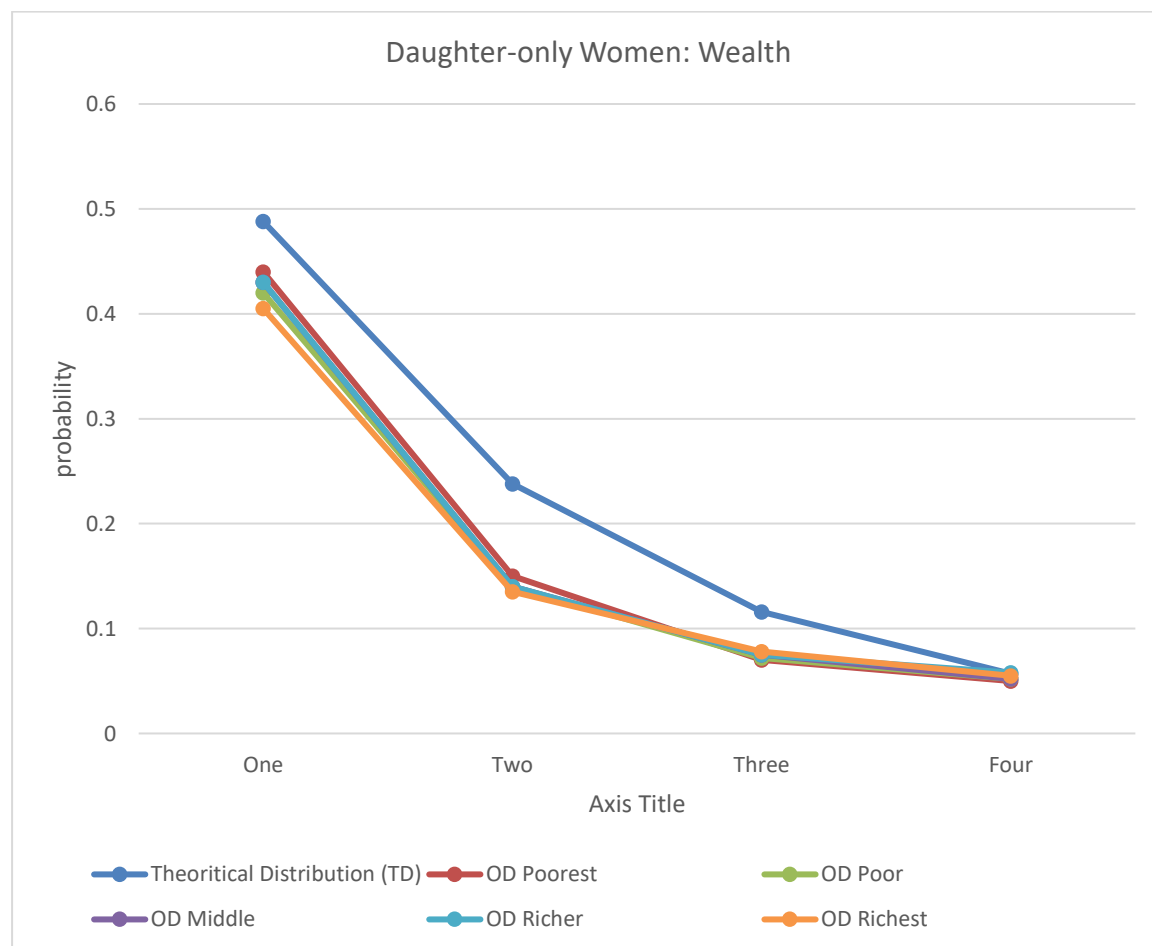


Figure 9: Observed and Theoretical Distributions of Girl-Only Families by Number of Children, by Wealth Quintile.

3.1.8 By Residence

Figure 10 compares the theoretical distribution of daughter-only families with the observed distributions for urban and rural women. In both urban and rural areas, the observed proportion of daughter-only families lies consistently below the theoretical expectation, indicating a systematic deficit attributable to son preference. The shortfall is greatest among families with one and two daughters and gradually narrows with increasing family size. While the urban distribution is marginally closer to the theoretical benchmark than the rural distribution, the differences between the two are relatively small. This pattern suggests that son preference remains pervasive across both rural and urban India, although its intensity appears to be slightly stronger in rural areas. The persistence of deficits across both places of residence indicates that urbanisation alone has not been sufficient to eliminate gender-biased reproductive behaviour. In fact, the Census 2011 reveals that child sex ratio was lower in urban areas (905) than in rural areas (923). This pattern has often been attributed to greater access to prenatal sex determination technologies in urban settings, combined with persistent son preference.

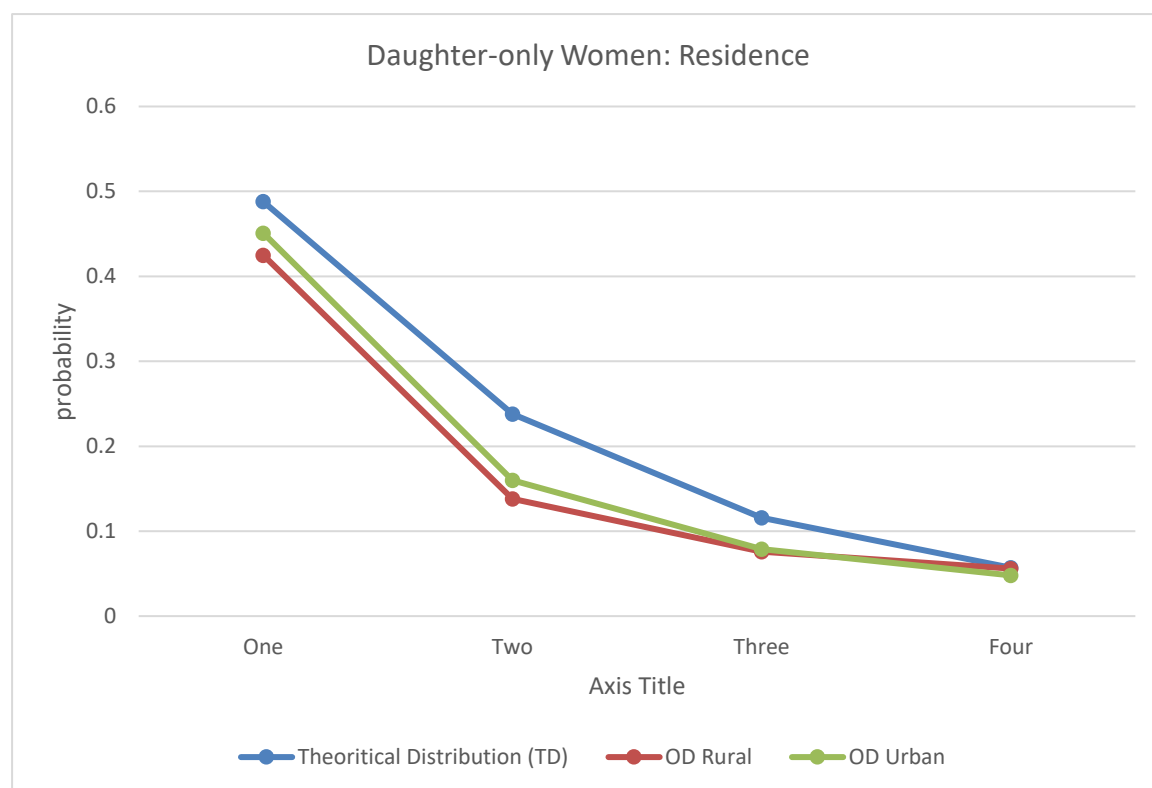


Figure 10: Observed and Theoretical Distributions of Girl-Only Families by Number of Children, by Residence.

3.1.9 By Age group

Figure 11 compares the theoretical distribution of daughter-only families with the observed distributions by women's age. For both age groups, the observed proportion of daughter-only families is consistently lower than the theoretical expectation, indicating a persistent deficit associated with son preference. However, the deficit is considerably larger among women aged 35 years and above, whose observed distribution diverges more sharply from the theoretical benchmark across all family sizes. In contrast, women aged 35 years or younger display distributions that are relatively closer to the theoretical expectation, suggesting a weaker manifestation of son preference among younger cohorts. This pattern may be considered as an evidence of gradual decline in son preference over time, reflecting generational changes in fertility behaviour, rising female education, urbanisation, and shifting gender norms. Nevertheless, the continued deficit of daughter-only families among younger women indicates that son preference remains an enduring feature of reproductive behaviour despite evidence of a cohort-based decline.

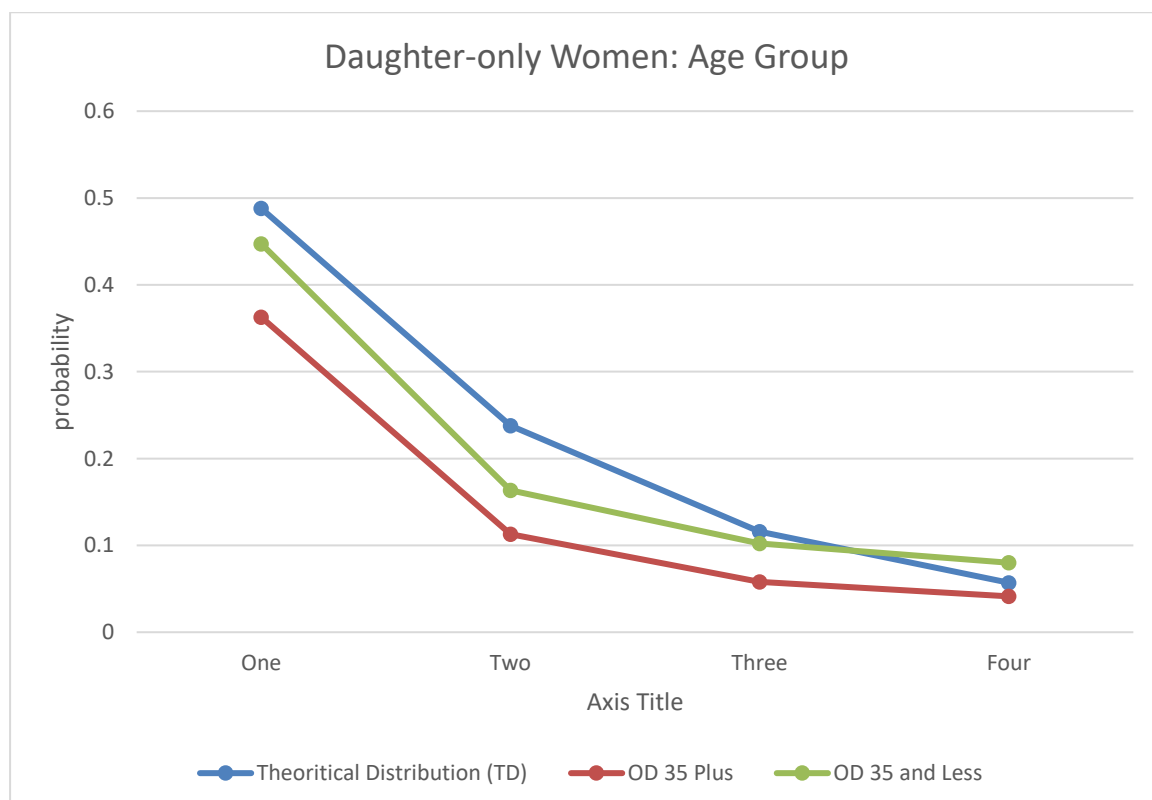


Figure 11: Observed and Theoretical Distributions of Girl-Only Families by Number of Children, by Age Group.

3.1.10 Proportion of Missing Girl-only Families

Table 2 presents the expected and observed proportions of girl-only families across Indian states and Union Territories, together with the resulting absolute and relative deficits. The expected proportion is derived under the assumption of a natural sex ratio at birth, while the observed proportion reflects the actual distribution of sonless families in the population. Across all states and Union Territories, the observed proportion of girl-only families is consistently lower than the theoretical expectation, indicating a pervasive deficit of girl-only families in India. This systematic shortfall suggests that son preference, operating through sex-selective fertility stopping, prenatal sex selection, or a combination of both, reduces the likelihood of families remaining without a son.

Considerable interstate variation is evident in both the absolute and relative deficits of girl-only families. The relative deficit ranges from 72.69% in Haryana to only 0.58% in Lakshadweep. Northern and north-western states exhibit the largest deficits, with Haryana (72.69%), Rajasthan (71.46%), Bihar (66.23%), Punjab (64.37%), and Madhya Pradesh (63.07%) recording the greatest shortfalls relative to their expected proportions. For example, although 20.68% of families in Haryana would be expected to have only daughters based on the state's parity distribution, only 5.65% are observed, resulting in an absolute deficit of 15.03 percentage points. In contrast, southern and several north-eastern states display substantially smaller deficits. Kerala (1.06%), Lakshadweep (0.58%), Puducherry (4.15%), Sikkim (13.67%), and Tripura (15.73%) exhibit observed proportions that closely approximate their theoretical expectations, suggesting comparatively weaker manifestations of son preference.

The pronounced regional heterogeneity is broadly consistent with the well-established geographical pattern of son preference in India. States in the northern and north-western regions, where patriarchal kinship systems and stronger preferences for sons have historically prevailed, exhibit the largest deficits of girl-only families. In contrast, the relatively small deficits observed in the southern and several north-eastern states reflect more gender-balanced reproductive outcomes. Overall, the findings demonstrate that the deficit of girl-only families provides an intuitive and behaviourally meaningful measure of son preference by quantifying the extent to which the prevalence of sonless families falls below its biologically expected level. The indicator therefore complements conventional demographic measures of son preference while offering a direct assessment of the cumulative effects of gender-biased reproductive behaviour.

Table 2: Expected and Observed Proportions of Girl-only Families, and Relative Deficit, by State/UT

Sl. No.	State/UT	Expected (%)	Observed (%)	Deficit (pp)	Relative Deficits (RD)
1	Haryana	20.68	5.65	15.03	72.69
2	Rajasthan	17.51	5.00	12.51	71.46
3	Bihar	13.34	4.51	8.84	66.23
4	Punjab	22.67	8.08	14.59	64.37
5	Madhya Pradesh	18.32	6.77	11.56	63.07
6	Himachal Pradesh	23.25	9.41	13.84	59.52
7	Dadra & Nagar Haveli and Daman & Diu	18.46	7.52	10.94	59.25
8	Gujarat	20.67	8.61	12.06	58.35
9	Uttarakhand	18.64	7.86	10.78	57.83
10	Jammu & Kashmir	18.15	7.90	10.25	56.47
11	Uttar Pradesh	15.38	6.71	8.67	56.38
12	Jharkhand	16.79	7.51	9.29	55.30
13	Chandigarh	21.09	9.90	11.19	53.07
14	Arunachal Pradesh	17.45	8.72	8.73	50.03
15	NCT of Delhi	20.58	10.83	9.76	47.40
16	Ladakh	19.75	10.42	9.33	47.22
17	Maharashtra	21.94	11.79	10.15	46.24
18	Manipur	17.81	10.29	7.52	42.22
19	Chhattisgarh	18.37	10.66	7.71	41.98
20	Nagaland	15.28	9.06	6.22	40.72
21	Odisha	22.83	14.72	8.12	35.55
22	Karnataka	21.98	15.08	6.91	31.41
23	Goa	25.09	17.92	7.17	28.59
24	Assam	21.44	15.70	5.74	26.78
25	West Bengal	25.11	18.42	6.69	26.63
26	Telangana	21.51	16.07	5.43	25.26
27	Tamil Nadu	23.51	18.54	4.97	21.13
28	Mizoram	16.24	13.03	3.21	19.79
29	Andhra Pradesh	23.08	18.72	4.36	18.91
30	Meghalaya	15.61	12.92	2.68	17.20
31	Tripura	27.81	23.43	4.37	15.73
32	Sikkim	27.60	23.83	3.77	13.67
33	Andaman & Nicobar Islands	25.87	22.50	3.37	13.03
34	Puducherry	24.91	23.87	1.03	4.15
35	Kerala	23.12	22.88	0.24	1.06
36	Lakshadweep	19.42	19.31	0.11	0.58
37	India	19.93	11.46	8.57	43.00

Notes: The expected proportion of girl-only families is calculated under the assumption of a natural sex ratio at birth and conditional on the observed parity distribution. The absolute deficit is the difference between the expected and observed proportions of girl-only families. The relative deficit is computed as $(\text{Expected} - \text{Observed})/\text{Expected} \times 100$. Child Sex Ratio (CSR) refers to girls per 1,000 boys aged 0–6 years from the 2011 Census. Child Sex Ratio (CSR) refers to the number of girls per 1,000 boys aged 0–6 years from the 2011 Census of India.

3.2 External Validation of Missing Girl-Only Families as a Measure of Son Preference

The geographical distribution of the relative deficit of girl-only families closely corresponds with established demographic indicators of son preference (See Table 3). States recording lower child sex ratios and more masculine sex ratios at birth are also characterized by larger relative deficits of girl-only families, whereas states with more balanced sex ratios exhibit substantially smaller deficits. For example, Haryana, Rajasthan, and Punjab, which record some of the lowest child sex ratios in the country, also exhibit the largest relative deficits of girl-only families. In contrast, Kerala and Puducherry, with relatively balanced child sex ratios and sex ratios at birth, display only negligible deficits of girl-only families. This close correspondence provides strong descriptive evidence supporting the validity of the relative deficit of girl-only families as a behavioural indicator of son preference. Overall, the findings indicate that the proposed measure effectively captures the substantial spatial heterogeneity in gender-biased reproductive behaviour across Indian states and complements conventional demographic indicators of son preference.

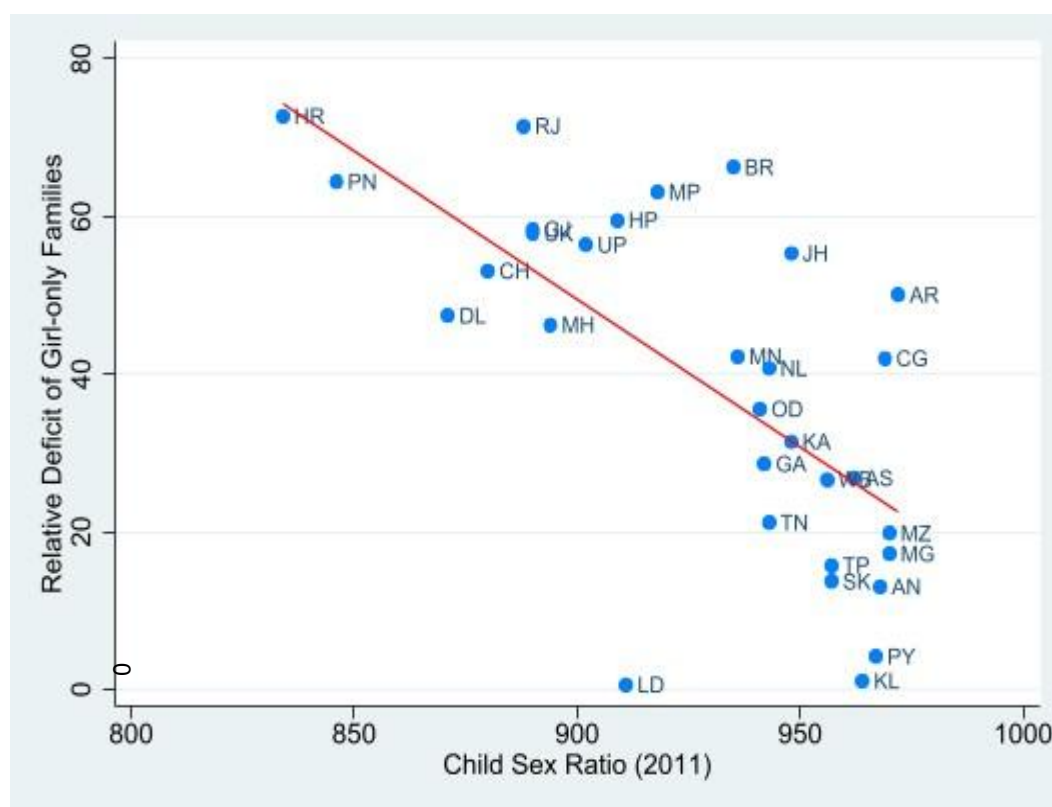


Figure 12: Relationship between Preference for Living with Son in Old Age and Relative Deficit of Girl-only Families across Indian States and Union Territories.

These descriptive patterns are further corroborated by the correlation analyses. The state-level distribution of the relative deficit of girl-only families is strongly associated with established demographic indicators of son preference. The relative deficit exhibits a strong and statistically significant negative correlation with the Child Sex Ratio (CSR) from the 2011 Census (Pearson's $r = -0.679$, $p < 0.001$, $N=33$), indicating that states with more masculine child sex ratios tend to record substantially larger deficits of girl-only families (See Figure 12). The association with the Sex Ratio at Birth (SRB) is also negative but comparatively weaker, with correlation coefficients of $r = -0.160$ for NFHS-4 ($p = 0.35$) and $r = -0.313$ for NFHS-5 ($p = 0.06$). While the correlation with NFHS-4 is not statistically significant, the association with NFHS-5 is marginally significant at the 10 percent level. The stronger relationship with the CSR is expected because the child sex ratio reflects the cumulative effects of gender-biased reproductive behaviour over a longer period, whereas state-level SRB estimates from household surveys are based on relatively recent births and are therefore more susceptible to sampling variability, particularly in smaller states and Union Territories. Overall, these findings provide evidence of the convergent validity of the relative deficit of girl-only families as a complementary indicator of son preference, demonstrating that states with larger daughter deficits also tend to exhibit more masculine demographic sex ratios.

Moreover, the scatter plot and line of fit presented in Figure 13 shows a clear positive association between the proportion of women who expect to live with their sons in old age and the relative deficit of girl-only families across Indian states. States where old-age dependence on sons is more prevalent tend to exhibit larger daughter deficits, consistent with the hypothesis that expectations of filial support reinforce son preference and shape reproductive behaviour. The relationship also provides construct validity for the relative deficit of girl-only families as a behavioural measure of son preference. Its close correspondence with an independent attitudinal indicator of son preference—women's expectations of old-age support from sons—suggests that the measure captures meaningful interstate variation in the intensity of son preference rather than random demographic variation alone. Although a few states deviate from the overall trend, the figure provides strong descriptive evidence that regions with stronger son-oriented norms also exhibit larger deficits of girl-only families.

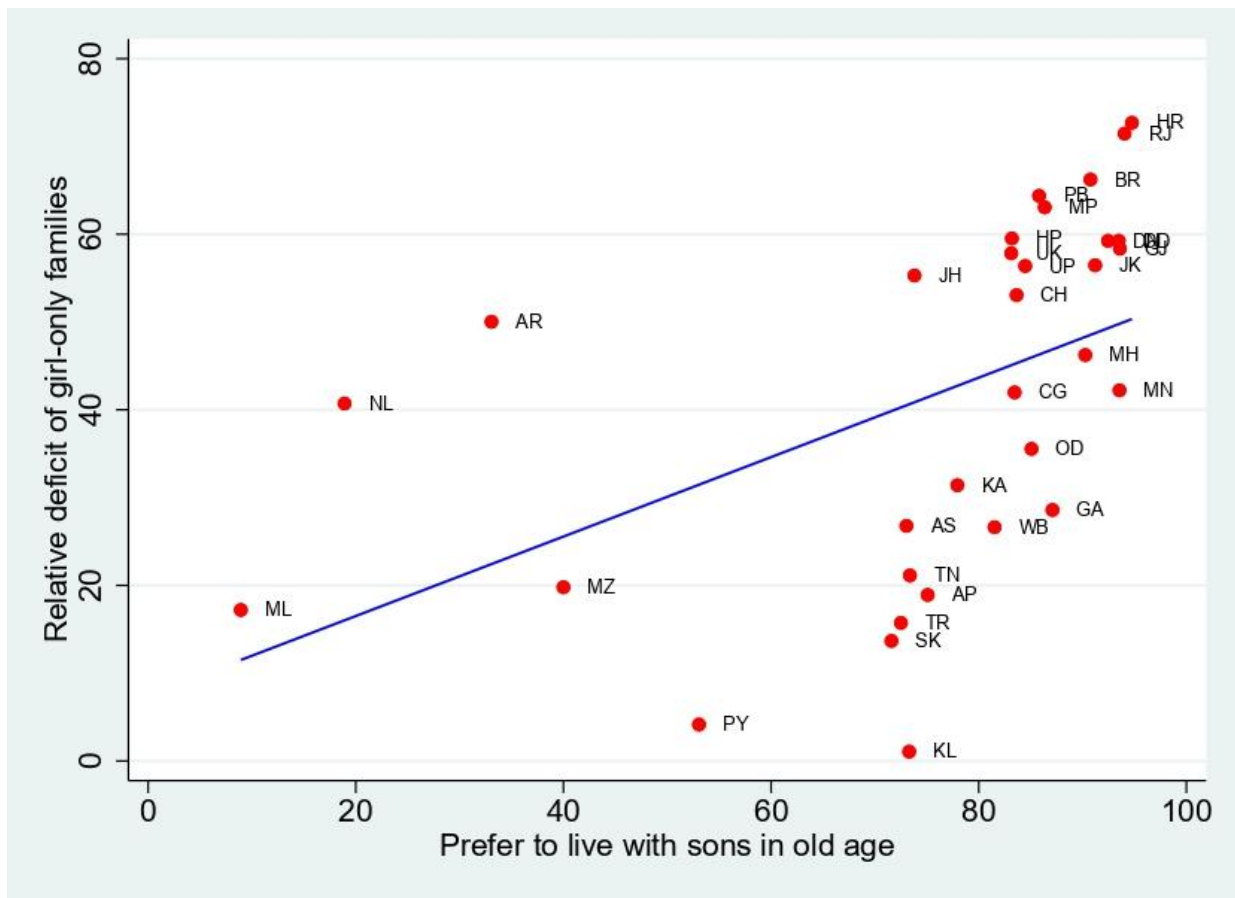


Figure 13: Relationship between Preference for Living with Son in Old Age and Relative Deficit of Girl-only Families across Indian States and Union Territories.

Table 3: Deficit of Girl-only Families, Child Sex Ratio, and Sex Ratio at Birth by State/UT

Sl. No.	State/UT	Deficit (pp)	Relative Deficit (%)	Child Sex Ratio (Census 2011)	SRB (NFHS-4)	SRB (NFHS-5)
1	Haryana	15.03	72.69	834	836	893
2	Rajasthan	12.51	71.46	888	887	891
3	Bihar	8.84	66.23	935	934	908
4	Punjab	14.59	64.37	846	860	904
5	Madhya Pradesh	11.56	63.07	918	927	956
6	Himachal Pradesh	13.84	59.52	909	937	875
7	DNH & DD	10.94	59.25	926/904	983	813
8	Gujarat	12.06	58.35	890	906	955
9	Uttarakhand	10.78	57.83	890	888	984
10	Jammu & Kashmir	10.25	56.47	862	923	976
11	Uttar Pradesh	8.67	56.38	902	903	941
12	Jharkhand	9.29	55.30	948	919	899
13	Chandigarh	11.19	53.07	880	981	838
14	Arunachal Pradesh	8.73	50.03	972	926	989
15	NCT of Delhi	9.76	47.40	871	812	923
16	Ladakh	9.33	47.22	–	823	1125
17	Maharashtra	10.15	46.24	894	924	913
18	Manipur	7.52	42.22	936	962	967
19	Chhattisgarh	7.71	41.98	969	977	960
20	Nagaland	6.22	40.72	943	953	945
21	Odisha	8.12	35.55	941	932	894
22	Karnataka	6.91	31.41	948	910	978
23	Goa	7.17	28.59	942	966	838
24	Assam	5.74	26.78	962	929	964
25	West Bengal	6.69	26.63	956	960	973
26	Telangana	5.43	25.26	–	872	894
27	Tamil Nadu	4.97	21.13	943	954	878
28	Mizoram	3.21	19.79	970	949	969
29	Andhra Pradesh	4.36	18.91	939	914	934
30	Meghalaya	2.68	17.20	970	1009	989
31	Tripura	4.37	15.73	957	969	1028
32	Sikkim	3.77	13.67	957	809	969
33	Andaman & Nicobar Islands	3.37	13.03	968	859	914
34	Puducherry	1.03	4.15	967	843	959
35	Kerala	0.24	1.06	964	1047	951
36	Lakshadweep	0.11	0.58	911	905	1051

Notes: The absolute deficit equals the difference between the expected and observed proportions of girl-only families. The relative deficit is computed as $(\text{Expected} - \text{Observed}) / \text{Expected} \times 100$. Child Sex Ratio (CSR) refers to girls per 1,000 boys aged 0–6 years from the 2011 Census. Sex Ratio at Birth (SRB) is measured as the number of female births per 1,000 male births from NFHS-4 (2015–16) and NFHS-5 (2019–21).

3.3 Determinants of Girl-only Families

3.3.1 Determinants of the Odds of Having a Girl-only Family

Table 4 represents the results of the binary logistic regression examining the association between selected socioeconomic and demographic characteristics and the likelihood (the odds ratios) of having a girl-only family. The dependent variable is binary, coded as 1 for girl-only families and 0 for families with at least one living son. The model adjusts for parity, age, region, household wealth, educational attainment, caste, religion, and place of residence.

The number of living children is the strongest predictor of having a girl-only family. Each additional living child is associated with a 53.2% reduction in the odds of having a girl-only family ($OR = 0.468, p < 0.001$). This finding is consistent with the theoretical expectation that the probability of a girl-only family decreases exponentially with parity under a natural sex ratio at birth.

After controlling for parity and other socio-demographic characteristics, older women exhibit significantly lower odds of having a girl-only family than younger women. Compared with women aged 15–24 years, those aged 25–34 years have 12.1% lower odds ($OR = 0.879, p < 0.001$), while women aged 35–49 years have 13.1% lower odds ($OR = 0.869, p < 0.001$). Although the cross-sectional nature of the data precludes a cohort interpretation, these results indicate that younger women are more likely to have only daughters among women who have completed childbearing.

Substantial regional variation is also evident. Significant regional differences persist after accounting for parity and socio-demographic characteristics. Relative to women residing in the South, women in the North exhibit 58.4% lower odds of having a girl-only family ($OR = 0.416, p < 0.001$). Similarly, women in the Central ($OR = 0.490$), West ($OR = 0.559$), and East ($OR = 0.813$) regions have significantly lower odds. In contrast, the difference between the South and the North-East is not statistically significant ($OR = 0.952, p = 0.094$). These findings suggest that, after accounting for parity and socio-economic characteristics, the South has the highest prevalence of girl-only families, whereas the North and Central regions exhibit substantially lower prevalence, reflecting stronger son preference.

Household wealth is negatively associated with the odds of having a girl-only family.

Compared with women in the poorest households, those in the poorer, middle, richer, and richest wealth quintiles have progressively lower odds, although the reduction for the poorer quintile is relatively modest ($OR = 0.947, p = 0.046$). Women in the richest households have approximately 15.5% lower odds than those in the poorest households ($OR = 0.845, p < 0.001$).

Educational attainment exhibits the opposite pattern. Compared with women with no formal education, those with secondary education have 16.3% higher odds of having a girl-only family ($OR = 1.163, p < 0.001$), while women with higher education have 48.1% higher odds ($OR = 1.481, p < 0.001$). This positive association is consistent with lower fertility and weaker son preference among more educated women after conditioning on parity.

Differences by caste and religion are comparatively modest after controlling for other socio-demographic characteristics. Among social groups, Scheduled Tribe women have marginally lower odds of having a girl-only family than Scheduled Caste women ($OR = 0.947, p = 0.012$), while differences for Other Backward Classes and other caste groups are not statistically significant. Muslim women have 10.5% higher odds of having a girl-only family than Hindu women ($OR = 1.105, p = 0.001$), whereas the difference for other religious groups is not statistically significant. Women residing in rural areas have 19.0% lower odds of having a girl-only family than their urban counterparts ($OR = 0.810, p < 0.001$), suggesting that son preference remains stronger in rural India.

Table 4: Logistic Regression Estimates for the Odds of Having a Girl-only Family

Variables	Odds Ratio	95% CI
Number of living children		
Living children	0.468***	(0.455, 0.481)
Age group (Ref: 15–24 years)		
25–34 years	0.879***	(0.844, 0.915)
35–49 years	0.869***	(0.831, 0.909)
Region (Ref: South)		
North	0.416***	(0.398, 0.434)
Central	0.490***	(0.461, 0.520)
East	0.813***	(0.769, 0.859)
North-East	0.952	(0.899, 1.008)
West	0.559***	(0.525, 0.595)
Wealth quintile (Ref: Poorest)		
Poorer	0.947*	(0.897, 0.999)
Middle	0.885***	(0.838, 0.935)
Richer	0.890***	(0.839, 0.944)
Richest	0.845***	(0.789, 0.905)
Education (Ref: No education)		
Primary	1.005	(0.953, 1.059)
Secondary	1.163***	(1.114, 1.214)
Higher	1.481***	(1.384, 1.584)
Social group (Ref: Scheduled Caste)		
Scheduled Tribe	0.963	(0.906, 1.023)
Other Backward Class	0.947**	(0.907, 0.988)
Others	1.006	(0.955, 1.060)
Religion (Ref: Hindu)		
Muslim	1.105***	(1.040, 1.174)
Others	1.061	(0.987, 1.139)
Place of residence (Ref: Urban)		
Rural	0.810***	(0.777, 0.845)
Observations	351,444	
Pseudo R^2	0.0979	
Wald χ^2	7469.80***	

Notes: Odds ratios are reported. Robust standard errors are clustered at the PSU level. Sampling weights are applied. Reference categories are shown in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

3.3.2 Age and Regional Gradients in the Odds of Having a Girl-only Family

Figure 14 presents the adjusted predicted probabilities of having a girl-only family by age group and region, derived from the logistic regression model with an interaction between age and region (See Table 5). The estimates are evaluated while holding parity and other socio-demographic characteristics constant, thereby isolating the joint association of age and region with the likelihood of having a girl-only family.

Three broad patterns emerge. First, substantial regional disparities persist after controlling for observable characteristics. Across all age groups, women residing in the South consistently exhibit the highest predicted probability of having a girl-only family, followed by those in the North-East and East. In contrast, women in the North and Central regions display the lowest probabilities, with the West occupying an intermediate position. These regional differences are consistent with the well-documented north–south gradient in son preference in India.

Second, the age gradient varies considerably across regions. In the South, the predicted probability increases modestly from approximately 16.5% among women aged 15–24 years to around 18% among women aged 35–49 years. This positive gradient suggests that, conditional on completed family size and other characteristics, older women in the South are more likely to have only daughters than younger women. One possible explanation is that declining son preference among younger cohorts has reduced the prevalence of completed girl-only families, although this interpretation should be viewed cautiously because the analysis is based on cross-sectional data.

In contrast, the North-East exhibits the opposite pattern. The predicted probability declines sharply with age, falling from nearly 20% among the youngest women to about 15% among women aged 35–49 years. Similar, albeit less pronounced, downward gradients are observed in the North, Central, East, and West. These findings indicate that the relationship between age and the likelihood of having a girl-only family is not uniform across India but depends strongly on the regional context.

Finally, despite these heterogeneous age trajectories, regional disparities remain substantial throughout the life course. The persistent advantage of the South and the relatively low probabilities observed in the North and Central regions suggest that contextual factors, including regional norms surrounding gender and fertility, continue to shape reproductive outcomes beyond individual socio-economic characteristics. Taken together, these findings reveal that the prevalence of girl-only families is shaped not only by family size

but also by the interaction between cohort and regional context. Even among women who have completed childbearing, substantial geographical disparities remain in the odds of having a girl-only family, highlighting the enduring influence of regional gender systems on reproductive behaviour.

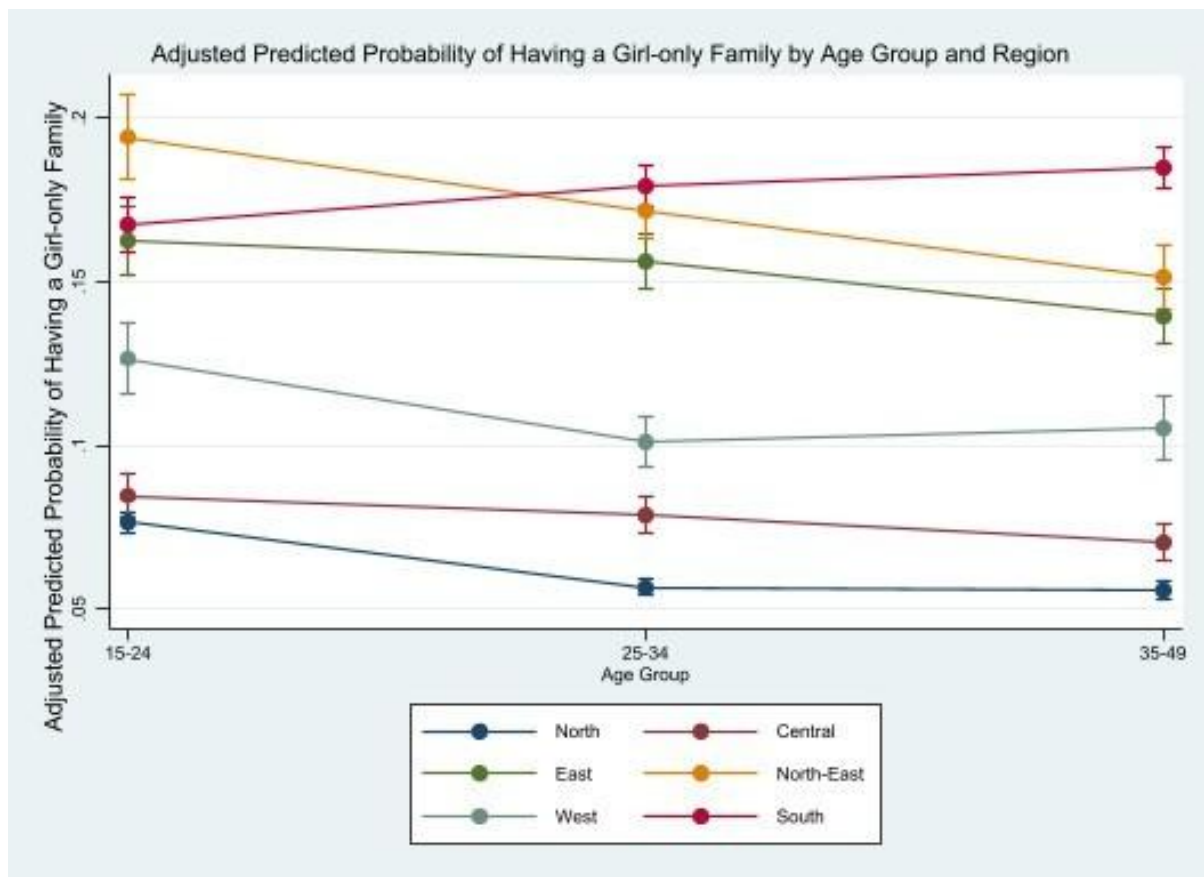


Figure 14: Adjusted Predicted Probability of Having a Girl-only Family by Age Group and Region

Notes: Predicted probabilities are estimated from a logistic regression model including an interaction between age group and region, controlling for the number of living children, household wealth, educational attainment, caste, religion, and place of residence. Error bars indicate 95% confidence intervals.

Table 5: Logistic Regression Estimates of the Probability of Being in a Girl-only Family:
Interaction of Age Group and Region

Variables	Odds Ratio	Robust SE	95% CI
Number of living children	0.472***	(0.0068)	[0.459, 0.486]
Age group (Ref: 15–24 years)			
25–34 years	1.089**	(0.0406)	[1.012, 1.171]
35–49 years	1.133***	(0.0433)	[1.051, 1.221]
Region (Ref: South)			
North	0.577***	(0.0230)	[0.534, 0.624]
Central	0.595***	(0.0320)	[0.536, 0.661]
East	0.974	(0.0508)	[0.879, 1.079]
North-East	1.244***	(0.0708)	[1.113, 1.391]
West	0.735***	(0.0449)	[0.652, 0.829]
Age × Region Interaction			
25–34 × North	0.656***	(0.0325)	[0.595, 0.723]
25–34 × Central	0.843*	(0.0571)	[0.739, 0.963]
25–34 × East	0.873*	(0.0550)	[0.771, 0.987]
25–34 × North-East	0.782***	(0.0521)	[0.686, 0.891]
25–34 × West	0.704***	(0.0548)	[0.604, 0.820]
35–49 × North	0.621***	(0.0319)	[0.561, 0.686]
35–49 × Central	0.714***	(0.0517)	[0.620, 0.823]
35–49 × East	0.729***	(0.0481)	[0.640, 0.829]
35–49 × North-East	0.641***	(0.0461)	[0.556, 0.738]
35–49 × West	0.709***	(0.0583)	[0.604, 0.833]
Wealth quintile (Ref: Poorest)			
Poorer	0.951	(0.0260)	[0.902, 1.004]
Middle	0.892***	(0.0250)	[0.845, 0.943]
Richer	0.896***	(0.0269)	[0.845, 0.950]
Richest	0.852***	(0.0299)	[0.796, 0.913]
Education (Ref: No education)			
Primary	0.999	(0.0270)	[0.947, 1.053]
Secondary	1.164***	(0.0256)	[1.115, 1.215]
Higher	1.492***	(0.0515)	[1.395, 1.597]
Caste (Ref: Scheduled Caste)			
Scheduled Tribe	0.964	(0.0298)	[0.907, 1.024]
OBC	0.944***	(0.0205)	[0.905, 0.985]
Others	1.012	(0.0270)	[0.960, 1.066]
Religion (Ref: Hindu)			
Muslim	1.099***	(0.0341)	[1.034, 1.168]
Others	1.063	(0.0389)	[0.989, 1.142]
Residence (Ref: Urban)			
Rural	0.809***	(0.0175)	[0.776, 0.844]
Observations		351,444	
Pseudo R^2		0.099	
Wald χ^2		7,689.29***	

Notes: Odds ratios are reported with robust standard errors in parentheses and 95% confidence intervals in brackets. Estimates are obtained from a weighted logistic regression with standard errors clustered at the primary sampling unit (PSU). The dependent variable equals 1 if the respondent has only living daughters and no living sons. Reference categories are: age 15–24 years, South region, poorest wealth quintile, no education, Scheduled Caste, Hindu, and urban residence. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

4 Discussion and Conclusion

In this paper, we investigate the proportion of girl-only (daughters-only) families in India. The relative scarcity of girl-only families in India is a direct demographic consequence of persistent son preference, which is realised through two principal mechanisms: parity progression (differential stopping behaviour) and prenatal intervention (sex selection). Couples who strongly desire at least one son often continue childbearing until a male child is born or resort to sex-selective abortion to achieve their preferred family composition. Consequently, the proportion of families consisting exclusively of daughters is substantially lower than expected under natural fertility conditions. It is in this context, the prevalence of missing girl-only families offers a novel and behaviorally grounded indicator of son preference. Unlike conventional measures such as the sex ratio at birth (SRB), child sex ratio (CSR), or stated fertility preferences, missing girl-only families represent the cumulative reproductive decisions that couples make in pursuit of a son. As such, they describe the realized reproductive behavioral bias rather than stated attitudes or demographic outcomes in isolation.

Beyond its unique feature as a demographic indicator of son preference, the prevalence of girl-only families serves towards a comprehensive and systematic understanding of social change. The demographic significance of girl-only families extends beyond their numerical representation. Emerging evidence suggests that daughter-only families may play an important role in transforming prevailing normative of familial arrangements. Declining fertility is expected to increase the proportion of daughters-only families. In the absence of sons, daughters are more likely to assume roles that have historically been reserved for male children, including providing financial support, inheriting family responsibilities, and caring for ageing parents (Allendorf, 2015, 2020). Such changes challenge conventional patriarchal norms that assign sons the primary responsibility for lineage continuation, old-age support, and ritual obligations. From this perspective, rising share of girl-only families defines an important pathway through which gender norms and intergenerational relationships can evolve. As daughters assume responsibilities traditionally associated with sons, they may contribute to weakening gendered divisions of labour within households and reducing the perceived economic and social advantages of having male children. These behavioural changes have the potential to reshape parental expectations regarding daughters and gradually erode the cultural foundations of son preference. However, the relative scarcity of girl-only families in India may slow down this process of social transformation. Because relatively few households experience life without sons, opportunities for observing daughters successfully fulfilling traditionally male roles remain limited. As a result, patriarchal institutions and gender

norms continue to be reinforced through prevailing family structures. The persistence of son preference therefore not only produces demographic distortions but also constrains the emergence of alternative family arrangements that could challenge and ultimately transform entrenched patriarchal systems.

In sum, missing girl-only families can be considered as an innovative indicator of gauging son preference. By focusing on the deficit of daughter-only family configurations rather than solely on skewed sex ratios or stated fertility preferences, this measure comprehends the cumulative behavioral consequences of son preference and offers new insights into how gender norms shape fertility decisions, family composition, and the persistence of gender inequality in contemporary India.

References

- Allendorf, K. (2012). Like daughter, like son? fertility decline and the transformation of gender systems in the family. *Demographic Research*, 27, 429.
- Allendorf, K. (2015). Fertility decline, gender composition of families, and expectations of old age support. *Population Research and Policy Review*, 34(4), 511-539.
- Bhat, P. M., & Zavier, A. F. (2007). Factors influencing the use of prenatal diagnostic techniques and the sex ratio at birth in India. *Economic and Political Weekly*, 2292-2303.
- Bhat, P. M., & Zavier, A. F. (2003). Fertility decline and gender bias in northern India. *Demography*, 40(4), 637-657.
- Clark, S. (2000). Son preference and sex composition of children: Evidence from India. *Demography*, 37(1), 95-108.
- Coale, A. J. (1991). Excess female mortality and the balance of the sexes in the population: An estimate of the number of "missing females". *The Population and Development Review*, 517-523.
- Das Gupta, M., & Mari Bhat, P. N. (1997). Fertility decline and increased manifestation of sex bias in India. *Population studies*, 51(3), 307-315.
- Dyson, T., & Moore, M. (1983). On kinship structure, female autonomy, and demographic behavior in India. *Population and development review*, 35-60.
- Guilmoto, C. (2009). Assessing the impact of fertility change and demographic masculinization on population structures in China and India: Century-long forecasts with and without high sex ratios at birth. *Population and Society*, 5 (1), 1-24.
- Guilmoto, C. (2012). *Sex imbalances at birth: Current trends, consequences and policy implications*.
- Guilmoto, C. Z. (2023). *Atlas of gender and health inequalities in india*. Springer.
- Gupta, M. D. (1987). Selective discrimination against female children in rural Punjab, India. *Population and development review*, 77-100.
- Jayachandran, S. (2017). Fertility decline and missing women. *American Economic Journal: Applied Economics*, 9(1), 118-139.
- Jayachandran, S., & Pande, R. (2017). Why are Indian children so short? The role of birth order and son preference. *American Economic Review*, 107(9), 2600-2629.
- Jha, P., Kesler, M. A., Kumar, R., Ram, F., Ram, U., Aleksandrowicz, L., ... & Banthia, J. K. (2011). Trends in selective abortions of girls in India: analysis of nationally representative birth histories from 1990 to 2005 and census data from 1991 to 2011. *The Lancet*, 377(9781), 1921-

1928.

- John, M. E. (2021). Sex selection, family building strategies and the political economy of gender. In *India's economy and society: Lateral explorations* (pp. 355–367). Springer.
- John, M. E., & Guilmoto, C. Z. (2024). Girl-only families in india. In *Atlas of gender and health inequalities in india* (pp. 97–105). Springer.
- Miller, B. (1981). *The Endangered Sex: Neglect of Female Children in Rural North India* (Ithaca, NY: Cornell University Press).
- Nagarajan, R., & Sahoo, H. (2019). Increasing acceptance of daughters in india: Trends, regional differentials and determinants. *Journal of Population and Social Studies*, 27 (2), 106–123.
- Pandian, R. K., & Allendorf, K. (2022). The rise of sonless families in asia and north africa. *Demography*, 59 (2), 761–786.
- Pande, R. P., & Astone, N. M. (2007). Explaining son preference in rural India: the independent role of structural versus individual factors. *Population Research and Policy Review*, 26(1), 1-29.
- Sahoo, H., & Nagarajan, R. (2020). “daughter-only” families in selected high and low son preference states in india: A comparative analysis. *Indian Journal of Human Development*, 14 (2), 234–256.
- Sen, Amartya (1990) “More Than 100 Million Women Are Missing” *The New York Review of Books*, 37(20), December 20, 1990.
- Sen, Amartya (1992) “Missing women” *British Medical Journal*, 304 (March), 587-588
- Sen, A. (2017). More than 100 million women are missing. In *Gender and justice* (pp. 219–222). Routledge.

5 Appendix

Table 6: Women Expecting to Live with Their Sons in Old Age, Relative Deficit of Girl-only Families, and Child Sex Ratio by State/UT

Sl. No.	State/UT	Expect to Live with Sons (%)	Relative Deficit (%)	Child Sex Ratio (2011)
1	HR	94.75	72.69	834
2	RJ	94.04	71.46	888
3	GJ	93.59	58.35	890
4	MN	93.55	42.22	936
5	DD	93.48	59.25	904
6	DN	92.45	59.25	926
7	JK	91.21	56.47	862
8	BR	90.76	66.23	935
9	MH	90.26	46.24	894
10	GA	87.10	28.59	942
11	MP	86.35	63.07	918
12	PB	85.81	64.37	846
13	OD	85.08	35.55	941
14	UP	84.47	56.38	902
15	CH	83.64	53.07	880
16	CG	83.45	41.98	969
17	HP	83.19	59.52	909
18	UK	83.13	57.83	890
19	WB	81.52	26.63	956
20	KA	77.94	31.41	948
21	AP	75.08	18.91	939
22	JH	73.81	55.30	948
23	TN	73.37	21.13	943
24	KL	73.30	1.06	964
25	AS	73.03	26.78	962
26	TR	72.50	15.73	957
27	SK	71.59	13.67	957
28	PY	53.06	4.15	967
29	MZ	40.00	19.79	970
30	AR	33.07	50.03	972
31	NL	18.92	40.72	943
32	ML	8.93	17.20	970

Notes: The second column reports the percentage of women who expect to live with their sons in old age based on IHDS-2. Relative deficit is defined as the percentage shortfall of the observed proportion of girl-only families from its expected proportion under the natural sex ratio at birth. Child Sex Ratio (CSR) denotes the number of girls per 1,000 boys aged 0–6 years from the 2011 Population Census.

State/UT abbreviations are as follows: AP = Andhra Pradesh, AR = Arunachal Pradesh, AS = Assam, BR = Bihar, CG = Chhattisgarh, CH = Chandigarh, DD = Daman & Diu, DN = Dadra & Nagar Haveli, GA = Goa, GJ = Gujarat, HP = Himachal Pradesh, HR = Haryana, JH = Jharkhand, JK = Jammu & Kashmir, KA = Karnataka, KL = Kerala, MH = Maharashtra, ML = Meghalaya, MN = Manipur, MP = Madhya Pradesh, MZ = Mizoram, NL = Nagaland, OD = Odisha, PB = Punjab, PY = Puducherry, RJ = Rajasthan, SK = Sikkim, TN = Tamil Nadu, TR = Tripura, UK = Uttarakhand, UP = Uttar Pradesh, and WB = West Bengal.