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The Dual Burdens of Disability and Gender Norms: Understanding disabled women's fertility in developing countries

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Abstract

How do disabilities affect fertility? Evidence remains scarce in developing countries, where disabilities and son preference are widespread. We construct retrospective panel data on fertility using a hand-collected survey in China. Since son preference is difficult to measure, we embed detailed One-Child Policy rules and existing children's sex composition into finite mixture models to uncover "patriarchal" and "non-patriarchal" types. We find that wives' disabilities significantly reduce childbearing, consistent with findings from developed countries. However, in patriarchal families—typically rural with older, educated husbands—wives' disabilities *increase* fertility, as childbearing continues until a son is born, seemingly exploiting the wives' disabilities.

Keywords: Fertility, disabilities, gender role, son preference, finite mixture logit, latent types, China
JEL classification: J13, I12, Z13, J16, J18

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I. Introduction

Disabilities, defined as conditions impairing functioning and capabilities, affect one in six people worldwide (World Health Organization 2023).[1] Globally, having children is not uncommon for couples in which one or both spouses have disabilities (hereafter referred to as "disabled couples"), as most do not face compromised fecundity (Rubenstein et al. 2022). People with disabilities, especially women, encounter additional hurdles (Trani et al. 2018), yet there is limited research on how disabilities affect fertility. In particular, there has not been studies from developing countries to date, even though 80% of the world's disabled population resides in these regions (UNDRR 2023).

Households in developing countries often rely on male children due to underdeveloped social welfare programs (Alesina et al. 2013; Almond et al. 2019). Sons are expected to continue the family lineage, inherit land and assets, and care for elderly parents (Hong-Chew et al. 2018). Driven by son preference, many couples, particularly those in rural and agrarian societies, adhere to son-biased fertility stopping and continue having children until a son is born (McCrary and Royer 2011). This common practice often leaves women voiceless in fertility matters (Gneezy et al. 2009).

The interaction of disability and son preference may place disabled women in a particularly vulnerable position. Disabled couples may have a strong preference for more children, particularly sons, due to a heightened need for long-term care and old-age financial support. This may result in continued childbearing, despite the significant challenges of childbearing and childrearing (Mitra et al. 2017). Additionally, men who struggle to find a suitable spouse may choose to marry a disabled woman as a compromise (Pan and Ye 2012). Such marriages are frequently driven by men's desire to continue their family lineage,[2] limiting disabled

[1] It is estimated that 1.3 billion people—16% of the global population—live with some form of disability (World Health Organization 2023).

[2] In recent years, cases of men marrying women with disabilities to carry on their family lineage have continued to be reported in China. For instance, a report by *The Paper* describes the case of Zhang, a 55-year-old man who married a 20-year-old woman with intellectual disabilities to have a child (see "20-Year-Old Mentally Disabled Woman Marries 55-Year-Old Bachelor," *The Paper*, March 5th, 2021: https://www.thepaper.cn/newsDetail_forward_11588825, last accessed on March 5, 2021). Similarly, a video titled "This Bride I Cannot Accept," reported by China Jiangxi Radio and Television on March 4, 2018, features a 27-year-old man who married a woman with intellectual disabilities to ensure family continuity. Another report by *Hebei Youth Daily* highlights a case in Shandong Province, where a man married a woman with intellectual disabilities, fathering nine children with the spouse (see https://kan.china.com/read/1176809.html, in Chinese, last accessed on July 11, 2021).

women's bargaining power despite the significant health risks associated with continued fertility and childbearing (Lambert and Rossi 2016; Gül and Koruk 2019).

This study provides the first empirical investigation into how fertility varies by disability status in developing countries and how this disability effect and son preference interact. Such research has been constrained by a lack of suitable data. We address this gap using a unique hand-collected survey conducted in 2019–2020 in central China, which oversamples the disabled population. Leveraging complete fertility histories from the survey, we construct annual retrospective panel data spanning 5 decades, tracking couples' fertility trajectories from the year of marriage to the survey year. We apply a hazard model to explore the effect of disabilities on the likelihood of childbirth and the effect heterogeneity across genders, disability types, and the degree of son preference.

Son preference, however, is difficult to measure based on the data (Gaudin 2011; Jayachandran 2017). We overcome this challenge by adapting the Heckman and Singer (1984) finite mixture logit (FML) model. This type of model has been used to identify unobserved (latent) types and alleviate potential selection bias caused by unobserved preference heterogeneity (Heckman and Singer 1984; Johar and Maruyama 2011). Our innovation is to embed detailed eligibility conditions under China's family planning policies (FPPs) into the FML model. We allow two latent groups to react differently to these eligibility conditions depending on the sex composition of their existing children. In this framework, the group whose fertility decisions are highly sensitive to whether they already have at least one son is considered the group with stronger son preference. To enhance the credibility of this data-driven approach, we conducted extensive archival research to document in detail the development of FFP exemption rules during our study period. The accuracy and richness of these exogenous policy variations are key to distinguishing groups with and without strong son preference. Once the groups with differing degrees of son preference are identified, we uncover how the effects of disabilities on fertility vary between them. Furthermore, this framework allows us to explore the determinants of group membership, namely, the types of couples more likely to exhibit strong son preference.

This study features three further novel aspects. First, the large-scale, first-hand survey dataset used in this study provides detailed information on disability severity, heritability, and type. These details allow for an in-depth exploration of effect heterogeneity and its underlying mechanisms, which few studies have explored. For example, individuals with more severe disabilities might face greater challenges in childbearing and childrearing. Concerns about passing on heritable disabilities may also dampen fertility. Distinguishing between intellectual or mental disabilities enables us to assess the extent to which the voice of the disabled spouse is reflected in fertility decision-making.

Second, China provides a unique setting to examine the role of son preference in fertility decisions among disabled couples. Son preference is deeply entrenched in China (Ebenstein 2010; Li et al. 2011; Hong-Chew et al. 2018; García 2024). The implementation of stringent FPPs further intensified this preference by drastically reducing fertility rates. As families were restricted to fewer children, the importance of each child increased, reinforcing the persistence of son preference (Guilmoto 2012; Mei and Jiang 2025). For disabled couples, whose fertility is also constrained by FPPs,[3] the preference for sons may be even stronger, as sons are often viewed as vital for financial security and long-term caregiving support.

Third, we revisit son preference, adding to the literature by quantifying its intensity at the family level by utilizing the membership equation of FML models. Existing studies have measured son preference through sex ratios at birth (Almond et al. 2019), parental resource allocation (Choi and Hwang 2015), son-biased fertility stopping behavior (Blau et al. 2020; Bhalotra et al. 2020), and stated preferences (Gaudin 2011; Jayachandran 2017). However, these approaches have limitations. While sex ratios at birth serve as a macro-level indicator of son preference when applied at the aggregate level, such as across countries or districts, they overlook family-level nuances. The parental resource allocation approach, which examines intra-household resource distribution, only applies to families with both boys and girls. The fertility stopping behavior approach, which infers son preference by observing the tendency to cease childbearing following the birth of a son, effectively identifies son preference within households but does not fully measure its intensity or variation across families. Similarly, survey-based explorations of stated preferences—though insightful—often face gaps between reported attitudes and actual behaviors. Our proposed method seeks to address these limitations

[3] Under certain conditions, such as when the first child was diagnosed with a non-hereditary disability, couples were permitted to have a second child.

by offering a behaviorally anchored measure that quantifies both the presence and strength of son preference at the family level.

This work advances the broad literature on disabled women's fertility. Existing studies, exclusively from developed countries, highlight lower fertility rates among women with disabilities compared to their non-disabled counterparts (Helbig et al. 2010; Gül and Koruk 2019; O'Connor-Terry and Harris 2022). This gap has been attributed to biological, behavioral, and social factors. Studies have shown that women with disabilities are less likely to conceive a child or complete a pregnancy and often encounter challenges during the delivery process (Gül and Koruk 2019). Additionally, concerns about their ability to care for children and the potential risk of passing on disabilities may influence their fertility decisions (Helbig et al. 2010). Limited access to reliable information on pregnancy and reproductive healthcare further exacerbates these challenges (O'Connor-Terry and Harris 2022). Moreover, negative societal attitudes often discourage women with disabilities from pursuing parenthood (Tarasoff et al. 2019).

This paper also informs policy discussions on the unique challenges faced by disabled women, particularly in fertility, and their broader welfare implications. While the world has become more accessible to people with disabilities in various ways, research has shown that disabled individuals in developing countries remain socioeconomically marginalized, facing barriers in healthcare, education, and employment (Mizunoya and Mitra 2013) and a heightened risk of poverty (Mitra et al. 2013; Trani et al. 2018). Women with disabilities, in particular, experience compounded challenges due to gender-specific deprivations, including limited autonomy in family decisions (Gül and Koruk 2019), exploitation, and heightened exposure to violence (Ghosh et al. 2022). By examining fertility-related challenges, this study underscores the need for targeted welfare policies that address specific vulnerabilities.

Our findings are summarized as follows. First, consistent with studies from developed countries, wives' disabilities—especially severe and physical ones—negatively affect fertility, with stronger impacts on the extensive margin (first child) than the intensive margin (additional children). Second, the FML models uncover two latent groups, "patriarchal" and "non-patriarchal," where the patriarchal group comprises approximately 60% of couples, mainly rural families with older, highly educated husbands. Third, in patriarchal families, wives' disabilities are associated with *higher birth rates*, indicating that these couples adhere to fertility stopping rules tied to son preference rather than FPP regulations, continuing to have children until a son is born. This pattern suggests the exploitation of disabled women and is most pronounced in poorer and mountainous regions and among socially isolated couples. These findings underscore the need for targeted policy support for disabled women in developing countries with strong son preference.

II. Background

A. Disabled Population in China

China has a substantial and growing disabled population. According to two large-scale, nationally representative surveys conducted in 1987 and 2010, the number of individuals with disabilities increased from 52.7 million to 85.02 million, with the prevalence rate increasing from 4.9% to 6.34% (China's Disabled Persons' Federation 2021). Despite this growth, the reported figures remain below the global average of 16%, a discrepancy partially attributed to China's stricter criteria for defining disability compared to international standards.[4]

To address the needs of disabled individuals, the Chinese government has introduced various legislative and policy measures in healthcare, education, employment, social welfare, and poverty alleviation (China SCIO 2019). However, these benefits are available only for individuals with an official disability certificate, which requires a lengthy application and verification process.[5] By 2023, only 37.8 million people—approximately 44% of the disabled population—had been officially recognized, leaving the majority excluded from support programs. Research shows that 43% of people with disabilities over the age of 15 are reported to be illiterate (World Disability Union 2013), approximately half have unmet rehabilitation

[4] The World Health Organization's International Classification of Functioning, Disability, and Health defines disability across three dimensions: body functions and structures, activities, and participation, covering a broad spectrum of disabilities. In contrast, China's disability classification focuses on medical criteria, particularly impairments in body functions and structures (see https://www.gov.cn/ztzl/gacjr/content_459939.htm, last accessed on December 2, 2006, for more details).

[5] Individuals who believe they have a disability first visit a government-designated hospital, where a qualified doctor assesses their condition. Once the disability is confirmed, the doctor issues a medical certificate detailing the type (visual, hearing, speech, physical, intellectual, mental, or multiple disabilities) and severity (mild, moderate, or severe). The individual then submits this certificate, along with other required documents (including personal photos, a copy of the ID card, family information, etc.), to the China Disabled Persons' Federation. If the application is approved, the individual receives an official disability certificate, which is necessary to access disability-related benefits and services.

needs (Zhao and Wang 2021), and over 90% rely primarily on family members for care (Zheng et al. 2016). These findings reveal substantial deficiencies in the formal support system.

Regarding marriage and fertility, women with disabilities often have limited autonomy, especially in regions where patriarchal norms dominate. In rural areas, marriages between men and disabled women persist, often driven by these men's desire to continue their family lineage (Pan and Ye 2012). Within these marriages, disabled women often face pressure to have more children despite the health risks of repeated childbirth and often lack appropriate public support due to limited awareness of the cultural factors that challenge disabled women (Shang et al. 2014).

B. Family Planning Policies in China and Declining Fertility

Figure 1 illustrates the evolution of FPPs and the total fertility rate (TFR) in China. The country experienced a surge in fertility rates in the 1960s, with the average woman having six children. To curb population growth, the government introduced the "Later, Longer, Fewer" Policy (LLF) in 1971, which encouraged delayed marriage, longer birth intervals, and fewer children. Although voluntary, the LLF policy included coercive elements that rapidly reduced the TFR. In 1979, China implemented the stringent One-Child Policy (OCP), restricting most couples, including disabled couples, to having one child. However, early enforcement of the OCP was relatively lenient (Zhang 2017). Some rural couples evaded OCP restrictions on having additional children by migrating, hiding pregnancies,[6] falsely reporting "fake twins" (Huang et al. 2016), or engaging in interethnic marriages (Huang et al. 2023).

Thereafter, local governments gradually introduced a series of relaxations. As shown in Figure 1, between 1982 and 2014, the Early Restricted Two-Child Policy was rolled out across provinces, allowing couples in which both spouses were only children to have a second child. Concurrently, between 1985 and 2012, most provinces gradually adopted the One-and-a-Half Policy, which permitted rural couples with a firstborn daughter to have a second child. Despite these exemptions, fertility control remained strict during the 1980s, and many couples did not

[6] In 1992, China's Spring Festival Gala included a skit titled *Guerrilla Fighters of Excess Births*, which portrayed a couple circumventing the One-Child Policy by migrating to avoid penalties for having additional children (Source: https://tv.cctv.com/2011/01/19/VIDEJ9hmUiuHgEBJ6tmXOQCO110112.shtml, last accessed on January 19, 2011).

meet the criteria for having a second child. Consequently, fertility rates continued to decline, falling to an average rate of 1.8 children per woman by 2012.

To reverse this declining fertility trend, China introduced three waves of nationwide policy relaxation in the recent decade. In 2014, China eased the OCP with the Restricted Two-Child Policy, allowing couples in which either spouse was an only child to have a second child. In 2016, China ended the OCP after over 3 decades, introducing the Universal Two-Child Policy, which permitted couples in which neither spouse is an only child to have a second child. In 2021, the policy was further expanded to allow all couples to have up to three children.

[Figure 1 about here]

C. Persistent Son Preference in China

Globally, son preference has evolved in diverse ways. In many developed nations, evidence suggests that son preference has diminished—or even reversed. For example, South Korea has experienced a decline in son preference (Choi and Hwang 2015), and in the United States, it has largely disappeared among native populations (Blau et al. 2020). Moreover, several European countries now exhibit a preference for daughters (Cukrowska-Torzewska and Grabowska 2023).

In stark contrast, son preference remains deeply entrenched in many developing countries. In China, this preference has not only persisted but become more deeply entrenched. Research indicates that the implementation of stringent FPPs, such as the LLF and OCP—which restricted families to fewer children—significantly amplified the importance of each child, thereby reinforcing the desire for male children (Guilmoto 2012; Mei and Jiang 2025). Specifically, when fertility rates were high, families were more likely to have at least one son by chance. However, the constraints imposed by FPPs significantly amplified the pressure to secure a male child. This intensification is further evidenced by two measures of son preference: the persistent observation of son-biased fertility stopping behavior, in which families with a firstborn daughter often continue having children in the pursuit of a son (Ebenstein 2010; Li et al. 2011; Mei and Jiang 2025; García 2024), and China's exceptionally high sex ratio at birth, which remains the highest globally (Chao et al. 2019; UN 2024).

III. Data and Variables

This study utilizes data from a hand-collected survey administered by Renmin University of China between October 2019 and June 2020. The survey was carried out in Xin County, Henan Province, a region in central China (see Figure A1 for the location). Xin County's disability rate is approximately 8%, slightly above the national average of 6.4%. Such variations are common, as disability rates often differ due to local socioeconomic conditions, healthcare access, and environmental factors. The higher disability rate in Xin County allows for a more in-depth examination of the challenges faced by disabled individuals in this study. Additionally, the county's GDP per capita in 2020 is close to the national county average, making it a suitable location for studying the disabled population.

With authorization from the local government, we accessed the name list of all household heads and disabled individuals with disability certificates. We employed a one-to-one oversampling strategy, surveying roughly equal numbers of households with and without disabled members. Specifically, we relied on village leaders familiar with local families to confirm whether household heads resided in the village and to identify families with disabled individuals. In our study, disabled individuals included both those with official disability certificates and those without certificates but exhibiting visible disabilities, with the latter group further identified by the village leaders. We then classified the household heads into disabled and non-disabled groups and randomly sampled roughly equal numbers of households from each group within each village based on the village population.

The surveys were conducted by local leaders, who are trusted by local families, increasing households' willingness to participate and provide honest responses. In cases where individuals had severe disabilities or intellectual impairments that prevented them from answering questions, their family members responded as proxies, ensuring data accuracy and reliability. For additional details on the survey design, see Appendix A1.

A. Constructing Retrospective Panel Data

We extracted a dataset of wife–husband pairs[7] from the survey data and expanded the cross-sectional data into a retrospective panel dataset, with the unit of observation being a couple-year. Specifically, using the complete fertility history of the sample women (all children's birth years), we constructed every woman's fertility outcome for each calendar year.[8]

Studies on this topic primarily rely on cross-sectional analysis, which typically compares the number of pregnancies or children between disabled and non-disabled populations at the survey date. Using a retrospective annualized panel offers several benefits. First, it enables the analysis of both recent birth cohorts (who have not finished their fertility stage) and older birth cohorts by defining fertility outcomes precisely by year, regardless of their remaining reproductive period. Second, it facilitates controlling for time-varying factors, such as age, the number of existing children, and years since marriage, minimizing biases due to potential misspecification. Third, it allows us to incorporate the evolution of exogenous FPPs into the annual FML framework, as detailed in the next section.

Our analysis includes couple-year observations starting from the time of marriage. We restricted the sample to couples in which both spouses were born between 1930 and 2000 due to the limited number of observations outside this range (see Figures A2 and A3 for their distribution). We further restricted the sample to couple-years in which wives were aged 12 to 45 and husbands were aged 14 to 65, as childbirth outside these age ranges is rare (see Figure A4 for age distributions). We limited the study period to 1960–2019 due to the small number of observations before 1960 and partial birth coverage in 2020. We also excluded couples who had children before marriage, as their fertility patterns may differ.[9] The final sample comprises 6,579 couples and 123,690 couple-year observations (see Figure A5 for the distribution). Tables 1 and 2 present the definitions and summary statistics of the main variables, respectively.

[Table 1 about here]

[7] We excluded individuals who were divorced or widowed before the survey year. The potential bias from higher divorce or widowhood rates among disabled individuals is minimal in our study. The incidence of divorce in our sample is only 1.17%, hence their exclusion is unlikely to affect the results. Additionally, 98.3% of widowed women are over 45, an age typically beyond childbearing years, hence widowhood does not significantly affect fertility rates in our study.

[8] Children include both co-residing and non-co-residing children. Miscarriages, early child mortality, and adopted children are excluded from the analysis due to data limitations. However, these cases are rare and excluding them is unlikely to significantly affect our results.

[9] Such cases were rare in 20th–century China. In the analysis sample, only 91 couples had children before marriage.

B. Disability Status

Based on the self-reported question, "When (in which year) did your disability occur?" we constructed disability status as a time-varying variable. This disability indicator was set to 1 in the year following the reported incidence and all subsequent years. For individuals who experienced disability prior to marriage—accounting for 70% of disabled persons in our sample—the variable was set to 1 for the entire study period. Additionally, we classified disabilities across three dimensions: severity (mild, moderate, or severe), heritability (heritable or non-heritable), and type (intellectual or mental, physical, or sensory).[10]

We divided the sample into four groups based on the disability status of each spouse: (1) both non-disabled (DW = 0, DH = 0), (2) disabled wife and non-disabled husband (DW = 1, DH = 0), (3) non-disabled wife and disabled husband (DW = 0, DH = 1), and (4) both disabled (DW = 1, DH = 1). Using census data, local records on individuals with disabilities, and our survey data, we determined the distribution of couples in Xin County in 2020 by disability status as follows: 95.8% had no disabled spouse, 2.4% had a disabled wife, 1.4% had a disabled husband, and 0.4% had both spouses disabled (see Table A1).[11]

Panel A of Table 2 presents the number and percentage of women and men with disabilities, classified by severity, heritability, and type. Most individuals did not have severe disabilities. However, notable gender differences exist in heritability and disability type. Regarding heritability, 17% of disabled women had heritable disabilities, compared to 7.55% of disabled men. As for disability type, intellectual and mental disabilities were more common among women (47.14%), while physical disabilities were more prevalent among men (61.48%). The high marriage rate among women with intellectual and mental disabilities in China often reflects their limited autonomy in marriage and fertility decisions, with many marriages arranged or heavily influenced by family members (Pan and Ye 2012; Huang et al. 2022).

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[10] See Appendix A3 and Figure A6 for further details on disability classification.

[11] As mentioned in Section II.A, the official disability rate is 8.05%. However, the actual disability rate we calculated for couples was lower and inconsistent with the official figure. This is because our sample is limited to married couples in which the wife is under 45 and the husband is under 65. Older couples, who make up a significant portion of the population, and younger couples, are not included in this sample. Additionally, there are nearly twice as many disabled wives compared to disabled husbands, largely due to the fact that disabled men in China often struggle to marry, whereas non-disabled men may marry disabled women to fulfill their fertility desires, particularly in regions with a strong preference for having children (Pan and Ye 2012).

C. Fertility Rates

The outcome variable y_{it} is defined as whether couple i had a birth in year t. Over the past 5 decades, Xin County has experienced a sharp decline in fertility rates, though they have remained consistently higher than the national average (see Figure A7). Panel B of Table 2 presents fertility patterns according to couples' disability status. Non-disabled couples (DH = 0, DW = 0) exhibited the highest fertility rate (0.096), while couples with only a disabled husband (DH = 1, DW = 0) had the lowest fertility rate (0.067). Couples with a disabled wife (DH = 0, DW = 1, or DH = 1, DW = 1) maintained relatively higher fertility rates—whether only the wife was disabled (0.086) or both spouses were disabled (0.085, not shown in the table). This trend persists over time (Figure A8). Despite general fertility declines across all groups, couples with a disabled wife consistently reported higher fertility rates than those with a disabled husband, indicating nuanced gender differences in disabled couples' fertility patterns.

[Table 2 about here]

D. Eligibility for the Next Child

We construct an indicator of eligibility for the next child based on Xin County's detailed regulations, which followed Henan Province's FPP guidelines. In 1979, all Han couples were restricted to having only one child. From 1984 to 1990, rural couples in which both spouses were only children were allowed to have a second child. This exemption was revoked in 1991 but reinstated in 2012. Additionally, in 2012, another exemption was introduced, allowing rural couples whose first child was a daughter to have a second child. In 2014, the policy was further relaxed, allowing a second child for couples in which either spouse was an only child. In 2016, all couples were allowed to have a second child.

The eligibility indicator takes the value of 1 if the couple is allowed to give birth to a second child in year t and 0 otherwise. This indicator was coded based on the policy status as of July 1 in year t, with any policy change in the second half of the year attributed to the following year's eligibility status to account for the time lag between conception and birth. The proportion of couples prohibited from having additional children varied over time and between rural and urban areas. From 1980 to 2012, over 80% of all couples and nearly 100% of urban couples were ineligible to have another child (see Figure A9).

We use this variable to infer latent preferences for sons. Specifically, we examine whether couples responded differently to eligibility conditions by the sex composition of their existing children and, in particular, whether couples violated FPP restrictions when their first child was a daughter.

E. Other Explanatory Variables

We control for a range of individual- and couple-level characteristics that may influence fertility outcomes. These covariates include both time-varying and time-invariant variables. Time-varying variables encompass whether couples already had a son, whether they were eligible to have another child under FPPs, the number of existing children, age group dummies (every 2 years for wives and every 5 years for husbands), and years since marriage. Time-invariant variables include each spouse's years of schooling and the couple's location (urban or rural) at the time of survey. Table 1 summarizes the definitions of these variables.

Panel B of Table 2 provides the descriptive statistics of these variables by disability status. Over 60% of couple-year observations involved couples who already had a son and were restricted from having a second child, regardless of disability status. The proportion of couples without prior children was higher when the wife was disabled: 20.5% when both spouses were disabled (not shown in Table 2) and 15.6% when only the wife was disabled, compared to 9.9% when only the husband was disabled. Despite this, childbearing was prevalent among disabled couples, with approximately 80% of their couple-year observations indicating at least one child.

The average age was 33.4 for women and 35.6 for men. The level of education shows significant disparities by disability status, especially for women. Illiteracy rates (i.e., no formal education) were higher among wives in disabled couples, with 43% (DW = 1, DH = 0) and 44% (DW = 1, DH = 1) of women being illiterate, compared to 18.5% (DW = 0, DH = 0) and 16.2% (DW = 0, DH = 1) for couples in which the wife was not disabled. This disparity was not observed for husbands. The share of husbands who had at least 9 years of education was 70% in couples in which the husband was disabled but the wife was not (DW = 0, DH = 1), compared to 63% in couples in which neither spouse was disabled. In couples in which both spouses were disabled (DW = 1, DH = 1), 22% of husbands were illiterate, 41% had only 5 years of schooling, and 37% had more than 8 years of education (not shown in Table 2).[12]

In the analysis, we distinguish groups with varying degrees of son preference by focusing on how the effect of disability varies by the number of children, whether couples already had a son, and whether they were restricted from having another child. These variables are helpful in gauging son preference through observed fertility outcomes. Couples with strong son preference may prioritize the sex of the child over the total number of children, with their fertility declining once a son is born, in contrast to those with weak son preference. Moreover, couples with strong son preference may be willing to violate FPP regulations and have another child if they do not yet have a son.

IV. Empirical Strategy

Our objective is to understand the influence of disabilities on fertility outcomes and how the disability effect varies by disability type and son preference. The dependent variable $y_{it} \in \{0, 1\}$ is an indicator variable for whether couple $i \in \{1, \cdots, N\}$ gave birth to a child in year *t*. Assuming a latent construct, $y_{it}^* \in R$, we first analyze this binary outcome using the following logit model:

$$y_{it}^* = X_{it}\beta + \varepsilon_{it} , \tag{1}$$

where X_{it} is a vector of covariates, and ε_{it} independently follows a logistic distribution.[13] We observe $y_{it} = 1$ if $y_{it}^* > 0$. The probability of couple *i*'s childbirth in year *t* is given by:

$$Pr(y_{it} = 1|X_{it}) = \Lambda(X_{it}\beta) = \frac{\exp(X_{it}\beta)}{1 + \exp(X_{it}\beta)} , \tag{2}$$

where $\Lambda(\cdot)$ is a cumulative distribution function of logistic distribution. We can estimate this model by maximizing the following log-likelihood function:

$$ln\, L = \sum_{i=1}^{N} ln\, l(\beta|y_{it}, X_{it}) , \tag{3}$$

where

$$l(\beta|y_{it}, X_{it}) = \Lambda(X_{it}\beta)^{y_{it}} \cdot [1 - \Lambda(X_{it}\beta)]^{1-y_{it}}. \tag{4}$$

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[12] These patterns still hold if we calculate numbers using couple-level data.

[13] This model also has a random-utility interpretation, where y_{it}^* is a latent utility, and the couple makes an optimal fertility decision depending on whether $y_{it}^* > 0$, though we do not restrict our interpretation in this study to the random utility framework.

This logit model treats the data as pooled cross-sections and does not utilize the panel structure. To take advantage of the panel structure of our annualized data, we extend the above model to a Heckman and Singer (1984)-type FML model, which extends the traditional logit model by allowing for unobserved heterogeneity. It assumes that the population consists of multiple latent subgroups or "types" with varying intercepts (and potentially slope parameters). The FML approach has two advantages. First, it addresses concerns about selection bias. The fact that our data are a panel raises concerns about the consistency of estimates when there is unobserved heterogeneity. Even when we assume that unobserved heterogeneity is uncorrelated with any of the regressors and that there is no substantial omitted variable, our estimates may be biased, unlike in the usual cross-sectional linear model setting. By construction, our logit model is a discrete analog of the duration model with an exponential hazard. In the duration literature, it is generally acknowledged that the neglect of unobserved heterogeneity may lead to underestimation of the slope of the hazard function, which is the basis for the use of the mixture hazard function (Heckman and Singer 1984; Johar and Maruyama 2011). In our setting, couples remain in our sample after birth, hence we do not suffer from underestimation due to selective survival, but a similar selection bias may still exist. To understand this point, consider couples with a higher desire for children. If such a desire is unobservable and such couples tend to marry early and appear in the data more often, the failure to control for an unobserved desire for children may lead to an upward bias in the estimated slope parameter. The FML model alleviates this bias by explicitly modeling unobserved heterogeneity.

The second advantage of the FML model, which is more relevant to our study, is that it allows us to learn about relevant types that cannot be observed directly in the data. This advantage is particularly powerful when we allow the slope parameters to vary by type and allow the type of membership probability to depend on observed variables, as the results of such a model provide useful information about the latent types. In particular, we include variables closely related to son preference, such as eligibility for a second child and whether the couple already has a son. By allowing their slope parameters to vary, we can distinguish between groups with different degrees of son preference. Unlike widely used subsample analyses, this is a data-driven approach to detect heterogeneous groups that are otherwise unobserved (Johar and Maruyama 2011), as the groups are not directly observed or imposed a priori but are inferred from the data through the model.

In our setting, we allow for two latent types, $c \in \{1, 2\}$.[14] The probability that couple i belongs to Type 2, denoted by $\pi_i \in (0, 1)$ (also called the mixing probability), is given by the following membership equation:

$$\pi_i(\eta|Z_i) = \frac{exp(Z_i\eta)}{1 + exp(Z_i\eta)}, \tag{5}$$

where Z_i is a vector of couple i's time-invariant characteristics relevant to the membership assignment, associated with its coefficient parameters η. Couple i's likelihood contribution is:

$$\begin{aligned} l_i &\equiv l\big(\beta^1, \beta^2, \eta | y_{i1}, y_{i2}, \cdots, y_{iT_i}, X_{i1}, X_{i2}, \cdots, X_{iT_i}, Z_i\big) \\ &= \pi_i(\eta|Z_i) \prod_{t=1}^{T_i} \{\Lambda(X_{it}\beta^1)^{y_{it}} \cdot [1 - \Lambda(X_{it}\beta^1)]^{1-y_{it}}\} \\ &+ \big(1 - \pi_i(\eta|Z_i)\big) \prod_{t=1}^{T_i} \{\Lambda(X_{it}\beta^2)^{y_{it}} \cdot [1 - \Lambda(X_{it}\beta^2)]^{1-y_{it}}\}, \end{aligned} \tag{6}$$

where β^1 and β^2 are coefficient parameters specific to Type 1 and Type 2, respectively. The entire model is estimated by solving the following maximum likelihood problem:

$$\max_{\{\beta^1, \beta^2, \eta\}} ln\, L = \sum_{i=1}^{N} ln\, l_i \ . \tag{7}$$

Generally, the identification of the FML model is challenging, and allowing all covariates to vary by type is practically infeasible. Hence, we estimate several parsimonious specifications, allowing a small number of relevant coefficients to vary by type. Similarly, we carefully choose a parsimonious but relevant set of time-invariant variables, Z_i.

In the full model, we choose a set of variables related to son preference and allow them to have type-specific coefficients. These variables include the number of existing children, whether the couple already had a son, and whether the couple was eligible for additional children. If the FML model identifies substantial differences in the roles of these variables by latent type, it allows us to infer varying degrees of son preference by type. The estimated coefficients on Z_i in Equation (5) also provide insights into the characteristics of the identified

[14] We did not attempt to estimate a model with more than two latent types. Although it is theoretically possible, the identification is more challenging, and the computational burden is formidable. Moreover, we do not have any strong a priori theoretical motivation to expect three or more distinctive types.

types. Z_i consists of dummies for husbands' education level, the age and education gaps between the husband and wife, and an indicator for living in an urban area. These variables are chosen following Doepke and Tertilt (2009, 2018), who explored both patriarchal and equal household bargaining settings. In patriarchal settings, where husbands have a significant influence on fertility decisions (Doepke and Tertilt 2009), we expect that the husband's education may play an important role in shaping son preference. In a household bargaining context, where spouses negotiate over fertility, education and age gaps between spouses reflect the wife's bargaining power and hence influence the fertility decision (Doepke and Tertilt, 2018). Additionally, we expect stronger son preference in rural areas, where traditional norms remain.

V. Results

A. Baseline Results

Table 3 presents the results of the baseline Logit and FML models. The table reports the marginal effect of each independent variable in each model, followed by the coefficient estimate and its standard error in square brackets and parentheses, respectively. Appendix B provides details of the marginal effect calculation.

Logit[1] controls for the variables described above. Logit[2] incorporates village and year fixed effects to capture unobserved factors such as local culture and county-level fertility trends. The result of Logit[1] in Column (1) shows that disabilities (DW and DH), especially wives' disabilities (DW), lower fertility. The likelihood of disabled women giving birth each year is 1.7 percentage points lower than that of non-disabled women, with statistical significance at the 0.1% level. For disabled men, the probability is 0.9 percentage points lower than for their non-disabled counterparts, with statistical significance at the 5% level. These negative effects of disabilities suggest a greater cost and reluctance for a child, as giving birth and raising another child can be a formidable task for disabled parents.

The coefficient estimates of the other control variables exhibit the expected signs. Fertility declines with the number of children, the presence of a son, and FPP restrictions. Age group indicators show an inverse U-shape (see Table C1). Women around age 25 exhibit the highest fertility rates, and the same pattern holds for men, with the peak in their late 20s. These findings are consistent with the fact that biological fecundity declines with age. Marriage duration also influences fertility. Couples married for over 11 years are 4% less likely to have a child in a given year than those with shorter marriages, suggesting many couples cease childbearing after 10 years. Wives' education does not significantly affect fertility, whereas husbands with secondary education or higher have greater fertility. This aligns with research suggesting that men with higher education are more likely to have greater economic resources and accumulated wealth, which can facilitate their ability to support larger families (Doepke et al., 2023). Alternatively, men with higher education tend to dominate fertility decisions in less-developed regions (Jayachandran, 2015). Finally, urban residency is associated with lower fertility, consistent with studies on urbanization's impact on fertility (Bloom et al., 2009). The results in Column (2) are consistent with those in Column (1), even after controlling for village and year fixed effects.

The baseline FML model, FML[1], allows the constant term and the slope parameters of five dummy variables of the number of children, a son, and the FPP restriction to vary by type.[15] The result of FML[1] in Table 3 spans over two columns since the above coefficients have two estimates, one for each type. FML[1] estimates simultaneously the membership equation, with its result presented in Panel B in the bottom of the same table. The coefficient estimates of the membership equation indicate what type of couples are more likely to belong to Type 2.

The coefficient estimates of FML[1] in Panel A demonstrate robust negative effects of disability on fertility, with wives' disabilities having a larger impact than husbands' disabilities. Their effect sizes are similar to Logit[1] and Logit[2], suggesting that bias due to the selection on omitted types is not a major concern. In the meantime, FML[1] reveals two distinct types with stark contrasts in fertility behavior. Specifically, Type 1 couples follow the FPP restriction, and whether they already have a son does not influence their fertility behavior. Their fertility declines sharply as the number of children increases, indicating a diminishing marginal return of having another child. In contrast, Type 2 couples reduce their fertility once they have a son,

[15] We choose the set of controls in the FML models to be the same as in Logit[1]. We find that including village and year fixed effects makes the identification of FML models challenging.

but they do not mind exceeding the limit set by the policy, if necessary.[16] The fertility decline with the number of children is steeper for Type 2 than for Type 1, indicating their interest in a son, not the number of children. The results show that Type 2's fertility pattern is consistent with what is implied by son preference, while Type 1's is not. Hence, we labeled Types 1 and 2 as "non-patriarchal" and "patriarchal," respectively. Hereafter, we use these terms without quotation marks, but they should be interpreted solely as labels for the two types identified by our FML models. FML[1] further reveals that 42.2% of couples fall into Type 1, while 57.8% belong to Type 2.

The results in Panel B indicate that patriarchal couples typically live in rural areas. This finding aligns with the existing literature highlighting the prevalence of son preference in rural regions with limited social security (Alesina et al., 2013; Almond et al., 2019). The husband's education increases the probability of the couple being classified as patriarchal. Since this is correlated with the wife's education, and their education gap is not statistically significant, this largely captures the couple's education level. While families with low socioeconomic status (SES) have a greater need for future security, high-SES families may have a stronger incentive to maintain the family lineage. Interestingly, the husband's age relative to the wife's age increases the likelihood of belonging to the patriarchal type. This variable may capture wives' bargaining power, which tends to place less emphasis on family lineage. These results suggest that a husband's SES and bargaining power play more decisive roles in shaping fertility decisions in more patriarchal households with traditional gender norms.

[Table 3 about here]

B. Heterogeneity of Disability Effects

The effect of disability on fertility may depend on the nature of the disability. Table 4 shows the effect heterogeneity by disability severity (Panel A), heritability (Panel B), and type (Panel C). Panel A shows that more severe disabilities lower fertility to a greater extent, regardless of whether it affects the wife or husband. This result does not conform with the old-age security

[16] The coefficient on "*Next_unallowed*" for Type 2 is positive and statistically significant. A positive coefficient seems counterintuitive, but it may arise due to an underlying correlation or interaction with the number of children and their sex composition. For example, "*Next_unallowed*" necessarily implies one or more children. Given the identification challenge of the FML models, disentangling these interactions in detail is difficult, and we do not attempt to interpret this coefficient further. Additionally, the magnitude is relatively small.

hypothesis, which asserts that more severe disabilities imply a greater need for care from children. Instead, it highlights the significance of other channels, such as the cost and difficulty of conceiving and raising a child. As far as mild and moderate disabilities are concerned, wives' disabilities lower fertility, but husbands' do not. These gender differences support the observation in Table 3 that wives' disabilities have a stronger negative effect on fertility than husbands' disabilities.

Panel B of Table 4 shows that the heritability of disabilities matters differently between men and women. For men, the negative disability effect on fertility is primarily driven by heritable disabilities, likely because heritable disabilities weaken the incentive to maintain the family lineage. For women, such a pattern does not hold; both disabilities reduce fertility, with nonheritable disabilities exhibiting an even slightly larger effect. In patriarchal societies, women with heritable disabilities may still be valued mainly for their ability to have children, with their disabilities often overlooked or tolerated as long as fertility remains unaffected.

Panel C of Table 4 shows that physical disabilities hinder fertility to the greatest extent among all types for both wives and husbands.[17] While "other" types show weak and negative effects for both wives and husbands, intellectual and mental disabilities lower fertility only in the case of wives, and this negative effect is not stronger than the negative effect of wives' physical disabilities. These findings further challenge the old-age support hypothesis, which posits negative and stronger effects of intellectual and mental disabilities than other types because rational and forward-looking couples with disabilities would rationally choose to have more children in anticipation of future care needs, and, hence, most disabilities would increase the likelihood of childbirth, except for intellectual and mental disabilities. However, the results do not align with these expectations. Overall, the findings in Table 4 do not support the idea that disabled couples are more likely than their non-disabled counterparts to have children as a strategic response to increased old-age care needs.

[Table 4 about here]

[17] Perhaps physical disabilities may be associated with challenges for conception and successful childbirth. However, compared to the "other_type" group, which presumably faces a lower biological hurdle to conceive and deliver a child than the "physical" group, there is no robust and strong indication that intellectual and mental disabilities reduce fertility to a greater extent than the "other_type" group. Prior studies suggest both types of disabilities also face lower chances of fertility due to difficulties in communication and higher susceptibility to miscarriages (Dissanayake et al., 2020).

C. Effects of Disabilities on Extensive and Intensive Margins of Fertility

In Table 5, we explore whether the negative effect of disability varies depending on whether the couple already has a child. Distinguishing these extensive and intensive margin effects may be important because a portion of disabled couples may have no fecundity, while the fertility outcome of second children appears to depend on their will and behavior. In the regression models in Table 5, we interact the disability dummies with an indicator for whether they already have a child.

The results of Logit[3] and FML[2] reveal that the negative effects of disabilities are driven by the extensive margin effect. While more disabled couples remain childless than non-disabled couples, likely due to their limited fecundity, they exhibit comparable fertility rates with their non-disabled counterparts once they have a first child.

However, FML[3] reveals a rather different mechanism: the role of son preferences. FML[3] is a more generalized version of FML[2], allowing the disability variables to vary across types. The results show that while the same pattern remains for husbands' disabilities, wives' disability effects vary by type. Among non-patriarchal families, wives' disabilities significantly suppress their fertility, regardless of their current number of children, consistent with the results in Table 3. In patriarchal families, however, wives' disabilities *increase* the likelihood of the birth of a second child statistically significantly. The disability effect on the first child is still negative and statistically significant, but the effect size is smaller than in the non-patriarchal group. One possible interpretation of the negative extensive margin effect of wives' disabilities in the patriarchal group is the fecundity effect. Once they demonstrate the ability to give birth, their fertility rate is higher than that of their non-disabled counterparts. One possible interpretation of this finding is that these disabled wives are exploited to have more children until a son is born. Another possible explanation is the selection of wives; that is, more fecund disabled women tend to marry into families with strong son preference. However, such selection cannot explain why their fertility after the first birth is greater than that of non-disabled wives. Furthermore, while this could be what disabled wives want for their old-age security, we argue that it is not likely, given the results in Table 4, that the effects of intellectual and mental disabilities are not qualitatively different from those of physical disabilities. Hence, we argue that the most plausible explanation is that disabled wives in the patriarchal group are exploited to continue fertility until a son is born, with their well-being potentially compromised and without receiving adequate support and care.

The parameter estimates of the membership equations (Panels B1 and B2) are largely consistent with the results of the baseline FML model, FML[1]. The calculated shares of the two types also show no significant difference from the results in Table 3.

[Table 5 about here]

D. What is Behind the Influence of Son Preference?

To better understand the role of son preference and further corroborate the exploitation interpretation discussed above, we explore how the relationship between the disability effect and son preference varies according to disability status and couples' circumstances. Such heterogeneity analysis typically involves subsample analyses, in which we repeat the estimation of FML[3] using different subsamples. However, this approach significantly increases the number of parameters to be estimated, hence our FML model faces serious identification and computation challenges. We circumvent this challenge by constructing a measure of son preference using the fitted value of the membership equation in Panel B2 of Table 5. The fitted value of the membership equation indicates the probability that couple i belongs to the patriarchal group. We interpret this probability as the "strength" of son preference. We rank all couples in our sample by their predicted probability and split them into three groups. Considering that approximately 60% of couples are in the patriarchal type, we form the three subgroups as follows: (1) the bottom 40% (least patriarchal), (2) the middle 30% (medium patriarchal), and (3) the top 30% (most patriarchal).[18] We then employ the logit model instead of the FML model and interact the disability indicators with the dummy variables of the three patriarchal subgroups defined above.

1. Disability Effect and Son Preference

Table 6 shows how the relationship between the disability effect and son preference varies by disability severity (Panel A), heritability (Panel B), and type (Panel C). Panel A shows that wives' disability effects weaken as couples become more patriarchal, regardless of disability

[18] We also tested an alternative grouping by dividing the sample into three equally sized patriarchal groups, confirming the robustness of our results (see Table C2).

severity. In contrast, similar patterns are not found for husbands. This is consistent with the hypothesis that couples with strong son preference continue childbearing even with severe disability and associated health risks. These findings further align with the exploitation hypothesis.

Panel B of Table 6 shows that among couples with heritable disabilities, statistically significant fertility reduction is found only for the least patriarchal group. The medium and most patriarchal groups exhibit weaker effects. This suggests that in more patriarchal societies, son preference may outweigh concerns about transmitting heritable disabilities, posing potential health risks for future generations. For wives with non-heritable disabilities, the negative impact on fertility weakens as son preference intensifies, indicating potential exploitation to sustain childbearing. In contrast, husbands with non-heritable disabilities do not experience a decline in fertility.

Panel C of Table 6 shows that for wives with intellectual and mental disabilities, the negative impact on fertility weakens as son preference strengthens. Their cognitive impairments may increase their susceptibility to coercion or exploitation, leading to continued childbearing until a male heir is born. A similar pattern emerges for wives with physical and other disabilities. In contrast, husbands' disabilities, regardless of type, do not significantly affect fertility outcomes. This contrast further reveals how patriarchal norms disproportionately disadvantage disabled women.

[Table 6 about here]

2. Son Preference and Exploitation

Table 7 further corroborates the exploitation interpretation and investigates the extent to which son preference may trigger such exploitation under different conditions. We first categorize villages by economic status (poor vs. non-poor) and terrain (mountainous vs. non-mountainous). We also group couples by their social support networks, measured by the number of households with which they maintain relationships. Within each subsample, couples are classified into three patriarchal groups—least, medium, and most patriarchal—using a consistent distribution of 40%, 30%, and 30%, respectively.

Table 7 consistently demonstrates that the negative effect of disability on fertility diminishes as son preference intensifies. However, nuanced differences emerge depending on couples' circumstances. Specifically, in poor villages, the negative effect is significant only when son preference is weak (Panel A1) and becomes statistically insignificant as son preference increases. In contrast, in non-poor villages, the negative effect remains significant even when son preference is strongest (Panel A2). Similarly, in mountainous areas (Panel B1), disability has no significant effect on fertility, while in non-mountainous areas, the negative effect remains significantly negative (Panel B2). Furthermore, among couples with weak external support, the negative effect of disability on fertility disappears when son preference is strongest (Panel C1). For couples with stronger external support, this effect weakens but persists (Panel C2).

These findings reveal that exploitation driven by son preference is widespread across the country. However, it is particularly severe in poorer, mountainous regions and among socially isolated couples, where even a moderate degree of son preference can trigger the neglect or exploitation of disabled women. This aligns with the literature showing that in settings marked by inadequate infrastructure, limited economic opportunities, insufficient healthcare, and weak social support, couples often feel compelled to have more children, especially sons (Alesina et al., 2013; Yi, 2019). As a result, women with disabilities may not be adequately cared for but rather exploited to continue childbearing until a son is born, despite their disabilities.

We also extend the analysis to examine both extensive and intensive fertility margins (see Table C3). The results consistently support the conclusion that the exploitation of disabled women is particularly pronounced in contexts characterized by economic hardship, challenging geographic conditions, and social isolation. Under these conditions, even a slight propensity toward son preference can significantly intensify exploitative reproductive practices.

[Table 7 about here]

E. Robustness Checks

We conduct a series of sensitivity analyses to assess the robustness of our results. The first concern is that disabled individuals with a stronger desire for children, particularly sons, might marry earlier, potentially biasing our estimates. However, this is unlikely to be a major issue in China during our study period, as marriage rates remained consistently high at approximately 80%, regardless of disability status. In fact, our data shows that disabled men marry later (average age 28) compared to non-disabled men (average age 25), while the average marriage age for women remains consistent at 24 for both groups. To further mitigate any remaining concerns, we apply propensity score matching (PSM) to construct comparable groups of couples with and without disabled wives, controlling for observable characteristics such as education, age cohort, and residential location. We employ multiple matching strategies—including one-to-one, one-to-five, and variations with additional controls—to rigorously test the robustness of our results. As documented in Table D1, these approaches consistently reveal a significant negative effect of the wife's disability on fertility, confirming that selection bias does not substantially influence our findings.

Second, we address the discrepancy between conception and childbirth due to the 9-month gestation period. A key concern is that the differential rates of abortion or miscarriage, potentially influenced by factors such as disability status or patriarchal norms, could introduce bias into our findings. However, as data on abortions or miscarriages are unavailable, directly measuring their impact is challenging. To mitigate this issue, we redefine our outcome variable to equal 1 in year t if a couple gives birth in year t+1. The results presented in Table D2 show that the estimated effect sizes remain robust and consistent with those for childbirth in Table 3, indicating that unobserved terminations do not disproportionately affect our estimates.

Third, a small but non-negligible fraction of disabled couples includes both a disabled wife and a disabled husband. These couples may experience more than a simple additive effect of two disabilities, potentially leading to misspecification in our baseline model. To address this concern, we re-categorize couples into the following four groups: (1) "DW = 0, DH = 0," (2) "DW = 0, DH = 1," (3) "DW = 1, DH = 0," and (4) "DW = 1, DH = 1." As shown in Table D3, the likelihood of having a second child for couples in which both spouses are disabled (DW = 1, DH = 1) closely aligns with the sum of individual disability effects, supporting the robustness of our baseline model.

VI. Conclusion

Understanding the challenges faced by disabled individuals, particularly women, in developing countries is crucial for effective welfare policymaking. Leveraging China's unique context—including one of the world's largest disabled populations, decades-long FPPs, and entrenched son preference—this study offers the first empirical investigation into how fertility varies by disability status in developing countries and how this disability effect and son preference interact. Utilizing a large-scale survey with detailed disability data, we construct retrospective panel data and apply hazard models to assess the effects of disability on childbearing. We further employ FML models, combining latent preference analysis with exogenous FPP rules, to identify groups with and without son preference.

The FML model identifies two groups: "patriarchal" and "non-patriarchal." Overall, we find that wives' disabilities, especially severe and physical ones, significantly reduce childbearing, with a more pronounced effect on the extensive margin. However, among patriarchal families, wives' disabilities increase fertility, particularly in rural households with older, more educated husbands. These couples continue childbearing until a son is born, seemingly exploiting the wives' disabilities. These findings align logically with empirical observations of China's stringent FPPs, which lower fertility rates while increasing the perceived value of each child, thereby perpetuating entrenched son preference. Within the context of disabilities, concerns about long-term care and financial support further intensify this preference, rendering women with disabilities disproportionately vulnerable to exploitation aimed at achieving subsequent births.

This paper provides compelling evidence to motivate targeted policy interventions for the disabled population, particularly disabled women, in the developing world. Our study reveals a disconcerting reality in which wives with disabilities, particularly in families with strong son preferences, are not adequately cared for but rather exploited to continue childbearing until a son is born. This exploitation may not only expose disabled women to severe health risks, threatening their well-being, but may also perpetuate an intergenerational cycle of low human capital and poverty.

Our findings likely extend beyond China to diverse developing contexts, underscoring the need to address these issues on a global scale to safeguard the reproductive health of disabled women while fully respecting their right to make autonomous fertility decisions. We suggest several important directions for future research. First, the intersection between disability and gender remains an understudied area, necessitating further research on the unique challenges faced by disabled women. Second, there is limited research on the living conditions and life decisions of disabled individuals in the developing world. Addressing these gaps is crucial for advancing sustainable development and promoting inclusive societies that enable all individuals to lead healthy, fulfilling lives.

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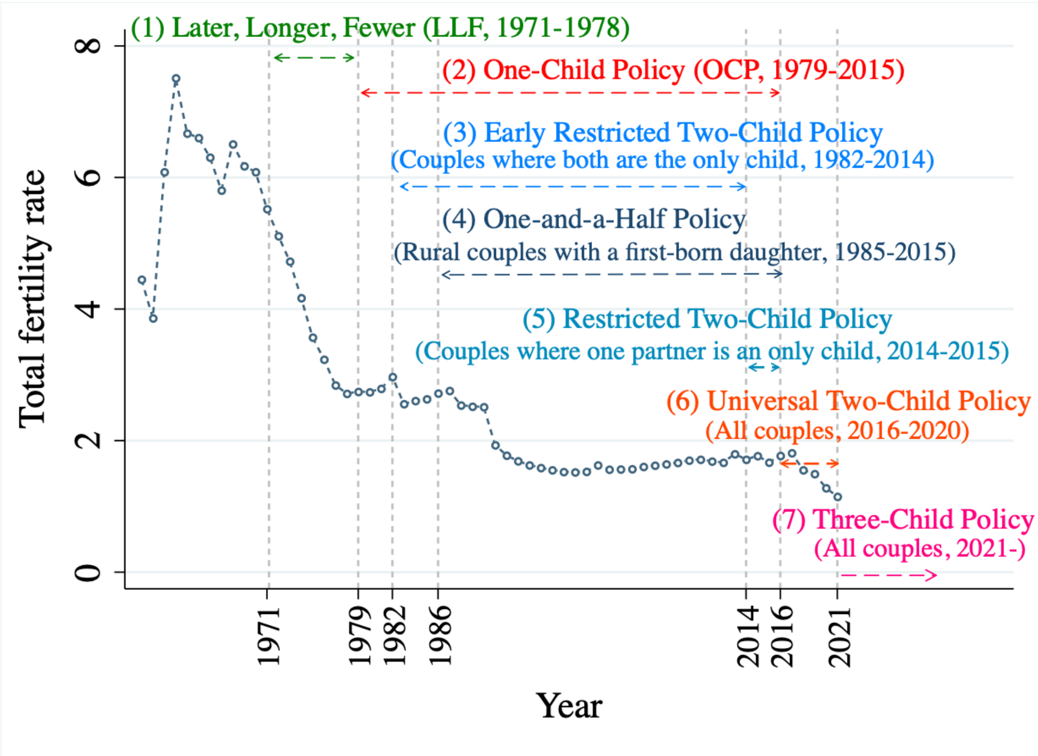
Figures and Tables



Source: World Bank Open Data

Figure 1: Evolution of family planning policies and the total fertility rate in China. This figure illustrates the evolution of family planning policies (FPPs) and the total fertility rate in China. It covers the following seven policies. (1) The Later, Longer, Fewer (LLF) Policy (1971) encouraged couples to delay marriage, maintain a minimum of 4 years between childbirths, and limit family size to two children. (2) The One-Child Policy (OCP) (1979) prohibited Han couples from having more than one child. (3) The Early Restricted Two-Child Policy (1982) allowed couples in which both spouses were only children to have a second child. (4) The One-and-a-Half Policy (1985) allowed rural couples with a firstborn daughter to have a second child. (5) The Restricted Two-Child Policy (2014) allowed couples in which either spouse is an only child to have a second child. (6) The Universal Two-Child Policy (2016) allowed all couples to have a second child. (7) The Three-Child Policy (2021) allowed all couples to have a third child. The implementation timing of policies (3) and (4) varies by province.

Table 1
Dependent and Explanatory Variables

Dependent variable	
y_{it}	= 1 if couple *i* gives birth in year *t*.
Explanatory variables: Disability status	
DW_{it}, DH_{it}	= 1 if the wife/husband in couple *i* is disabled in year *t*.
Severity:	
DW_mild_{it}, $DW\_moderate_{it}$, DW_severe_{it}	= 1 if the wife in couple *i* has mild/moderate/severe disabilities in year *t*.
DH_mild_{it}, $DH\_moderate_{it}$, DH_severe_{it}	= 1 if the husband in couple *i* has mild/moderate/severe disabilities in year *t*.
Heritability:	
$DW\_heritable_{it}$, $DW\_nonheri_{it}$	= 1 if the wife in couple *i* has heritable/non-heritable disabilities in year *t*.
$DH\_heritable_{it}$, $DH\_nonheri_{it}$	= 1 if the husband in couple *i* has heritable/non-heritable disabilities in year *t*.
Type:	
$DW\_intel\_ment_{it}$, $DW\_physical_{it}$, $DW\_other\_type_{it}$	= 1 if the wife in couple *i* has intellectual or mental/physical/visual, hearing, or speech disabilities in year *t*.
$DH\_intel\_ment_{it}$, $DH\_physical_{it}$, $DH\_other\_type_{it}$	= 1 if the husband in couple *i* has intellectual or mental/physical/visual, hearing, or speech disabilities in year *t*.
Explanatory variables: Personal characteristics	
Age:	
$AgeW\_1222_{it}$, $AgeW\_2325_{it}$, $AgeW\_2628_{it}$, $AgeW\_2931_{it}$, $AgeW\_3234_{it}$, $AgeW\_3537_{it}$, $AgeW\_3840_{it}$, $AgeW\_4145_{it}$,	= 1 if the wife in couple *i* belongs to age group:12–22, 23–25, 26–28, 29–31, 32–34, 35–37, 38–40, 41–45 in year *t*.
$AgeH\_1424_{it}$, $AgeH\_2529_{it}$, $AgeH\_3034_{it}$, $AgeH\_3539_{it}$, $AgeH\_4065_{it}$	= 1 if the wife in couple *i* belongs to age group: 14–24, 25–29, 30–34, 35–39, 40–65 in year *t*.
Education:	
$EduW\_0_{i}$, $EduW\_1\_5_{i}$, $EduW\_6\_8_{i}$, $EduW\_9+_{i}$	= 1 if the wife in couple *i* has schooling years of 0/1–5/6–8/9 and above.
$EduH\_0_{i}$, $EduH\_1\_5_{i}$, $EduH\_6\_8_{i}$, $EduH\_9+_{i}$	= 1 if the husband in couple *i* has schooling years of 0/1–5/6–8/9 and above.
Explanatory variables: Couples' common characteristics	
$Nchild0_{it}$, $Nchild1_{it}$, $Nchild2_{it}$, $Nchild3+_{it}$	= 1 if couple *i* has 0/1/2/3+ children in year *t*.
$Child0_{it}$, $Child1+_{it}$	= 1 if couple *i* has no children/at least one child in year *t*.
$Have\_son_{it}$	= 1 if couple *i* already has a son/sons in year *t*.
$Next\_unallowed_{it}$	= 1 if couple *i* is not allowed to have the next child in year *t*.
$Yr\_mrg\_0\_2_{it}$, $Yr\_mrg\_3\_5_{it}$, $Yr\_mrg\_6\_10_{it}$, $Yr\_mrg\_11+_{it}$	= 1 if the years of marriage for couple *i* are 0–2/3–5/6–10/11+ years in year *t*.
$Urban_{i}$	= 1 if couple *i* lives in an urban area and at least one spouse has an urban Hukou at the time of survey.

NOTE.—This table presents the definitions of the variables used in our analysis. The dummies for the husband's and wife's education and location are time-invariant, while the remaining variables are time-varying. Mild disability refers to minor limitations with little impact on daily life, occasionally requiring assistance. Moderate disability involves significant limitations in performing daily activities necessitating regular support or assistive devices. Severe disability requires continuous support due to major limitations, making most tasks unmanageable independently. Hukou is China's household registration system, similar to an internal passport, determining where a person is officially registered to live—either rural or urban.

Table 2

Summary Statistics

	A. Disability details (latest year of each disabled person)				
	Disabled wives			Disabled husbands	
	N	Percent		*N*	Percent
DW	857	100%	DH	636	100%
Severity:			Severity:		
DW_mild	288	33.61%	DH_mild	273	42.93%
DW_moderate	252	29.41%	DH_moderate	172	27.04%
DW_severe	317	36.99%	DH_severe	191	30.03%
Heritability:			Heritability:		
DW_heritable	148	17.27%	DH_heritable	48	7.55%
DW_nonheri	709	82.73%	DH_nonheri	588	92.45%
Type:			Type:		
DW_intel_ment	404	47.14%	DH_intel_ment	66	10.38%
DW_physical	240	28.01%	DH_physical	391	61.48%
DW_other_type	213	24.85%	DH_other_type	179	28.15%

	B. Retrospective panel dataset					
	DW = 0 and DH = 0 (*N* = 105,374)		DW = 0 and DH = 1 (*N* = 10,575)		DW = 1 and DH = 0 (*N* = 5,942)	
	Mean	SD	Mean	SD	Mean	SD
y (annual fertility)	0.096	0.295	0.067	0.251	0.086	0.281
Have_son	0.695	0.460	0.688	0.463	0.637	0.481
Next_unallowed	0.694	0.461	0.775	0.417	0.650	0.477
Nchild0 (base)	0.127	0.333	0.099	0.298	0.156	0.363
Nchild1	0.427	0.495	0.393	0.488	0.430	0.495
Nchild2	0.341	0.474	0.430	0.495	0.329	0.470
Nchild3+	0.106	0.308	0.078	0.269	0.085	0.279
Age_Wife	33.290	6.919	35.390	6.826	33.810	6.936
AgeW_1222 (base)	0.057	0.232	0.039	0.193	0.054	0.226
AgeW_2325	0.094	0.292	0.062	0.242	0.085	0.278
AgeW_2628	0.129	0.335	0.088	0.283	0.115	0.319
AgeW_2931	0.138	0.345	0.106	0.308	0.129	0.336
AgeW_3234	0.136	0.343	0.123	0.329	0.137	0.344
AgeW_3537	0.131	0.337	0.140	0.347	0.136	0.343
AgeW_3840	0.125	0.331	0.153	0.360	0.130	0.336
AgeW_4145	0.190	0.392	0.289	0.453	0.213	0.410
Age_Husband	35.020	7.203	38.060	7.118	39.060	7.675
AgeH_1424 (base)	0.069	0.254	0.029	0.167	0.026	0.159
AgeH_2529	0.186	0.389	0.108	0.311	0.092	0.289
AgeH_3034	0.225	0.418	0.177	0.382	0.168	0.374
AgeH_3539	0.222	0.415	0.229	0.420	0.226	0.418
AgeH_4065	0.298	0.457	0.457	0.498	0.489	0.500
Age_gap	1.755	3.276	2.733	4.062	5.271	5.442
Yr_mrg_0_2 (base)	0.155	0.362	0.090	0.286	0.138	0.345
Yr_mrg _3_5	0.152	0.359	0.107	0.309	0.142	0.349
Yr_mrg_6_10	0.238	0.426	0.207	0.405	0.239	0.426
Yr_mrg_11+	0.455	0.498	0.596	0.491	0.481	0.500
EduW_0 (base)	0.185	0.389	0.162	0.369	0.430	0.495
EduW_1_5	0.395	0.489	0.356	0.479	0.292	0.455
EduW_6_8	0.342	0.474	0.451	0.498	0.247	0.431
EduW_9+	0.078	0.268	0.031	0.173	0.031	0.173
EduH_0 (base)	0.055	0.228	0.060	0.237	0.101	0.301
EduH_1_5	0.316	0.465	0.235	0.424	0.372	0.483
EduH_6_8	0.491	0.500	0.574	0.495	0.478	0.500
EduH_9+	0.138	0.345	0.131	0.338	0.049	0.217
Urban	0.174	0.379	0.173	0.378	0.065	0.246

NOTE.—Panel A reports couple-level summary statistics for disabled couples classified by severity, heritability, and type. Panel B reports key variables at the couple-year level from the retrospective panel dataset used in the analysis.

Table 3

The Marginal Effect of Disability on Per-Year Fertility

	A. Regression coefficients			
	Logit[1]	Logit[2]	FML[1]	
	All	All	Type 1: "Non-patriarchal"	Type 2: "Patriarchal"
	(1)	(2)	(3)	(4)
DW	–0.017***	–0.022***	–0.016***	
	[–0.231] (0.040)	[–0.302] (0.043)	[–0.224] (0.042)	
DH	–0.009*	–0.009*	–0.009*	
	[–0.118] (0.052)	[–0.121] (0.053)	[–0.129] (0.054)	
Nchild1	–0.074***	–0.087***	–0.042***	–0.113***
	[–1.004] (0.037)	[–1.209] (0.040)	[–0.819] (0. 094)	[–1.336] (0.056)
Nchild2	–0.116***	–0.144***	–0.072**	–0.210***
	[–1.569] (0.055)	[–2.000] (0.058)	[–1.420] (0.184)	[–2.470] (0.122)
Nchild3+	–0.104***	–0.140***	–0.092***	–0.208***
	[–1.404] (0.075)	[–1.943] (0.079)	[–1.816] (0.145)	[–2.454] (0.179)
Have_son	–0.037***	–0.040***	0.006	–0.129***
	[–0.506] (0.034)	[–0.550] (0.035)	[0.116] (0.113)	[–1.518] (0.130)
Next_unallowed	–0.054***	–0.046***	–0.094***	0.060***
	[–0.730] (0.034)	[–0.636] (0.039)	[–1.838] (0.120)	[0.710] (0.128)
Yr_mrg_35	–0.006*	–0.002	–0.006*	
	[–0.087] (0.037)	[–0.028] (0.038)	[–0.084] (0.038)	
Yr_mrg_610	–0.003	0.005	0.002	
	[–0.034] (0.041)	[0.064] (0.043)	[0.035] (0.044)	
Yr_mrg_11+	–0.048***	–0.034***	–0.037***	
	[–0.649] (0.059)	[–0.480] (0.060)	[–0.524] (0.062)	
EduW_5	–0.001	0.002	0.001	
	[–0.012] (0.032)	[0.027] (0.035)	[0.017] (0.035)	
EduW_8	0.002	0.001	0.006*	
	[0.028] (0.035)	[0.011] (0.041)	[0.091] (0.038)	
EduW_9+	–0.001	–0.007†	0.005	
	[–0.007] (0.052)	[–0.102] (0.058)	[0.075] (0.057)	
EduH_5	0.008*	0.007†	0.008**	
	[0.112] (0.052)	[0.103] (0.056)	[0.125] (0.056)	
EduH_8	0.010**	0.01*	0.015***	
	[0.138] (0.052)	[0.142] (0.058)	[0.219] (0.058)	
EduH_9+	0.009*	0.006	0.013**	
	[0.124] (0.061)	[0.083] (0.066)	[0.188] (0.067)	
Urban	–0.004†		–0.011***	
	[–0.059] (0.033)		[–0.147] (0.040)	
Constant	–0.060***	–0.036***	0.040***	–0.060***
	[–0.813] (0.055)	[–2.251] (0.438)	[0.769] (0.067)	[–1.050] (0.066)
Type share	–	–	42.2%	57.8%
Age group dummies	Yes	Yes	Yes	
Village FE	No	Yes	No	
Year FE	No	Yes	No	
Log likelihood	–28,959	–28,190	–28,761	
N	123,460	123,460	123,460	

	B. Membership probability to "patriarchal" group in FML[1]						
	EduH_1_5	EduH_6_8	EduH_9+	Edu_gap	Age_gap	Urban	Constant
Marg. eff.	0.025	0.191***	0.191***	–0.006	0.009†	–0.372***	–0.006
Coeff.	[0.113]	[0.869]	[0.868]	[–0.027]	[0.041]	[–1.690]	[–0.026]
SD	(0.168)	(0.193)	(0.246)	(0.021)	(0.020)	(0.265)	(0.151)

NOTE.—The dependent variable is whether couple *i* gives birth to a child in a given year. Reported for each independent variable are the marginal effect, raw coefficient estimate (in square brackets), and the corresponding standard error (in parentheses). FML[1] allows the constant term and coefficients on Nchild1, Nchild2, Nchild3+, Have_son, and Next_unallowed to vary across the two latent types, which we labelled as "non-patriarchal" and "patriarchal.". Type shares show the estimated shares of the two types. Panel B reports the results of the membership equation of FML[1].

† $p < 0.1$.

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

Table 4

The Effect of Disability on Fertility by Disability Severity, Heritability, and Type

	(1)	(2)
	A. Severity	
DW_mild	–0.013** [–0.175] (0.065)	–0.017*** [–0.248] (0.068)
DW_moderate	–0.015** [–0.200] (0.067)	–0.018*** [–0.267] (0.071)
DW_severe	–0.022*** [–0.302] (0.063)	–0.025*** [–0.375] (0.066)
DH_mild	0.001 [0.009] (0.076)	0.001 [0.009] (0.078)
DH_moderate	–0.008 [–0.113] (0.096)	–0.005 [–0.069] (0.100)
DH_severe	–0.022** [–0.295] (0.095)	–0.023*** [–0.350] (0.100)
Controls	Yes	Yes
Village and year FE	No	Yes
Log likelihood	–28,954	–28,184
N	123,460	123,460
	B. Heritability	
DW_heritable	–0.009 [–0.131] (0.086)	–0.017** [–0.251] (0.090)
DW_nonheri	–0.017*** [–0.248] (0.044)	–0.021*** [–0.308] (0.046)
DH_heritable	–0.023* [–0.339] (0.154)	–0.024* [–0.365] (0.160)
DH_nonheri	–0.007† [–0.096] (0.054)	–0.006† [–0.093] (0.056)
Controls	Yes	Yes
Village and year FE	No	Yes
Log likelihood	–28,957	–28,188
N	123,460	123,460
	C. Type	
DW_intel_ment	–0.013*** [–0.187] (0.055)	–0.021*** [–0.306] (0.059)
DW_physical	–0.022*** [–0.316] (0.073)	–0.025*** [–0.368] (0.076)
DW_other_type	–0.016** [–0.235] (0.073)	–0.016** [–0.237] (0.076)
DH_ intel_ment	0.016 [0.230] (0.153)	0.0153 [0.228] (0.159)
DH_physical	–0.013** [–0.188] (0.069)	–0.011* [–0.167] (0.071)
DH_other_type	–0.007 [–0.105] (0.085)	–0.010† [–0.148] (0.088)
Controls	Yes	Yes
Village and year FE	No	Yes
Log likelihood	–28,955	–28,186
N	123,460	123,460

NOTE.—The dependent variable is whether couple *i* gives birth to a child in a given year. The table reports marginal effects, raw coefficient estimates (in square brackets), and standard errors (in parentheses) across different disability categories. Panel A categorizes disabilities by severity (mild, moderate, or severe), Panel B by heritability (heritable or non-heritable), and Panel C by type ("intellectual/mental," "physical," or "other, such as visual, hearing, or speech-related"). Each panel represents a separate regression. The regressions in Columns (1) and (2) use the same set of controls as in Columns (1) and (2) in Table 3, respectively.

† $p < 0.1$.

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

Table 5

The Effects of Disability on Extensive and Intensive Margins of Fertility

	A. Regression coefficients				
	Logit[3]	FML[2]		FML[3]	
	All	Type 1: “Non-patriarchal”	Type 2: “Patriarchal”	Type 1: “Non-patriarchal”	Type 2: “Patriarchal”
	(1)	(2)	(3)	(4)	(5)
DW×Child0	–0.033***	–0.032***		–0.038***	–0.023*
	[–0.446] (0.056)	[–0.445] (0.057)		[–0.788] (0.170)	[–0.254] (0.120)
DW×Child1+	–0.0005	0.002		–0.037**	0.033***
	[–0.007] (0.053)	[0.034] (0.057)		[–0.768] (0.248)	[0.370] (0.098)
DH×Child0	–0.021***	–0.022***		–0.018	–0.022
	[–0.290] (0.077)	[–0.306] (0.078)		[–0.371] (0.234)	[–0.243] (0.172)
DH×Child1+	0.003	0.004		–0.0002	0.010
	[0.036] (0.067)	[0.053] (0.072)		[–0.004] (0.169)	[0.108] (0.108)
Nchild1	–0.079***	–0.046***	–0.121***	–0.040***	–0.127***
	[–1.077] (0.039)	[–0.886] (0.092)	[–1.419] (0.056)	[–0.820*] (0.093)	[–1.430] (0.058)
Nchild2	–0.121***	–0.077***	–0.217***	–0.068***	–0.226***
	[–1.642] (0.056)	[–1.486] (0.177)	[–2.547] (0.118)	[–1.400] (0.172)	[–2.550] (0.114)
Nchild3	–0.108***	–0.098***	–0.216***	–0.091***	–0.224***
	[–1.468] (0.075)	[–1.885] (0.143)	[–2.532] (0.179)	[–1.872] (0.155)	[–2.531] (0.169)
Have_son	–0.037***	0.007	–0.128***	0.008	–0.126***
	[–0.502] (0.034)	[0.144] (0.113)	[–1.504] (0.130)	[0.171] (0.126)	[–1.424] (0.106)
Next_unallowed	–0.054***	–0.096***	0.059***	–0.095***	0.054***
	[–0.729] (0.034)	[–1.859] (0.125)	[0.694] (0.136)	[–1.955] (0.120)	[0.610] (0.123)
Constant	–0.058***	0.039***	0.086***	0.037***	0.080***
	[–0.783] (0.055)	[0.746] (0.067)	[1.011] (0.066)	[0.760] (0.067)	[0.986] (0.066)
Type share	—	41.50%	58.50%	39.50%	60.50%
Controls	Yes	Yes		Yes	
Log likelihood	–28,934	–28,733		–28,726	
N	123,460	123,460		123,460	

	B1. Membership probability to “patriarchal” group in FML[2]						
	EduH_1_5	EduH_6_8	EduH_9+	Edu_gap	Age_gap	Urban	Constant
Marg. eff.	0.023	0.189***	0.186***	–0.005	0.010*	–0.358***	–0.001
Coeff.	[0.104]	[0.860	[0.844]	[–0.023]	[0.045]	[–1.631]	[–0.004]
SD	(0.168)	(0.192)	(0.242)	(0.021)	(0.020)	(0.273)	(0.151)

	B2. Membership probability to “patriarchal” group in FML[3]						
	EduH_1_5	EduH_6_8	EduH_9+	Edu_gap	Age_gap	Urban	Constant
Marg. eff.	0.064†	0.234***	0.239***	–0.008†	0.008†	–0.332***	–0.020
Coeff.	[0.291]	[1.068]	[1.092]	[–0.037]	[0.038]	[–1.514]	[–0.092]
SD	(0.164)	(0.179)	(0.236)	(0.020)	(0.018)	(0.270)	(0.141)

NOTE.—This table presents the marginal effects of disabilities on extensive and intensive fertility margins, followed by raw coefficient estimates (in square brackets) and standard errors (in parentheses). FML[2] allows coefficients on Nchild1, Nchild2, Nchild3+, Have_son, Next_unallowed, and the constant term to vary by latent type. FML[3] further allows the coefficients on disability terms to be type-specific. Both FML[2] and FML[3] reveal “patriarchal” and “non-patriarchal” types, depending on their strength of son-preference behavior. Type shares report the estimated shares of the two types. Panels B1 and B2 report the results of the membership equations of FML[2] and FML[3], respectively. All regressions apply the same set of controls as in Column (1) in Table 3.

† $p < 0.1$.
* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

Table 6

The Relationship between the Disability Effect and Son Preference by Disability Status

Interacted terms	× Least Patriarchal (40%)		× Medium Patriarchal (30%)		× Most Patriarchal (30%)	
	A. By severity (N = 123,460, log likelihood = –28,943)					
DW_mild	–0.027***	[–0.392] (0.128)	–0.012	[–0.177] (0.112)	–0.001	[–0.012] (0.103)
DW_moderate	–0.012	[–0.172] (0.132)	–0018**	[–0.260] (0.112)	–0.009	[–0.136] (0.107)
DW_severe	–0.031***	[–0.446] (0.104)	–0.019***	[–0.272] (0.106)	–0.010	[–0.138] (0.109)
DH_mild	0.012	[0.174] (0.153)	–0.004	[–0.058] (0.141)	–0.001	[–0.014] (0.112)
DH_moderate	–0.017	[–0.242] (0.159)	–0.015	[–0.213] (0.170)	0.015	[0.218] (0.174)
DH_severe	–0.014	[–0.196] (0.132)	–0.024*	[–0.350] (0.197)	–0.027**	[–0.390] (0.196)
	B. By heritability (N = 123,460, log likelihood = –28,947)					
DW_heritable	–0.020*	[–0.289] (0.146)	–0.010	[–0.140] (0.146)	0.006	[0.085] (0.151)
DW_nonheri	–0.026***	[–0.376] (0.080)	–0.017***	[–0.253] (0.073)	–0.009†	[–0.127] (0.070)
DH_heritable	–0.043**	[–0.627] (0.253)	–0.027	[–0.398] (0.304)	0.006	[0.081] (0.252)
DH_nonheri	–0.002	[–0.033] (0.091)	–0.011	[–0.158] (0.101)	–0.005	[–0.070] (0.091)
	C. By type (N = 123,460, log likelihood = –28,945)					
DW_intel_ment	–0.023**	[–0.334] (0.102)	–0.014*	[–0.209] (0.095)	–0.002	[–0.036] (0.087)
DW_physical	–0.026*	[–0.376] (0.169)	–0.027**	[–0.389] (0.124)	–0.014†	[–0.206] (0.105)
DW_other_type	–0.027***	[–0.387] (0.111)	–0.011	[–0.160] (0.120)	–0.001	[–0.013] (0.158)
DH_ intel_ment	0.010	[0.152] (0.119)	0.017	[0.252] (0.278)	0.029	[0.415] (0.326)
DH_physical	–0.012	[–0.172] (0.224)	–0.015†	[–0.216] (0.126)	–0.011	[–0.153] (0.115)
DH_other_type	–0.007	[–0.102] (0.143)	–0.017	[–0.249] (0.171)	0.004	[0.052] (0.137)

NOTE.—This table presents the relationship between disability effect and son preference by disability severity, heritability, and type in Panels A, B, and C, respectively. The three patriarchal groups are constructed by the fitted values from the membership equation in Panel B2 of Table 5: (1) the bottom 40% (least patriarchal), (2) the middle 30% (medium patriarchal), and (3) the top 30% (most patriarchal). We interacted these three indicators with disability indicators regarding severity (Panel A), heritability (Panel B), and disability type (Panel C). The marginal effects are presented, followed by raw coefficient estimates in square brackets and the corresponding standard errors in parentheses. All regressions include the control variables used in Column (1) of Table 3, as well as indicators for the medium and most patriarchal groups.

† $p < 0.1$.

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

Table 7

The Relationship between the Disability Effect and Son Preference by Couple's Circumstances

Interacted terms	× Least Patriarchal (40%)		× Medium Patriarchal (30%)		× Most Patriarchal (30%)	
	A. By village economic status					
	A1. Poor village (N = 44,982, log likelihood = –10,917)					
DW	–0.022***	[–0.310] (0.094)	–0.001	[–0.018] (0.108)	0.0004	[0.006] (0.097)
DH	–0.007	[–0.099] (0.130)	–0.012	[–0.018] (0.178)	0.0006	[0.009] (0.135)
	A2. Non-poor village (N = 78,478, log likelihood = –18,004)					
DW	–0.026***	[–0.391] (0.098)	–0.022***	[–0.324] (0.091)	–0.017**	[–0.260] (0.090)
DH	–0.009	[–0.142] (0.109)	–0.006	[–0.094] (0.124)	–0.008	[–0.112] (0.115)
	B. By village terrain					
	B1. Mountainous area (N = 28,126, log likelihood = –6,828)					
DW	–0.010	[–0.134] (0.115)	–0.005	[–0.074] (0.135)	0.004	[0.055] (0.116)
DH	–0.012	[–0.169] (0.162)	–0.016	[–0.222] (0.239)	0.008	[0.114] (0.161)
	B2. Non-mountainous area (N = 95,334, log likelihood = –22,100)					
DW	–0.026***	[–0.390] (0.089)	–0.024***	[–0.357] (0.081)	–0.011*	[–0.169] (0.079)
DH	–0.013†	[–0.184] (0.103)	–0.003	[–0.038] (0.110)	–0.008	[–0.113] (0.100)
	C. By social support network					
	C1. Weak external support (N = 94,708, log likelihood = –22,394)					
DW	–0.018**	[–0.265] (0.084)	–0.015**	[–0.216] (0.073)	–0.003	[–0.041] (0.073)
DH	–0.015*	[–0.218] (0.100)	–0.008	[–0.111] (0.103)	–0.004	[–0.059] (0.098)
	C2. Strong external support (N = 28,752, log likelihood = –6,529)					
DW	–0.038***	[–0.571] (0.146)	–0.036***	[–0.542] (0.162)	–0.018†	[–0.270] (0.148)
DH	0.012	[0.180] (0.185)	–0.024	[–0.365] (0.241)	0.008	[0.119] (0.195)

NOTE.—This table presents how the relationship between the disability effect and son preference varies by village characteristics and the couple's social support network. Panels A, B, and C each contain two regressions based on specific subsamples. For each regression, two coefficients are reported with the marginal effects, the raw coefficient estimates in square brackets, and the corresponding standard errors in parentheses. All regressions include the control variables used in Column (1) of Table 3, as well as indicators for moderately and highly patriarchal types.

† $p < 0.1$.

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

Appendix to “The Dual Burdens of Disability and Gender Norms: Understanding Disabled Women’s Fertility in Developing Countries”

A. Survey, Sample, and Variables

This section discusses further details of the survey used in this study.

A1. Design of Survey

The survey was conducted by Xinye Zheng’s research team at Renmin University of China between October 2019 and June 2020 in Xin County, Henan Province, China (Figure A1). Xin County has a population of approximately 278,620 across 17 townships and 206 villages. Xin County was selected because its GDP per capita closely aligns with the national county average, making it economically representative. While its disability rate of 8% is slightly above the national average of 6.4%,[19] this difference falls well within normal regional variability (80th percentile). Additionally, such variations are common, as disability rates naturally differ due to local socioeconomic conditions, healthcare access, and environmental factors. Moreover, the higher disability rate in Xin County allows for a more in-depth examination of the barriers faced by disabled individuals, making it a suitable site for studying the disabled population.

To ensure an adequate sample size of the disabled population, we used a one-to-one sampling method, surveying roughly equal numbers of households with and without disabled members. We obtained authorization to access two administrative datasets: one containing the name list of 13,015 individuals with disability certificates (DCs)—which included their names, genders, disability statuses, and addresses—and another containing electronic records with the name list of all household heads and their addresses. We identified households with three consecutive electric records, ensuring the likelihood of the residents being present for the interviews.

We then combined these two name lists by village and provided them to village leaders, who are highly familiar with local families. The village leaders helped us verify whether the household heads belonged to their village and identified disabled individuals from the list with disability certificates (who may not be household heads) and linked them to the appropriate

[19] According to the most recent official county-level statistics from 2006, the proportion of disabled people in the total population was 8.05%.

household heads' families. Additionally, the leaders determined whether any remaining household heads' families had disabled individuals without disability certificates but with visible disabilities. Using the one-to-one ratio and applying village-specific population weighting, we randomly selected a roughly equal number of households with and without disabled individuals in each village based on the village population. Furthermore, during the survey, if we encountered households previously classified as non-disabled but with self-reported disabled members without disability certificates, we reassigned them to the disabled group. In the end, we surveyed 5,776 households with disabled members and 6,041 households without disabled members.

To ensure the informed consent of disabled individuals for the survey, we collaborated with local governments and village leaders who had strong community ties and were fluent in the local dialect. These leaders were provided with village-specific sample lists and digital questionnaires and conducted door-to-door surveys from March 1 to May 31, 2020. During the survey, if individuals had severe disabilities or intellectual impairments that prevented them from answering questions, their family members responded as proxies. This ensured the accuracy of the data for those who were unable to communicate directly.

We implemented several measures to ensure data quality. First, we provided training at both the county and village levels so that village leaders were fully prepared to collect data. Second, with the leaders' consent, we incorporated audio recordings, GPS tracking, household photo uploads, and survey-duration monitoring into the electronic questionnaire. These features let us confirm that interviews were conducted in respondents' homes rather than in the village office, thereby safeguarding the accuracy of our data. Finally, we carried out random village audits to further verify data reliability.

The survey collected detailed information on disabilities, including the year of onset, severity, heritability, and disability type. Additionally, it gathered sociodemographic information of all household members relevant to our study, including birth year, gender, education level, relationship to the household head, marital status, and the year of marriage. After the survey, we meticulously reviewed the data, eliminating duplicates, checking for consistency, and resolving discrepancies in collaboration with the village leaders. These efforts significantly enhanced data reliability and accuracy, providing a solid foundation for subsequent analysis.

The final valid sample comprises 8,030 households and 28,685 individuals.

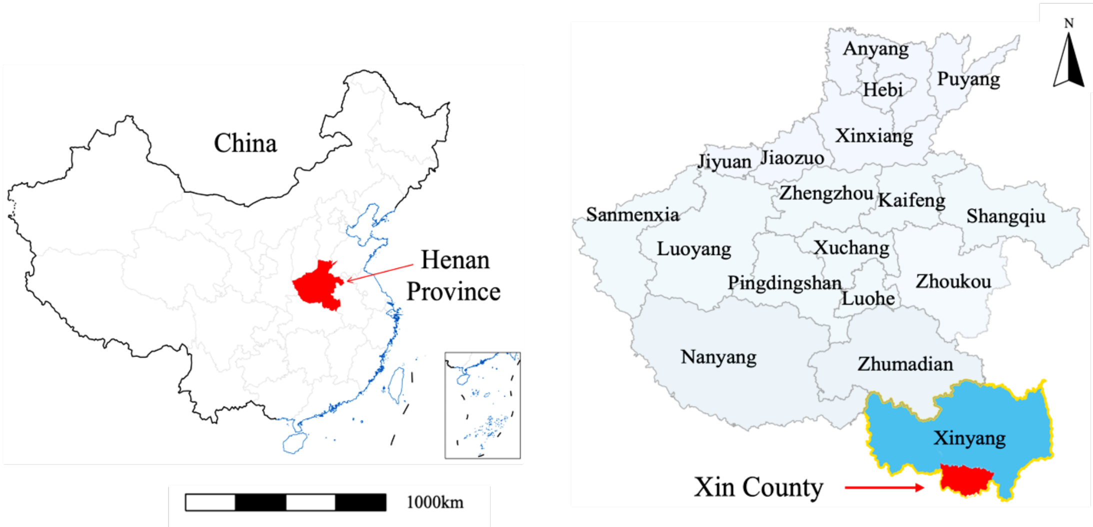


Figure A1: Geographic location of Xin County. This figure presents the geographic location of Xin County (shaded in red in the right panel). In China's administrative hierarchy, local governments are structured into three levels: provinces, prefectures, and counties. Xin County is situated in the central part of China, under the jurisdiction of Xinyang Prefecture (shaded in blue in the right panel) in Henan Province (shaded in red in the left panel).

A2. Sample Restriction

Based on the raw cross-sectional survey data, Figure A2 shows that the distribution of birth years for wives and husbands follows a roughly normal pattern between 1930 and 2000, with notable deviations in 1959 and 1960 due to the impact of the Great Chinese Famine. Given the sparsity of observations outside this timeframe, we restrict the sample to individuals born between 1930 and 2000.

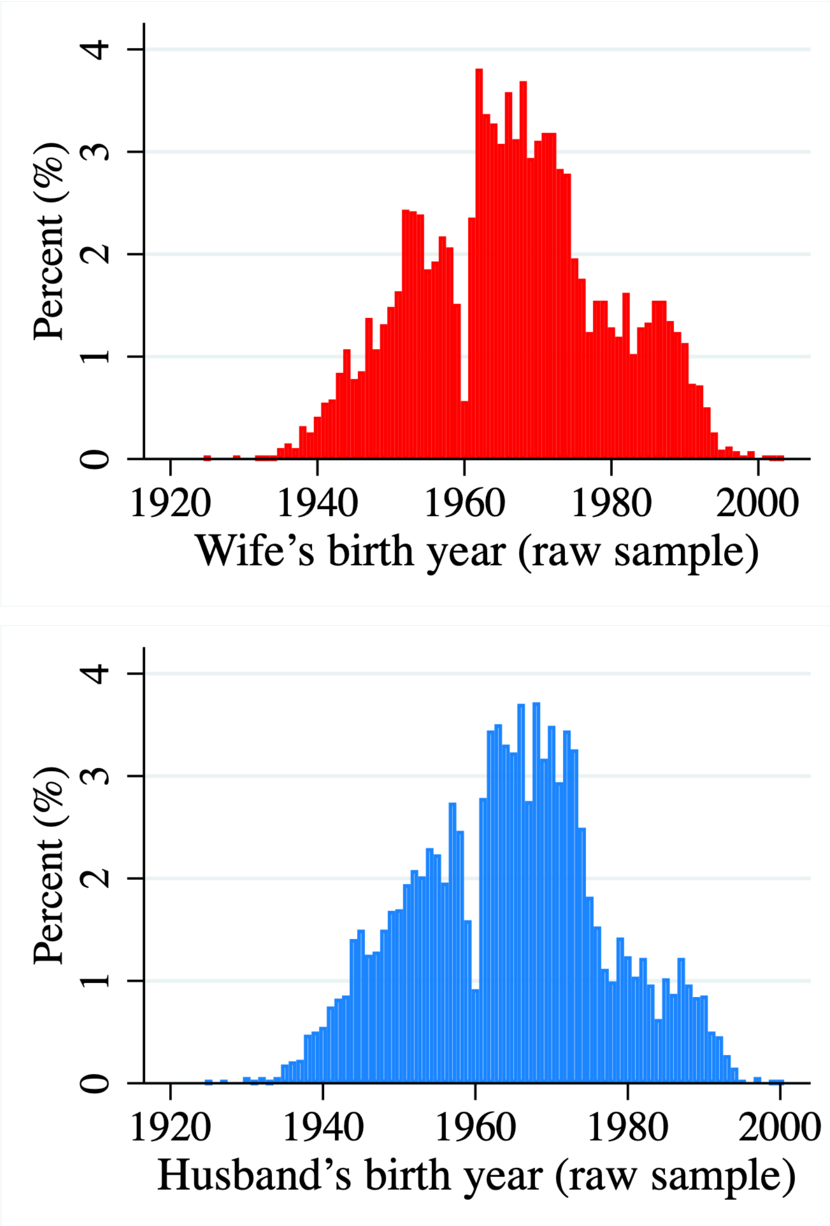


Figure A2: Distribution of birth years for wives and husbands in the raw retrospective data. This figure displays the distribution of birth years for wives (left panel) and husbands (right panel) in the raw retrospective data. The *y*-axis represents the percentage of wives and husbands as a proportion of the total number of women and men, respectively, for each year. The *x*-axis indicates the corresponding birth years.

We then annualize cross-sectional survey data, tracking couples from the year of marriage until 2020, or the year when women turned age 45. The unit of analysis is the couple-year. The distribution of birth years for wives and husbands in the regression sample is shown in Figure A3.

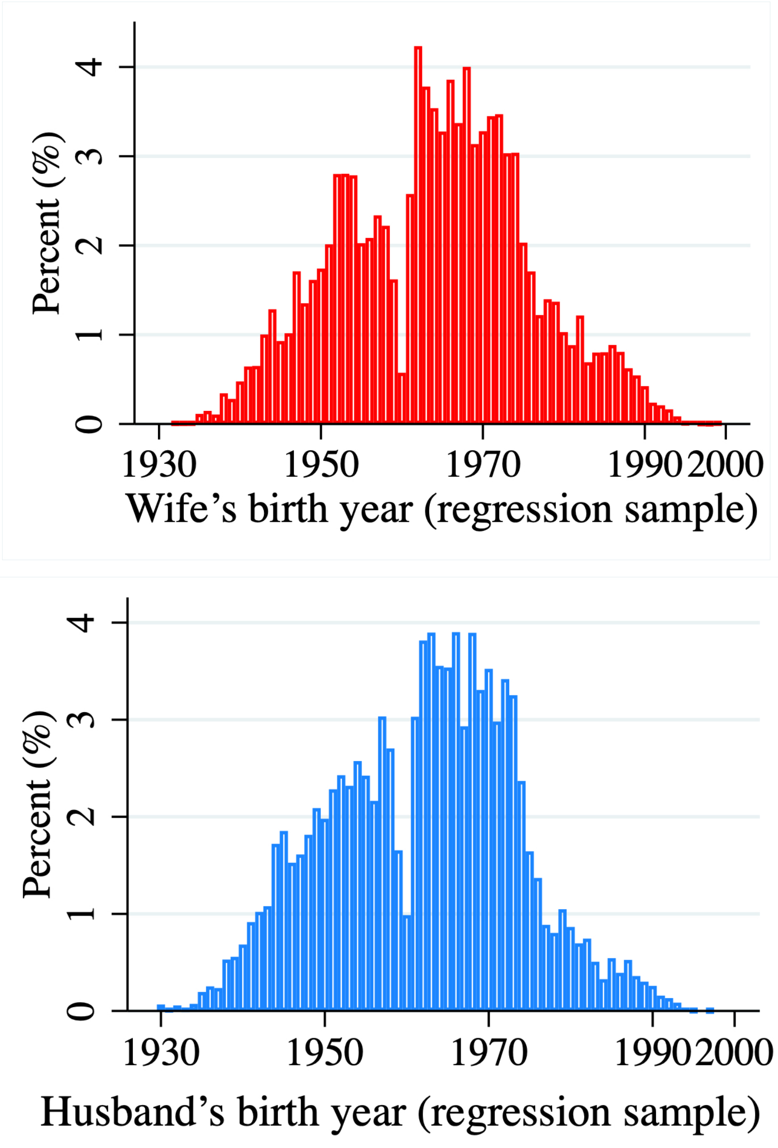


Figure A3: Distribution of birth years for wives and husbands in the regression sample. This figure shows the distribution of birth years for wives (left panel) and husbands (right panel) in the regression sample, which includes individuals born between 1930 and 2000 due to the limited number of observations before 1930. The *y*-axis represents the frequency of individuals, and the *x*-axis indicates the calendar year of birth. Red bars represent the number of women born in each year, and blue bars represent the number of men born in each year.

Figure A4 shows the distribution of parents' ages at childbirth for wives and husbands in the raw data, with peak fertility between ages 20 and 30, followed by a decline. Childbirth is rare for wives under age 12 and over 45, and for husbands under 14 and over 65. Accordingly, we restricted the sample to couples in which wives were aged 12 to 45 and husbands were aged 14 to 65.

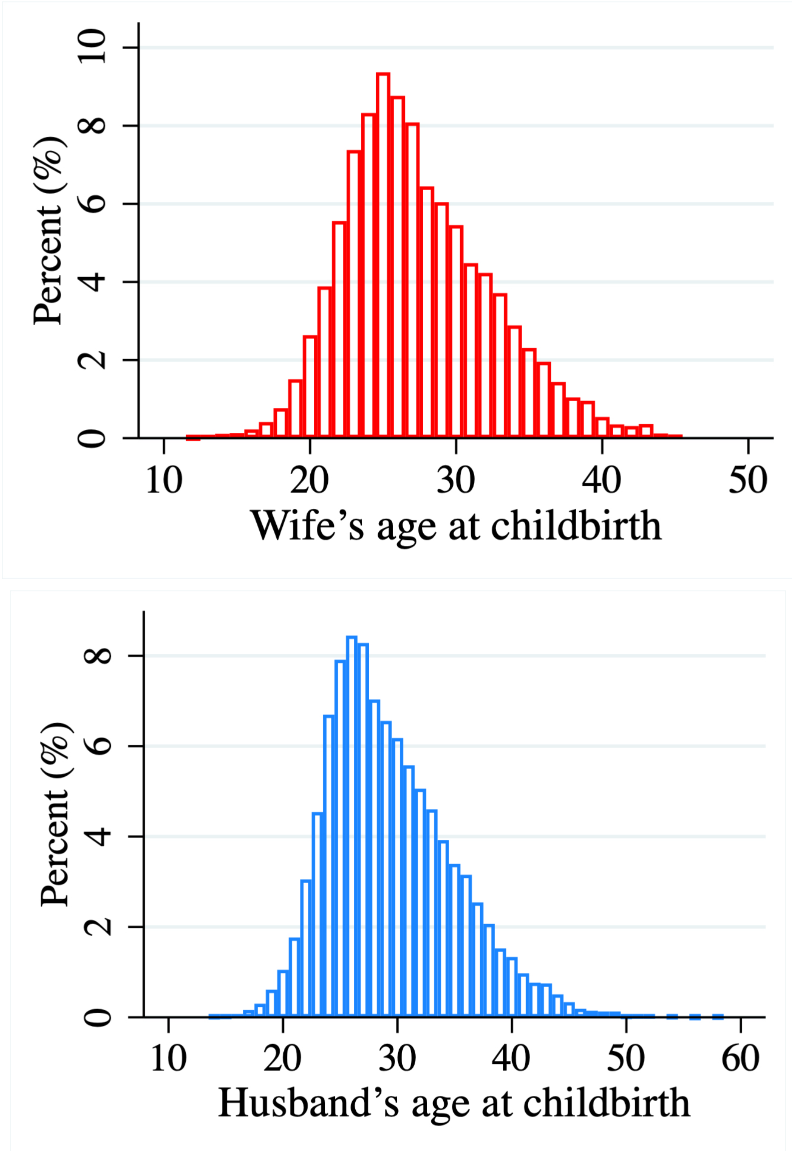


Figure A4: Distribution of age at childbirth for wives and husbands in the raw retrospective data. This figure presents the distribution of the wife’s age when giving birth (left panel) and the husband’s age at the birth of the child (right panel), based on the raw retrospective data. The *y*-axis represents the number of wives and husbands (right panel), and the *x*-axis indicates their respective ages at the time of childbirth. For the main analysis, the sample was restricted to wives aged 12 to 45 and husbands aged 14 to 65 due to the limited number of observations outside these ranges.

We limit the analysis period further to 1960–2019 due to the sparsity of available data prior to 1960 and incomplete records for 2020 (see Figure A5). Excluding earlier data also helps control for the potential effects of famine-related shocks. Additionally, couples with prenuptial births were excluded to minimize bias related to early childbirth disabilities, although such cases are rare in the dataset.

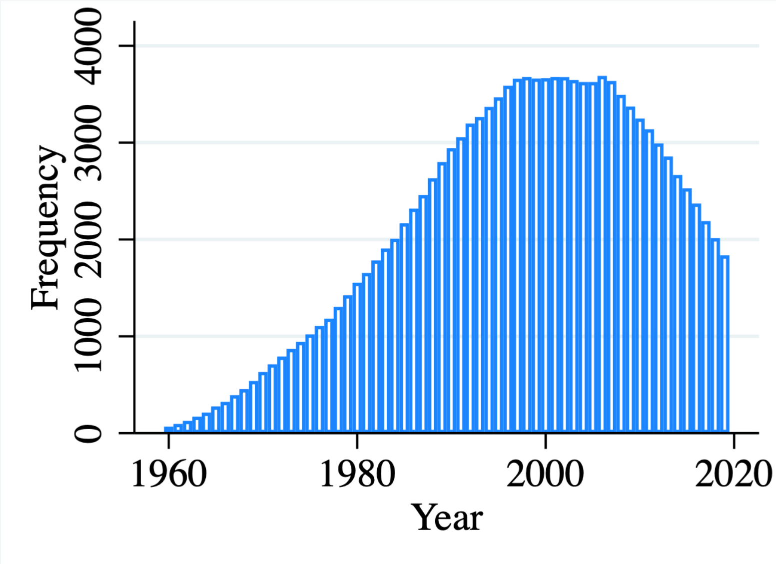


Figure A5. Distribution of couples by calendar year in the regression sample. This figure depicts the distribution of couples by calendar year within the regression sample.

A3. Disability Classification

We classify disabilities according to the following three dimensions:

(1) Severity: Disabilities are classified as mild, moderate, or severe based on the Activities of Daily Living (ADL) index, which aggregates scores across 12 daily activities (e.g., walking, listening, and speaking), each rated on a scale of 0 to 10. The total ADL score ranges from 0 to 120, with higher scores indicating greater disability severity. We use quartiles to categorize the ADL scores, with cutoffs at 10 and 30. Scores of 0–10 indicate mild disability (minor limitations with minimal impact on daily life, where occasional assistance may be needed), 10–30 indicate moderate disability (significant limitations in daily activities requiring regular support or assistive devices), and 30–120 indicate severe disability (major limitations requiring continuous support, with most tasks being unmanageable independently). The sample includes 288 wives and 273 husbands with mild disabilities, 252 wives and 172 husbands with moderate disabilities, and 317 wives and 191 husbands with severe disabilities (Figure A6).

(2) Heritability: Disabilities are categorized as heritable or non-heritable based on the reported cause—heritable factors, specific diseases, or unknown causes. Heritable disabilities encompass conditions such as chondrosis, congenital glaucoma, congenital deaf-muteness, vitamin D-resistant rickets, and hemophilia. We also analyzed intergenerational disability status and types among those reporting “unknown” causes.

[20] In our sample, 148 wives have heritable disabilities, compared to 709 with non-heritable disabilities; among husbands, 48 have heritable disabilities, and 588 have non-heritable disabilities. [21] The proportion of women with heritable disabilities is higher than that of men.

(3) Type: Disabilities are categorized as physical, sensory, intellectual, or mental. Physical disabilities affect mobility or dexterity, including paralysis, limb loss, and muscular dystrophy. Sensory disabilities involve blindness, deafness, or speech disorders. Intellectual disabilities, such as Down syndrome and autism, impact cognitive function and adaptive abilities. Mental disabilities affect the nervous system and include conditions such as epilepsy, multiple sclerosis, and Parkinson's disease. Due to the limited number of mental disability cases, intellectual and mental disabilities are combined into an "intel_ment" group. Sensory disabilities and cases with missing types[22] are grouped into "other_type," and the remainder are classified as "physical." In the sample, 404 wives have intellectual or mental disabilities, 240 have physical disabilities, and 213 are in the "other_type" group, while among husbands, the numbers are 66, 391, and 179, respectively. 47.14% of wives primarily have intellectual and mental disabilities, whereas 61.48% of husbands predominantly have physical disabilities.

[20] We identified heritable disabilities by checking whether individuals had the same type of disabilities as their parents, grandparents, or children. If both or all of them had the same type of disabilities, we assumed that their disabilities were heritable, and non-heritable otherwise.

[21] Of 148 wives with heritable disabilities, 54 people directly reported heritable causes, 31 people who answered unknown had children with the same disabilities, and 63 people had hereditary diseases. Of 48 husbands with heritable disabilities, 35 people directly reported heritable causes, five people reported disease causes that are heritable, and eight people who answered unknown had the same disability types as their parents or grandparents.

[22] The number of missing values of disability types for wives and husbands are 10 and 25, respectively. Because the number of observations is small, we grouped them together with the "other_type" group.

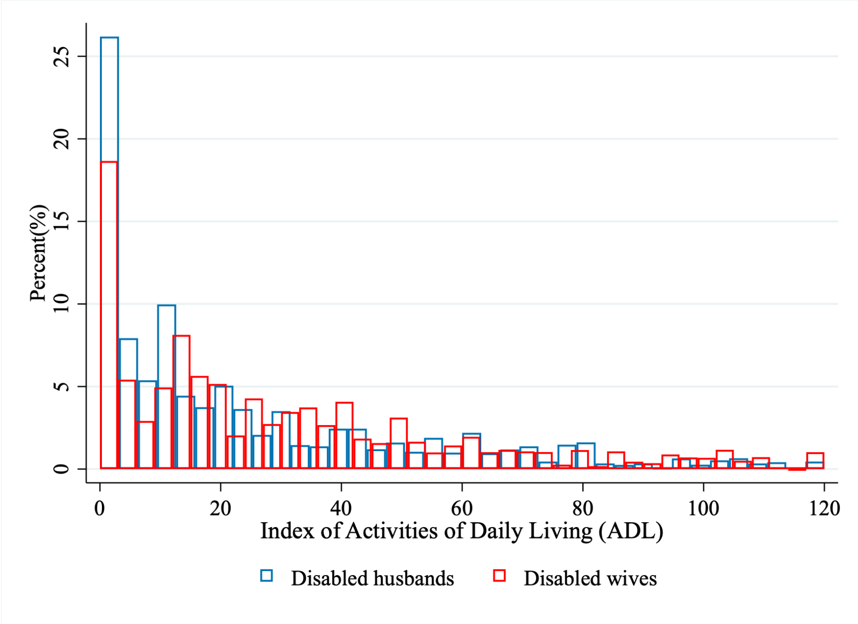


Figure A6: Distribution of ADL indexes for disabled husbands and wives. This figure presents the distribution of ADL indexes for disabled husbands (blue bars) and wives (red bars). The ADL index measures the level of difficulty experienced in performing 12 essential daily activities, such as walking, eating, dressing, speaking, hearing, and shopping. Each activity is rated on a scale from 0 to 10, with the total ADL index ranging from 0 to 120, where higher scores reflect greater levels of disability severity.

A4. The Disability Rate in Xin County

This section describes the calculation of the prevalence rate of disabilities among couples in Xin County. First, we obtained the population size from the 2020 census. According to the census, Xin County's population is 278,620, with 139,087 males and 139,533 females. Of these, 23.5% of women are married and under 45, and 94% of the husbands of these women are under 65. Thus, the estimated number of married women under 45 with husbands under 65 is calculated as follows: $139{,}533 \times 0.235 \times 0.94 = 30{,}792$.

Second, using administrative data from local Disabled Persons Federations on individuals with disability certificates, we identified 842 disabled women aged 12 to 45 and 3,345 disabled men aged 14 to 65. Our survey indicates that approximately 97.5% of disabled persons possessed a disability certificate. Adjusting for this coverage rate, we estimated that there were 864 disabled women and 3,431 disabled men in the specified age groups. Subtracting the number of disabled women from the total number of married women under 45 resulted in 29,928 non-disabled married women under 45 ($30{,}792 - 864 = 29{,}928$).

Third, based on the panel dataset, the proportions of couples in different disability types were obtained as follows: “DH = 0, DW = 0” (84.91%), “DH = 1, DW = 0” (5.03%), “DH = 0, DW = 1” (8.7%), and “DH = 1, DW=1” (1.36%).

Fourth, we calculated the actual number of couples by disability status as follows:

- Number of couples with “DH = 0, DW = 1” (only the wife disabled):

$$864 \times 8.7 / (8.7 + 1.36) = 747$$

- Number of couples with “DH = 1, DW = 1” (both disabled):

$$864 \times 1.36 / (8.7 + 1.36) = 117$$

- Number of couples with “DH = 1, DW = 0” (only the husband disabled):

$$117 \times 5.03 / 1.36 = 433$$

- Number of couples with “DH = 0, DW = 0” (neither disabled):

$$29{,}928 - 433 = 29{,}495$$

Finally, Table A1 presents the disability rates across these combinations, revealing that the actual proportions of couples in the types “DH = 0, DW = 0,” “DH = 0, DW = 1,” “DH = 1, DW = 0,” and “DH = 1, DW = 1” are 95.8%, 2.4%, 1.4%, and 0.4%, respectively. The observation that there are nearly twice as many couples with a disabled wife compared to a disabled husband is largely due to the fact that disabled men in China often struggle to marry non-disabled women. In contrast, non-disabled men may marry disabled women to fulfill their fertility desires, particularly in regions with a strong preference for having children.

Table A1

Proportion of Couples by Disability Status

Husband’s disability:	Wife’s disability:	
	DW = 0	DW = 1
DH = 0	95.8	2.4
DH = 1	1.4	0.4

NOTE.—This table presents the estimated disability rates in the total actual number of couples in Xin County. DW is an indicator of the wife’s disability status, equaling 1 if the wife has a disability, otherwise 0. DH is an indicator of the husband’s disability status, equaling 1 if the husband has a disability, otherwise 0.

A5. Fertility Rates

Figure A7 illustrates the trend of the fertility rate in Xin County compared to the national average. The data indicates that Xin County follows a similar pattern, with a sharp decline in fertility rates under FPPs, although its fertility rate remains higher than the national average.

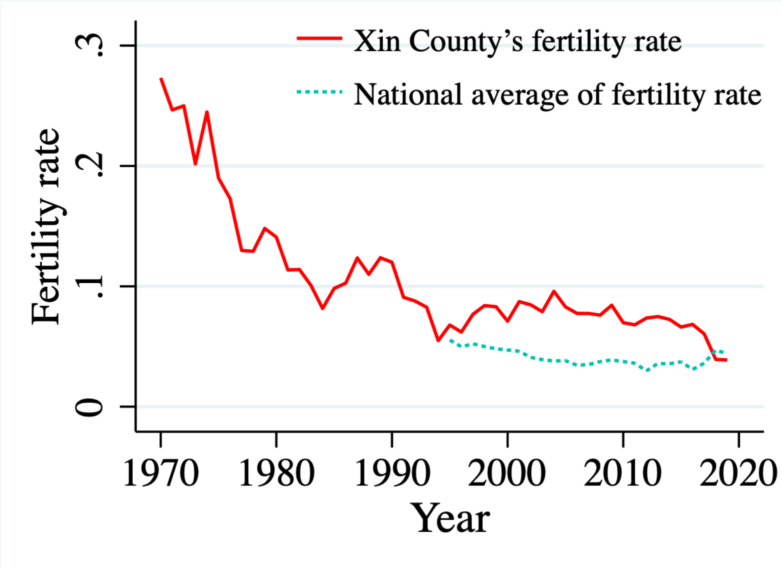


Figure A7: Fertility rate and number of live births per woman in Xin County and China. The panel displays the crude fertility rate derived from the raw sample alongside the national fertility rate reported by the National Bureau of Statistics (NBS), with the earliest available data from the NBS dating back to 1995.

Figure A8 illustrates the annual crude fertility rates by couples' disability status over time, revealing a consistent decline across all groups. Couples in which the wife has a disability exhibit slightly higher fertility rates compared to other groups. This subtle distinction suggests that disability status may influence reproductive patterns in nuanced ways, although the general downward trend over time remains consistent.

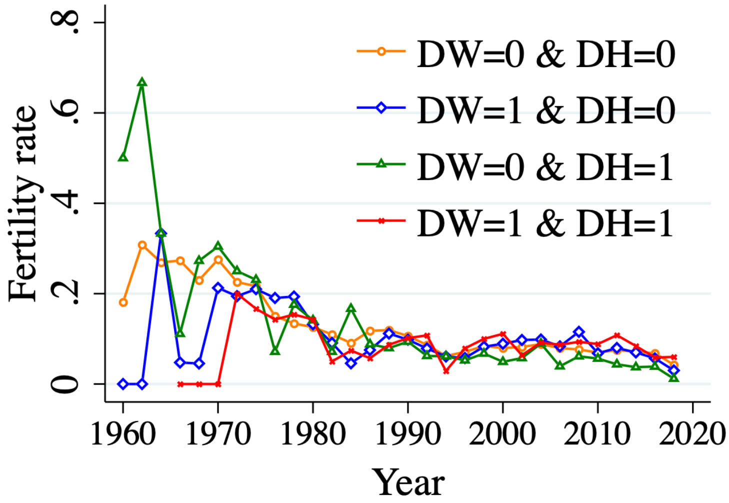
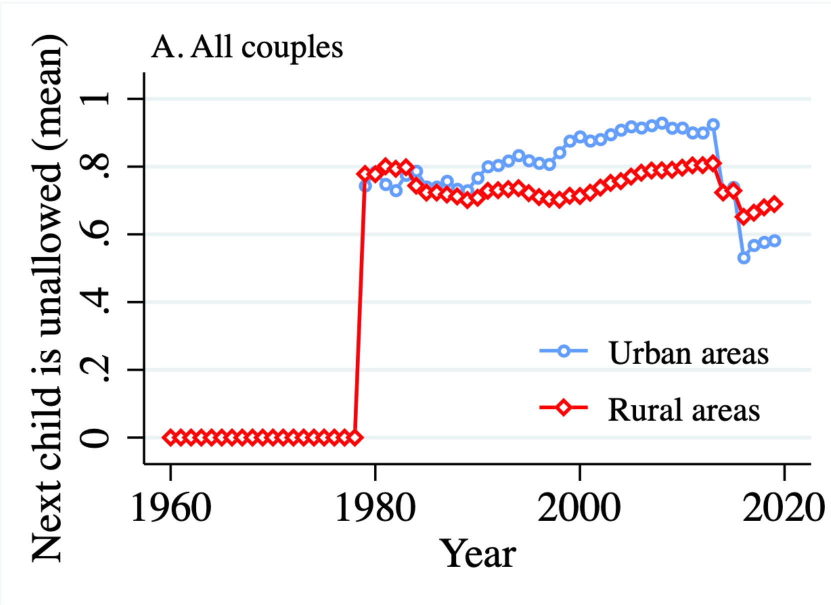


Figure A8: The trend of fertility rate in the regression sample. This figure shows the trend in fertility rates within the regression sample. The fertility rate is calculated using the formula: Fertility Rate = (Number of live births in a given year / Total number of women of childbearing age). The notation "DW = 0 & DH = 0" refers to couples in which neither the wife nor the husband has a disability. "DW = 1 & DH = 0" refers to couples in which only the wife has a disability, "DW = 0 & DH = 1" indicates that only the husband has a disability, and "DW = 1 & DH = 1" refers to couples in which both spouse are disabled.

A6. Eligibility for the Next Child

Xin County follows the FPPs implemented in Henan Province. In 1979, couples were generally prohibited from having a second child. From 1984 to 1990, rural couples in which both spouses were only children were allowed to have a second child, though this provision was revoked until 2012, when it was reinstated and expanded to include rural couples whose first child was a daughter. In 2014, the policy was further relaxed to permit a second child if either spouse was an only child, and by 2016, all couples were eligible to have a second child.

Panel A of Figure A9 shows that between 1980 and 2012, approximately 80% of all couples were restricted from having additional children, dropping to 70% in 2014 and 60% after 2016. FPPs primarily targeted couples with one child, with stricter enforcement in urban areas. During this period, Panel B of Figure A9 shows that 100% of urban couples with one child were prohibited from having a second, compared to 70% of rural couples. These restrictions eased after 2012, falling to 50% in urban areas and 40% in rural areas, and were eliminated entirely by 2016. This trend illustrates the significant impact of FPPs.



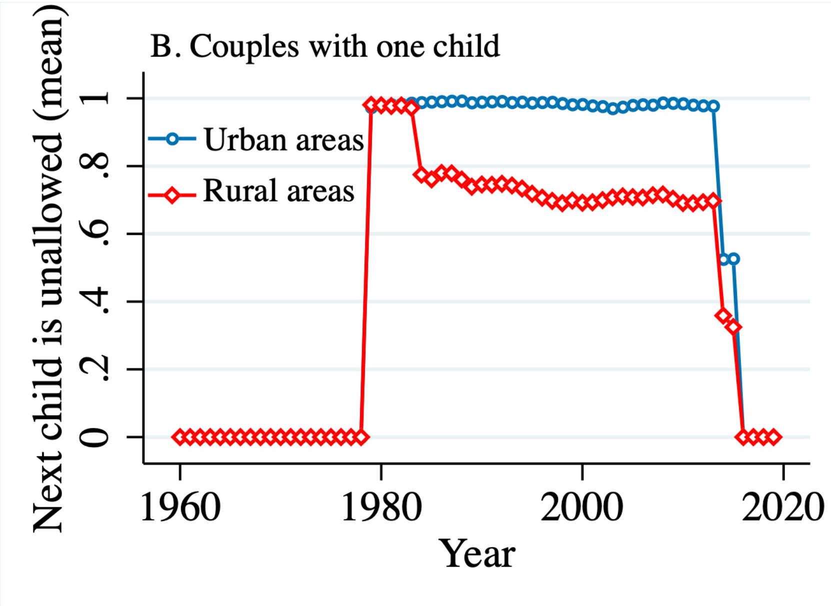


Figure A9: The proportion of couples ineligible for another child by FPPs. This figure shows the percentage of couples ineligible to have another child under FPPs in urban (blue line) and rural (red line) areas between 1960 and 1980. Panel A includes all couples, while Panel B focuses only on couples with one child.

B. Calculating the Marginal Effects of the FML Models

The marginal effect of the FML models is calculated in the following steps:

(1) Calculate the predicted probabilities for c = {1, 2}–$\hat{P}_1$ and $\hat{P}_2$, respectively–using the coefficients $\beta_{c,x}$ for variable x, estimated by FML the models:

$$\hat{P}_1 = \frac{\exp(X_{it}\beta_1)}{1+\exp(X_{it}\beta_1)}, \hat{P}_2 = \frac{\exp(X_{it}\beta_2)}{1+\exp(X_{it}\beta_2)}$$

where, for variables that do not vary by type, identical coefficient estimates are used for both types when calculating $\hat{P}_1$ and $\hat{P}_2$.

(2) Calculate the prior probability of type c (c={1, 2}) using the coefficients for variable z, $\eta_{c,z}$, given by the membership equation:

$$\hat{\pi}_1 = \frac{\exp\left(Z_{it}\eta_1\right)}{1+\exp\left(Z_{it}\eta_1\right)}, \hat{\pi}_2 = \frac{\exp\left(Z_{it}\eta_2\right)}{1+\exp\left(Z_{it}\eta_2\right)}$$

(3) Calculate the posterior probabilities, which indicate the probability that an observation belongs to each latent type, using Bayes' theorem:

$$\hat{\pi}_1 = \frac{\hat{P}_1 \cdot \hat{\pi}_1}{\hat{P}_1 \cdot \hat{\pi}_1 + \hat{P}_2 \cdot \hat{\pi}_2}, \hat{\pi}_{c=2} = \frac{\hat{P}_2 \cdot \hat{\pi}_2}{\hat{P}_1 \cdot \hat{\pi}_1 + \hat{P}_2 \cdot \hat{\pi}_2}$$

(4) Compute the type-specific marginal effects using the posterior probabilities as weights. For each type, calculate the marginal effects of variable x on the probability of the outcome $y = 1$ as:

$$ME_{1,x} = \hat{P}_1(1 - \hat{P}_1)\, \beta_{1,x}\hat{\pi}_1, ME_{2,x} = \hat{P}_2(1 - \hat{P}_2)\, \beta_{2,x}\hat{\pi}_2$$

Then, the marginal effects for variable x in Type 1 and Type 2 are $\overline{ME_{1,x}}$ and $\overline{ME_{2,x}}$, respectively.

(5) For variables that do not vary by type in the FML[1] and FML[2] models, calculate the overall marginal effects by taking the weighted average using the type shares:

$$ME_x = \overline{ME_{1,x}} \cdot share1 + \overline{ME_{2,x}} \cdot share2$$

This process ensures that the marginal effects reflect the contributions of the different types of couples and the overall influence of each variable on the probability of the outcome.

C. Supplementary Tables

C1. Age Group Effects: Extended Analysis of Table 3

Table C1, identical to Table 3, further presents the effects of husbands' and wives' age groups as dummy variables. For women, fertility is positively correlated with age up to age 35, after which the effect diminishes and becomes negative. For men, the positive correlation continues until age 40. These results highlight gender-specific fertility patterns, emphasizing key periods of reproductive potential.

Table C1

The Marginal Effect of Disability on Per-Year Fertility

	A. Regression coefficients			
	Logit[1]	Logit[2]	FML[1]	
	All	All	Type 1: "Non-patriarchal"	Type 2: "Patriarchal"
	(1)	(2)	(3)	(4)
DW	–0.017***	–0.022***	–0.016***	
	[–0.231] (0.040)	[–0.302] (0.043)	[–0.224] (0.042)	
DH	–0.009*	–0.009*	–0.009*	
	[–0.118] (0.052)	[–0.121] (0.053)	[–0.129] (0.054)	
Nchild1	–0.074***	–0.087***	–0.042***	–0.113***
	[–1.004] (0.037)	[–1.209] (0.040)	[–0.819] (0.094)	[–1.336] (0.056)
Nchild2	–0.116***	–0.144***	–0.072**	–0.210***
	[–1.569] (0.055)	[–2.000] (0.058)	[–1.420] (0.184)	[–2.470] (0.122)
Nchild3+	–0.104***	–0.140***	–0.092***	–0.208***
	[–1.404] (0.075)	[–1.943] (0.079)	[–1.816] (0.145)	[–2.454] (0.179)
Have_son	–0.037***	–0.040***	0.006	–0.129***
	[–0.506] (0.034)	[–0.550] (0.035)	[0.116] (0.113)	[–1.518] (0.130)
Next_unallowed	–0.054***	–0.046***	–0.094***	0.060***
	[–0.730] (0.034)	[–0.636] (0.039)	[–1.838] (0.120)	[0.710] (0.128)
Yr_mrg_35	–0.006*	–0.002	–0.006*	
	[–0.087] (0.037)	[–0.028] (0.038)	[–0.084] (0.038)	
Yr_mrg_610	–0.003	0.005	0.002	
	[–0.034] (0.041)	[0.064] (0.043)	[0.035] (0.044)	
Yr_mrg_11+	–0.048***	–0.034***	–0.037**	
	[–0.649] (0.059)	[–0.480] (0.060)	[–0.524] (0.062)	
AGEW2325	0.026***	0.036***	0.025***	
	[0.354] (0.039)	[0.497] (0.041)	[0.351] (0.039)	
AGEW2628	0.025***	0.038***	0.024***	
	[0.334] (0.042)	[0.530] (0.045)	[0.343] (0.044)	
AGEW2931	0.018***	0.035***	0.020***	
	[0.250] (0.049)	[0.489] (0.051)	[0.286] (0.051)	
AGEW3234	0.017***	0.032***	0.019***	
	[0.227] (0.056)	[0.452] (0.059)	[0.276] (0.060)	
AGEW3537	–0.003	0.011*	0.001	
	[–0.045] (0.067)	[0.149] (0.070)	[0.001] (0.073)	
AGEW3840	–0.040***	–0.028***	–0.035***	
	[–0.548] (0.086)	[–0.393] (0.088)	[–0.503] (0.092)	
AGEW4145	–0.111***	–0.099***	–0.105***	
	[–1.506] (0.112)	[–1.385] (0.114)	[–1.484] (0.118)	
AGEH2529	0.014***	0.021***	0.016***	
	[0.193] (0.036)	[0.293] (0.038)	[0.223] (0.038)	
AGEH3034	0.009**	0.015***	0.014***	
	[0.126] (0.044)	[0.203] (0.047)	[0.198] (0.047)	
AGEH3539	0.010*	0.011**	0.016***	
	[0.130] (0.054)	[0.152] (0.057)	[0.229] (0.059)	
AGEH4065	–0.008	–0.009	0.000	
	[–0.111] (0.071)	[–0.124] (0.076)	[0.001] (0.079)	
EduW_5	–0.001	0.002	0.001	

	[–0.012] (0.032)	[0.027] (0.035)	[0.017] (0.035)	
EduW_8	0.002	0.001	0.006*	
	[0.028] (0.035)	[0.011] (0.041)	[0.091] (0.038)	
EduW_9+	–0.001	–0.007†	0.005	
	[–0.007] (0.052)	[–0.102] (0.058)	[0.075] (0.057)	
EduH_5	0.008*	0.007†	0.009*	
	[0.112] (0.052)	[0.103] (0.056)	[0.125] (0.056)	
EduH_8	0.010**	0.01*	0.015***	
	[0.138] (0.052)	[0.142] (0.058)	[0.219] (0.058)	
EduH_9+	0.009*	0.006	0.013**	
	[0.124] (0.061)	[0.083] (0.066)	[0.188] (0.067)	
Urban	–0.004†	–	–0.011***	
	[–0.059] (0.033)	–	[–0.147] (0.040)	
Constant	–0.060***	–0.036***	0.040***	–0.060***
	[–0.813] (0.055)	[–2.251] (0.438)	[0.769] (0.067)	[–1.050] (0.066)
Type share	—	—	42.2%	57.8%
Village and year FE	No	Yes	No	
Log likelihood	–28,959	–28,190	–28,761	
N	123,460	123,460	123,460	

B. The membership probability to "patriarchal" group in FML[1]

	EduH1_5	EduH_6_8	EduH_9+	Edu_gap	Age_gap	Urban	Constant
Marg. eff.	0.025	0.191**	0.191***	–0.006	0.009†	–0.372***	–0.006
Coeff.	[0.113]	[0.869]	[0.868]	[–0.027]	[0.041]	[–1.690]	[–0.026]
SD	(0.168)	(0.193)	(0.246)	(0.021)	(0.020)	(0.265)	(0.151)

NOTE.—The dependent variable is whether couple i gives birth to a child in a given year. Reported for each independent variable are the marginal effect, raw coefficient estimates (in square brackets), and the corresponding standard error (in parentheses). FML[1] allows coefficients for Nchild1, Nchild2, Nchild3+, Have_son, and Next_unallowed to vary by two latent types: "patriarchal," which prefers sons, and "non-patriarchal," which does not. "Type share" represents the estimated proportion of each latent type. Panel B reports the results of the membership equation for FML[1].

† $p < 0.1$.

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

C2. Alternative Groupings for Son Preference

To verify the robustness of our results, we attempt an alternative grouping strategy, dividing couples into three equally sized patriarchal groups. Using the fitted values from the membership equation in Panel B2 of Table 5, we calculated each couple's likelihood of belonging to the patriarchal group. This probability reflects the "strength" of son preference. Couples were then ranked and divided into three groups: (1) least patriarchal (bottom 33.33%), (2) medium patriarchal (middle 33.33%), and (3) most patriarchal (top 33.33%). Table C2, consistent with Table 6, shows that the impact of wives' disabilities on reducing fertility diminishes as couples become more patriarchal, a pattern not observed for husbands' disabilities. This suggests that a strong preference for sons drives high fertility despite the wife's disability and health risks, supporting the exploitation interpretation.

Table C2

The Relationship between the Disability Effect and Son Preference by Disability Status

Interaction terms	× Least Patriarchal (1/3)		× Medium Patriarchal (1/3)		× Most Patriarchal (1/3)	
	A. By severity (N = 123,460, log likelihood = –28,944)					
DW_mild	–0.028**	[–0.410] (0.154)	–0.011	[–0.166] (0.107)	–0.005	[–0.069] (0.098)
DW_moderate	–0.014	[–0.201] (0.153)	–0.016*	[–0.233] (0.104)	–0.010	[–0.148] (0.106)
DW_severe	–0.031***	[–0.444] (0.114)	–0.022**	[–0.320] (0.099)	–0.009	[–0.130] (0.108)
DH_mild	0.007	[0.103] (0.173)	0.007	[0.099] (0.133)	–0.005	[–0.076] (0.110)
DH_moderate	–0.022†	[–0.313] (0.184)	–0.015	[–0.215] (0.161)	0.014	[0.204] (0.159)
DH_severe	–0.010	[–0.140] (0.141)	–0.026*	[–0.378] (0.182)	–0.028*	[–0.405] (0.188)
	B. By heritability (N = 123,460, log likelihood = –28,946)					
DW_heritable	–0.004	[–0.063] (0.164)	–0.024*	[–0.343] (0.138)	0.007	[0.101] (0.145)
DW_nonheri	–0.031***	[–0.452] (0.091)	–0.015**	[–0.218] (0.069)	–0.011*	[–0.156] (0.068)
DH_heritable	–0.045*	[–0.659] (0.304)	–0.030†	[–0.436] (0.253)	0.004	[0.062] (0.251)
DH_nonheri	–0.005	[–0.072] (0.101)	–0.005	[–0.071] (0.097)	–0.007	[–0.105] (0.088)
	C. By type (N = 123,460, log likelihood = –28,946)					
DW_intel_ment	–0.029***	[–0.428] (0.119)	–0.011†	[–0.166] (0.089)	–0.004	[–0.058] (0.085)
DW_physical	–0.022	[–0.314] (0.193)	–0.028***	[–0.402] (0.121)	–0.016*	[–0.230] (0.103)
DW_other_type	–0.024**	[–0.341] (0.123)	–0.017*	[–0.246] (0.110)	–0.001	[–0.013] (0.154)
DH_intel_ment	0.015	[0.222] (0.252)	0.010	[0.147] (0.250)	0.028	[0.412] (0.305)
DH_physical	–0.013	[–0.183] (0.128)	–0.010	[–0.147] (0.124)	–0.014†	[–0.198] (0.110)
DH_other_type	–0.010	[–0.138] (0.164)	–0.013	[–0.181] (0.151)	0.003	[0.041] (0.134)

NOTE.—This table presents the relationship between disability effect and son preference by disability severity, heritability, and type. The marginal effects are presented by the values not in brackets, the logit estimates are shown in square brackets, and the corresponding standard errors of the logit estimates are provided in parentheses. The three patriarchal groups are constructed by the fitted values from the membership equation in Panel B2 of Table 5: (1) the bottom 33.33% (least patriarchal), (2) the middle 33.33% (medium patriarchal), and (3) the top 33.33% (most patriarchal). We interacted these three indicators with disability indicators regarding severity (Panel A), heritability (Panel B), and disability type (Panel C). The marginal effects are presented, followed by raw coefficient estimates in square brackets and the corresponding standard errors in parentheses. All regressions include the control variables used in Column (1) of Table 3, as well as indicators for the medium patriarchal and most patriarchal groups.

† $p < 0.1$.
* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

C3. Son Preference and Disability Effect on Fertility Margins

Table C3 shows how the effect of disability on the extensive and intensive margins of fertility and son preference varies across different couple circumstances. Villages are categorized by economic status (poor vs. non-poor) and terrain (mountainous vs. non-mountainous). Additionally, couples are grouped based on their social support networks, as measured by the number of households with which they maintain relationships. Within each subsample, couples are classified into three patriarchal groups—least, medium, and most patriarchal—using a consistent distribution of 40%, 30%, and 30%, respectively.

Table C3 suggests that the negative impact of disability on the extensive margin of fertility diminishes as son preference intensifies. However, the results indicate that this effect becomes statistically insignificant in poor villages and mountainous areas, where son preference is the strongest. In contrast, the estimates remain significantly negative in non-poor or non-mountainous areas. These findings imply that while exploitation due to son preference may occur throughout the entire country, it is more pronounced in poorer and mountainous regions where even a moderate degree of son preference can significantly exacerbate the exploitation of women.

Table C3

The Relationship between the Disability Effect and Son Preference by Couples' Circumstances

Interaction terms	× Least Patriarchal (40%)		× Medium Patriarchal (30%)		× Most Patriarchal (30%)	
	A. By village economic status					
	A1. Poor village (N = 44,982, log likelihood = –10,910)					
DW×Child0	–0.033***	[–0.459] (0.130)	–0.021†	[–0.286] (0.156)	–0.005	[–0.068] (0.143)
DW×Child1+	–0.009	[–0.122] (0.127)	0.014	[0.193] (0.134)	0.005	[0.065] (0.124)
DH×Child0	–0.020	[–0.284] (0.190)	–0.009	[–0.124] (0.273)	–0.017	[–0.244] (0.209)
DH×Child1+	0.008	[0.114] (0.171)	–0.017	[–0.236] (0.237)	0.013	[0.185] (0.166)
	A2. Non-poor village (N = 78,478, log likelihood = –17,987)					
DW×Child0	–0.035***	[–0.518] (0.130)	–0.037***	[–0.559] (0.124)	–0.038***	[–0.573] (0.126)
DW×Child1+	–0.014	[–0.211] (0.140)	–0.005	[–0.072] (0.121)	0.004	[0.062] (0.117)
DH×Child0	–0.023*	[–0.339] (0.155)	–0.018	[–0.268] (0.178)	–0.021†	[–0.307] (0.187)
DH×Child1+	0.004	[0.061] (0.144)	0.004	[0.061] (0.163)	0.001	[0.010] (0.139)
	B. By village terrain					
	B1. Mountainous area (N = 28,126, log likelihood = –6,820)					
DW×Child0	–0.025*	[–0.348] (0.161)	–0.036*	[–0.498] (0.192)	–0.002	[–0.026] (0.170)
DW×Child1+	0.007	[0.099] (0.150)	0.020†	[0.281] (0.165)	0.009	[0.122] (0.148)
DH×Child0	–0.023	[–0.321] (0.234)	0.007	[0.092] (0.380)	–0.013	[–0.185] (0.253)
DH×Child1+	0.003	[0.041] (0.214)	–0.031	[–0.438] (0.321)	0.023	[0.316] (0.196)
	B2. Non-mountainous area (N = 95,334, log likelihood = –22,082)					
DW×Child0	–0.035***	[–0.517] (0.118)	–0.037***	[–0.552] (0.109)	–0.028***	[–0.417] (0.111)
DW×Child1+	–0.015†	[–0.217] (0.125)	–0.009	[–0.132] (0.108)	0.004	[0.058] (0.101)
DH×Child0	–0.026**	[–0.383] (0.143)	–0.014	[–0.212] (0.162)	–0.020†	[–0.300] (0.160)
DH×Child1+	0.002	[0.035] (0.138)	0.008	[0.115] (0.143)	0.0003	[0.005] (0.123)
	C. By social support network					
	C1. Weak external support (N = 94,708, log likelihood = –22,375)					
DW×Child0	–0.027***	[–0.386] (0.115)	–0.032***	[–0.459] (0.100]	–0.017**	[–0.247] (0.105)
DW×Child1+	–0.008	[–0.118] (0.115)	0.003	[0.046] (0.096)	0.009	[0.126] (0.092)
DH×Child0	–0.029**	[–0.416] (0.138)	–0.016†	[–0.226] (0.150)	–0.021†	[–0.297] (0.157)
DH×Child1+	0.001	[0.016] (0.135)	–0.0001	[–0.001] (0.135)	0.006	[0.091] (0.119)
	C2. Strong external support (N = 28,752, log likelihood = –6,522)					
DW×Child0	–0.058***	[–0.870] (0.196)	–0.053***	[–0.797] (0.223)	–0.037**	[–0.547] (0.205)
DW×Child1+	–0.013	[–0.200] (0.200)	–0.018†	[–0.266] (0.214)	0.001	[0.008] (0.194)
DH×Child0	0.014	[0.211] (0.297)	–0.042	[–0.631] (0.359)	0.007	[0.103] (0.329)
DH×Child1+	0.012	[0.175] (0.234)	–0.008	[–0.113] (0.309)	0.010	[0.150] (0.238)

NOTE.—This table presents how the disability effects on the extensive and intensive margins of fertility vary across couples' circumstances. The table is organized into three panels (A, B, and C), each containing two regressions based on specific subsamples. Each sub-panel (A1, A2, B1, B2, C1, and C2) presents a complete regression analysis. Each panel reports the marginal effects, followed by the raw coefficient estimates in square brackets, with corresponding standard errors provided in parentheses. All regressions include the control variables used in Column (1) of Table 3, as well as indicators for moderately and highly patriarchal types.

† $p < 0.1$.

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

D. Robustness Checks

This section presents several sensitivity analyses to assess the robustness of our findings. Table D1 presents the results of the propensity score matching (PSM) used to evaluate the impact of disability among comparable couples across four different strategies. In Column (1), a one-to-one matching approach is utilized, balancing 12 out of 18 covariates and maintaining an equal number of observations in both groups. Column (2) employs one-to-five matching, which successfully balances all covariates and ensures equal representation of unique women. Additionally, Column (3) uses one-to-one matching but includes additional controls, balancing six covariates. Finally, Column (4) applies one-to-five matching with additional controls, achieving full covariate balance. The one-to-five matching strategy, which fully balances all covariates, is particularly effective in reducing sampling variance and increasing statistical power. Across all settings, our findings consistently indicate a negative effect of wives' disabilities on fertility.

Table D1
The Disability Effects on Fertility Using PSM

	Match nearest neighbors (K = 1) (1)		Match nearest neighbors (K = 5) (2)	
DW	–0.021***	[–0.309] (0.054)	–0.035***	[–0.473] (0.076)
DH	–0.006	[–0.09] (0.078)	–0.012*	[–0.167] (0.083)
Controls	Yes		Yes	
Covariate balanced	12/18		18/18	
DW = 1 (#unique/*N*)	793/12137		793/12137	
DW = 0 (#unique/*N*)	1579/12137		792/3579	
Log likelihood	–5,597		–3,963	
N	24,274		15,176	
	Match nearest neighbors and other controls with identical propensity scores (K = 1) (3)		Match nearest neighbors and other controls with identical propensity scores (K = 5) (4)	
DW	–0.019**	[–0.269] (0.097)	–0.015***	[–0.230] (0.040)
DH	–0.007†	[–0.097] (0.059)	–0.004	[–0.064] (0.056)
Controls	Yes		Yes	
Covariate balanced	6/18		18/18	
DW = 1 (#unique/*N*)	189/1308		793/12137	
DW = 0 (#unique/*N*)	5671/111316		5518/103573	
Log likelihood	–26,457		–26,476	
N	112,624		115,710	

NOTE.—This table presents the effect of a wife and husband's disability on fertility using PSM samples. Columns (1) to (4) use different matching methods: one-to-one, one-to-five, and combinations with other controls with identical propensity scores. In the first stage, wives' disability is the dependent variable due to the endogeneity of marriage choices. Couples with disabled wives are matched to those with non-disabled wives but the same covariates, including education, age, and urban residency, using a logit model with 18 dummy variables. In Column (1), 12 out of 18 covariates are balanced, while in Columns (2) and (4), all covariates are balanced, and in Column (3), six out of 18 covariates are balanced. All regressions include the control variables used in Column (1) of Table 3. The marginal effects are presented outside brackets, the logit estimates are in square brackets, and the corresponding standard errors of the logit estimates are in parentheses.

† $p < 0.1$.
* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

Table D2 investigates the effect of disability on pregnancy choice, emphasizing the 9-month gap between conception intentions and childbirth. This gap can cause a disconnect between initial plans and circumstances at birth, with factors like policy changes or health shifts potentially altering outcomes. Ignoring this gap may lead to misattributing influences at childbirth to the original decision, creating endogeneity issues. To account for this, the outcome variable is coded as 1 in year *t* if couple *i* gives birth in year *t+1*. Panel A shows that disabilities, particularly in women, significantly decrease the likelihood of conception. Panel B reveals that these negative effects primarily affect the extensive margin, reducing the overall number of pregnancies rather than altering birth timing or spacing. These findings are consistent with previous studies, affirming the significant influence of disabilities on fertility outcomes and demonstrating the robustness of this relationship across various analyses.

Table D2

The Disability effects on pregnancy choice

	(1)		(2)	
	A. Average effect			
DW	–0.011***	[–0.158] (0.041)	–0.014***	[–0.208] (0.044)
DH	–0.008*	[–0.116] (0.054)	–0.008*	[–0.123] (0.055)
Controls	Yes		Yes	
Village and year FE	No		Yes	
Log likelihood	– 27,635		–27,028	
N	118,788		118,788	
	B. Effect on extensive and intensive margins of fertility			
DW×Child0	–0.023***	[–0.334] (0.057)	–0.026***	[–0.393] (0.059)
DW×Child1+	0.002	[0.032] (0.055)	–0.001	[–0.011] (0.057)
DH×Child0	–0.019***	[–0.272] (0.079)	–0.020***	[–0.296] (0.081)
DH×Child1+	0.002	[0.031] (0.071)	0.003	[0.039] (0.072)
Controls	Yes		Yes	
Village and year FE	No		Yes	
Log likelihood	–27,618		–27,009	
N	118,788		118,788	

NOTE.—This table presents the effect of disability on pregnancy choice. The outcome variable is set to 1 in year *t* if couple *i* gives birth in year *t*+1. Panel A shows the overall effect on fertility, while Panel B breaks down the impact into extensive and intensive margins. The marginal effects are presented by the values not in brackets, the logit estimates are shown in square brackets, and the corresponding standard errors of the logit estimates are provided in parentheses.

† $p < 0.1$.

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

Table D3 presents an alternative specification, replacing the two key dummy variables, DW (disabled wife) and DH (disabled husband), with three categorical variables that represent the couple's disability status: (1) DW = 0, DH = 1; (2) DW = 1, DH = 0; and (3) DW = 1, DH = 1. The reference group is couples in which neither spouse is disabled (DW = 0, DH = 0). This adjustment addresses potential misspecification in the baseline model by accounting for couples in which both spouses are disabled, which represents a small but significant fraction (1.36%). Such couples may experience compounded disadvantages beyond the sum of individual disabilities.

As demonstrated in Panels A and B, fertility probability is lowest among couples in which both are disabled, especially those with strong son preference. These results are consistent with the primary findings discussed in the main text.

Table D3
The Disability Effects on Fertility Across Different Types of Couples

	A. By couple's disability status	
DW = 1, DH = 1	–0.027***	[–0.389] (0.102)
DW = 1, DH = 0	–0.015***	[–0.224] (0.042)
DW = 0, DH = 1	–0.007†	[–0.104] (0.059)
Controls	Yes	
Log likelihood	–28,959	
N	123,460	
	B. By couple's disability status and patriarchal type	
DW = 1, DH = 1		
×Least Patriarchal	–0.040***	[–0.599] (0.159)
×Medium Patriarchal	–0.032**	[–0.457] (0.169)
×Most Patriarchal	0.013	[0.189] (0.205)
DW = 1, DH = 0		
×Least Patriarchal	–0.023***	[–0.332] (0.077)
×Medium Patriarchal	–0.016**	[–0.228] (0.070)
×Most Patriarchal	–0.008†	[–0.121] (0.067)
DW = 0, DH = 1		
×Least Patriarchal	–0.003	[–0.050] (0.099)
×Medium Patriarchal	–0.010	[–0.158] (0.115)
×Most Patriarchal	–0.007	[–0.106] (0.094)
Controls	Yes	
Log likelihood	–28,952	
N	123,460	

NOTE.—This table reports the effects of disability on fertility across different types of couples. We categorize couples into four groups: "DW = 0, DH = 0" (both non-disabled), "DW = 0, DH = 1" (disabled husband and non-disabled wife), "DW = 1, DH = 0" (non-disabled husband and disabled wife), and "DW = 1, DH = 1" (both disabled). Panel A presents the effects of disability on fertility according to couples' disability status. Panel B presents these effects by both couples' disability status and patriarchal type. All regressions include the control variables used in Column (1) of Table 3. The marginal effects are presented outside brackets, the logit estimates are in square brackets, and the corresponding standard errors of the logit estimates are in parentheses.

† $p < 0.1$.
* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.