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DE L'UNIVERSITÉ PSL

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Four essays on gender in rural India

Soutenue par

Mary DI SANTOLO

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UNIVERSITÉ PARIS-DAUPHINE, PSL

DOCTORAL DISSERTATION

Four essays on gender in rural India

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*A dissertation submitted in fulfillment of the requirements
for the degree of Doctor of Philosophy in Economics*

December 20, 2024

L'université n'entend ni approuver, ni désapprouver les opinions particulières émises dans cette thèse. Ces opinions sont considérées comme propres à l'auteur.

The University neither approves nor disapproves of the specific opinions expressed in this dissertation. These opinions are considered to be the author's own.

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GENERAL INTRODUCTION

Introduction

Promoting gender equality is not only about fairness but also about fostering more resilient and prosperous societies. Increasing evidence shows that countries with greater gender equality tend to experience higher and more sustainable economic growth. According to The World Bank (2022), countries with higher levels of gender equality benefit from enhanced economic growth, reduced poverty rates, and more inclusive social development.

The economic consequences of gender inequalities are profound, particularly within developing countries. On a global scale, Woetzel et al. (2015) estimate that closing gender gaps in economic participation between 2015 and 2025 could add \$28 trillion to global GDP, a 26% increase. In developing countries, Klasen and Lamanna (2009) found that gender inequality in education and employment slows economic growth, particularly in the Middle East and North Africa and in South Asia. Indeed, compared to East Asia, the differences in growth due to these inequalities is between 0.9-1.7 and 0.1–1.6 percentage points, respectively.

India, located in the South Asia region, faces deeply entrenched gender inequalities despite global efforts to address these disparities. According to the Global Gender Gap Index (2023) by the World Economic Forum, India ranks 127th out of 146 countries in terms of gender parity. Rural India, in particular, provides a critical context for studying gender inequality. It comprises 64% of the country's population (World Bank, 2023) and is governed by traditional social structures that reinforce patriarchal norms and gender roles, making it a focal area for research on gender inequalities.

This dissertation explores gender inequality in rural India from two primary perspectives. First, it analyzes two key determinants of gender inequality: climate change and financial decision-making power. Second, it investigates sustainable approaches to reducing gender inequality, with a particular emphasis on early childhood interventions. Addressing inequalities early in life is essential for lasting change, as many social norms and expectations that shape gender roles in adulthood are established during childhood and adolescence.

Throughout this dissertation, the term "gender inequalities" will refer to differences between the sexes, affecting women, men, girls, and boys. The focus will be on economic gender inequalities, primarily those related to education, labor market, and credit market.

The remainder of this introduction is organized as follows. Section 1 outlines the state of gender inequalities in (rural) India across the lifespan of women. Section 2 discusses the determinants of gender inequalities, particularly in education, labor market, and credit market in (rural) India, as highlighted in the literature, as well as this dissertation's specific contributions. Finally, Section 3 addresses solutions mentioned in the existing literature for reducing gender inequalities, alongside those proposed in this dissertation within the context of rural India.

Gender inequalities in (rural) India

Indian women face gender inequalities throughout their lives—from childhood to adulthood—as evidenced by the following statistics in the areas of education, the labor market, and the credit market.

In the field of education, significant progress has been made in reducing gender inequalities, particularly in primary education. In line with the United Nations' Millennium Development Goal No. 2 (2000-2015): "Achieve Universal Primary Education", the "Right to Education Act" was implemented in 2009. Arising from Article 21-A of the Constitution, it guarantees all children the right to quality and equitable primary education in public institutions. As a result, since 2012-13, the Gross Enrollment Ratio (GER)¹ for girls in primary education has exceeded that of boys, signaling the elimination of the gender gap at this level. In 2021-22, according to the Ministry of Education, the GER for primary education was approximately 105% for girls, compared to 102% for boys.

1. Defined as: $[(\text{Number of enrolled students}/\text{Population in corresponding age group}) \times 100]$.

However, when we look beyond primary education, gender disparities become more pronounced and widen as the educational level increases. For example, at the higher secondary level, the GER for females was only 58.2%, compared to 65.3% for boys in rural areas, indicating a significant dropout rate among girls as they advance in education. Furthermore, the Gender Parity Index—defined as the ratio of GER for girls to GER for boys—in higher education for rural areas was reported at 0.92 in 2021-22, reflecting the underrepresentation of women in tertiary education.

In addition, girls face discrimination in access to private education. Private education in India is widely recognized in the existing literature as being of higher quality (Pandey, Bhandari, and Hardy 2007; Kingdon 2005). However, Indian girls are less likely to attend private schools than boys. For example, according to the Ministry of Education, at the primary level in private institutions, boys represent nearly 55% of students, and this figure rises to 57% at the secondary level.

Upon reaching adulthood, women face gender inequalities in various areas, including labor and credit markets.

Regarding labor market outcomes, India is known for having one of the lowest female labor force participation rates (for women aged 15 and above) globally—around 33% in 2021-22, according to the Ministry of Labour and Employment—with disparities between rural and urban areas. Indeed, female labor force participation in rural areas is relatively higher than in urban areas, with a difference of nearly 13 percentage points (36.6% versus 23.8%). The main reason cited by women for this high rate of inactivity is the importance of domestic work (childcare, personal commitments in home making)—44.5% (Ministry of Labour and Employment). Furthermore, there are significant gender disparities in the types of employment. According to national data from the Periodic Labour Force Survey for 2020-21, 44.8% of employed men were classified as own account workers and employers, compared to only 22.8% for women. Women are predominantly represented as helpers in household enterprises, accounting for 36.6%, whereas this is the least represented category for men, at 9.2%. Gender inequalities are also evident when considering different sectors of activity—agriculture, industry, or services. Women are overrepresented in the agricultural sector, with nearly two-thirds of working women employed in this sector, compared to about 40% for men. On the other hand, men are more likely to work in industry or the services sector compared to their female counterparts, with a gap of 10.7 percentage points and 11.6 percentage points, respectively.

Finally, regarding gender wage disparities, the same national data indicate that in 2022, the average earnings gap was 140 rupees per day for casual em-

ployment and 5,539 rupees per month for regular/salaried jobs, with variations between rural and urban areas. For casual jobs, the gender wage gap in daily earnings is around 149 rupees in rural areas compared to 131 rupees in urban areas. Conversely, for salaried employment, the gender wage gap in monthly earnings is relatively more pronounced in rural areas compared to urban areas—6,271 rupees versus 4,807 rupees per month.

In terms of the credit market, India is characterized by the coexistence of formal and informal lenders. Regarding access to the formal market, there is no significant difference between men and women in terms of account ownership at financial institutions—according to the World Bank, in 2021, 77.5% of men and 75.6% of women held a bank account. However, when it comes to borrowing, women are relatively less likely to do so through formal financial institutions or mobile money accounts, with a difference of about 4.5 percentage points. Nonetheless, it is not accurate to say that Indian women are credit-rationed, given the expansion of microcredit through both microfinance institutions and Self-Help Groups², which have specifically targeted women as primary beneficiaries. Indeed, in 2020, 98% of microfinance institution clients were women (Sa-Dhan 2020). Additionally, when considering informal lenders—such as relatives, friends, pawn brokers, money lenders, well-known individuals, employers, maistry, colleagues, shopkeepers, and neighbors, among others—it turns out that the relative amount of debt to income is higher for females than for males, particularly in rural areas and among the poorest households (Natal 2023). In rural Tamil Nadu, in 2016-17, while women’s income represented 22% of their household’s total income, their share of household debt amounted to 37%. These debts were primarily incurred to make ends meet, with 53% of indebted women borrowing for this reason, as opposed to 35% of indebted males (Reboul, Guérin, and Nordman 2021).

What determines gender inequality in (rural) India?

Globally, the persistence of gender inequalities is largely driven by the transmission of entrenched sexist social norms (Duflo 2012; Alesina, Giuliano, and Nunn 2013; Bertrand, Kamenica, and Pan 2015; Jayachandran 2015), and India exemplifies this phenomenon.

In Indian society, son preference is deeply ingrained (Ghani, Mani, and

2. A Self-Help Group consists of 15 to 20 women who circulate money among themselves and are subsequently eligible for external loans provided by National Governmental Organizations, banks, or non-banking financial companies

O'Connell 2013; Dhar, Jain, and Jayachandran 2019; Bhalotra, Chakravarty, and Gulesci 2020), rooted in patrilineal and patrilocal traditions. Inheritance, including family names and property, typically passes from father to son. Consequently, widows are often unable to inherit ancestral property and must rely on their sons to sustain their standard of living (Jayachandran 2015). This is further reinforced by the fact that, unlike daughters, sons usually reside close to or with their parents after marriage. Sons are thus seen as a form of economic security for their parents, especially in the Indian (primarily rural) context, where informal employment remains highly prevalent (88.8% in 2023, according to the International Labor Organization). By providing old-age support, sons tend to receive more investments in their health, education, and overall well-being during childhood, as parents directly benefit from these investments. Additionally, the marginalization of daughters is intensified by the practice of dowry. Historically, dowry served as a form of pre-mortem inheritance, providing a substantial financial asset intended to secure a woman's well-being. Today, however, despite its legal prohibition, dowry has evolved into something akin to a "groom price" (Anderson 2007), further reinforcing the perception of daughters as a financial burden. Furthermore, in Hinduism—the country's historical and majority religion—men hold a predominant role. For example, it is traditionally the sons who light the funeral pyre and provide salvation to the deceased. Additionally, within the Vedas, ancient Hindu texts, a clear preference for sons is explicitly mentioned (Jayachandran 2015).

The influence of these cultural factors manifests in gender inequalities across all sectors of the Indian economy, though it takes different forms in areas such as education, the labor market, and the credit market. The primary aspects highlighted in the literature are as follows:

Restricted Physical Mobility Due to Safety Concerns and Purity Norms: The cultural emphasis on female purity—where chastity holds significant social value in Indian society (Jayachandran 2015)—limits women's physical mobility, impacting their access to education and the labor market. Concerns about the risk of "pollution" by males often deter parents from sending daughters to schools located far away, particularly when gender-segregated facilities, such as separate toilets, are unavailable (Muralidharan and Prakash 2013; Adukia 2014). Furthermore, the predominance of male teachers can dissuade parents from enrolling their daughters (Muralidharan and Sheth 2013). Moreover, as adults, women continue to experience mobility restrictions that affect their participation in the labor market and hinder their economic independence by reinforcing their confinement to domestic roles (Jayachandran 2015). These constraints also extend to their access to formal financial institutions, where such barriers

further inhibit economic agency (Field, Jayachandran, and Pande. 2010).

Domestic Labor and Reproductive Roles: The domestic and reproductive roles imposed on women further deepen gender disparities in education and paid employment. From an early age, girls spend substantially more time than boys on household chores and family farm work, adversely affecting their school enrollment rates (Drèze and Kingdon 2001). In adulthood, societal expectations tied to motherhood—viewed as a prestigious role that employment cannot fulfill (Chasles 2009)—and household responsibilities confine women to unpaid or undervalued roles, particularly in agriculture, where their labor is often categorized as "family responsibilities" (Desai and Jain. 1994). Balancing domestic duties with paid employment becomes a persistent challenge, further curtailing women's economic autonomy.

Lack of Inheritance Rights and Patrilineal Norms: The absence of equitable inheritance rights for women, often justified by patrilineal structures, restricts their financial independence, particularly by limiting their access to formal credit markets (Agarwal 1994).

Socially Degrading Practices in Labor and Credit Markets: In the labor market, tasks within the agricultural sector considered labor-intensive or physically demanding, such as rice transplanting, are frequently assigned to women. This relegation fosters perceptions of these tasks as "degrading" and aligns them with traditional submissive female roles (Mbiti 2006). As a result, economic opportunities remain unequal, with men accessing better employment prospects in other sectors. Additionally, in (rural) India, where formal and informal credit markets coexist, women are overrepresented among borrowers from informal lenders. This reliance often arises from the need to make ends meet, yet borrowing from informal lenders is perceived as "degrading" for men, in contrast to borrowing from banks, which conveys social prestige (Garikipati et al. 2016).

Taste-Based Discrimination: Taste-based discrimination also presents a significant barrier for women in the labor market. Employers often exhibit a preference for male workers, which further restricts employment opportunities available to women (Sorsa and al. 2015).

Intersection with Household Socioeconomic Conditions: Socioeconomic conditions, in conjunction with entrenched, gender-biased social norms, further exacerbate gender inequalities in rural India. In low-income households, parents frequently prioritize boys' education, thus limiting girls' access to schooling (Kingdon 2002), especially in private education (Sahoo 2016). Additionally, women in the poorest households, despite meager incomes, often bear the primary responsibility for borrowing and manage the largest share of household debt (Reboul, Guérin, and Nordman 2021). Conversely, in wealthier households—often proxied by the education and income level of the household

head—social prestige linked to female inactivity may encourage women to remain outside the labor market (Sorsa and al. 2015).

This dissertation, through its first two chapters, contributes to the existing literature on the determinants of gender inequalities in rural India, particularly as they relate to entrenched, gender-biased social norms. It examines two specific determinants: climate change and financial decision-making power. Climate change is analyzed for its impact on gender disparities within agricultural employment, while financial decision-making power is investigated in relation to its influence on primary occupation and indebtedness.

Climate change emerges as a critical contemporary factor intersecting with deep-rooted, gender-biased social norms and socioeconomic conditions, collectively shaping gendered labor dynamics. Through its varied manifestations—such as temperature fluctuations and rainfall shocks—it significantly affects the agricultural sector and the livelihoods of those who depend on it, particularly rural households for whom farming is the primary income source. Although previous studies have explored the gender-differentiated impacts of climate change on labor market outcomes in rural India (Rose 1999; Mahajan 2018; Afridi, Mahajan, and Sandwan 2022; Nordman, Sharma, and Sunder 2022), Chapter 1 of this dissertation makes a distinct threefold contribution to this literature. First, it provides a comprehensive analysis of the gendered effects of drought shocks on agricultural labor supply, assessing both wage impacts (daily earnings) and labor quantity (number of days worked within the reference period). Second, it examines the potential mitigating role of irrigation practices. Third, it investigates district-level heterogeneity by accounting for the primary crop cultivated in each district.

With regard to Chapter 2 of this dissertation, it investigates the potentially exacerbating effects of financial decision-making power on gender inequalities within labor and credit markets. The existing literature generally agrees on the positive impact of decision-making power in reducing gender disparities (Doss 2013; Quisumbing and Maluccio 2003; Basu and Maitra 2020; Reggio 2011), with particular relevance in rural India (Nordman and Sharma 2016; Afridi 2010; Misra 2021; Smith and Byron. 2005). However, decision-making power encompasses various forms, including control over financial resources, decisions related to human capital, social choices, and economic decisions. Specifically, financial decision-making power may spark debate regarding its impact on women's empowerment and gender inequality. While it has the potential to enhance women's autonomy by increasing their control over household finances, it may also introduce additional responsibilities. This expanded role often intersects with outcomes related to labor market participation and indebtedness.

Thus, the contribution of this chapter lies in critically assessing whether decision-making power invariably functions as a tool of empowerment for women, or whether, under certain conditions—such as the context and type of decision-making involved—it instead reinforces structural inequalities that women face within both the household and the wider economy.

How can gender inequalities can be reduced in (rural) India?

As in other developing countries, deeply embedded cultural factors rooted in traditional, gender-biased social norms in India impede the reduction of gender disparities, despite the country's robust economic growth over recent decades, particularly since the economic liberalization of 1991. (Political) Interventions are thus essential to foster progress toward a more equitable society in India (Duflo 2012; Jayachandran 2015).

Existing literature highlights two types of (policy) interventions aimed at reducing gender inequalities: first, directly addressing the gender inequalities experienced by Indian women and girls, and/or second, targeting the root cause of these inequalities—namely, traditional and gender-biased social norms.

With regard to direct interventions addressing gender inequalities, the policy framework is particularly important for two main reasons: first, to grant women equal rights with men, and second, to implement financial incentives that counteract the harmful impact on women and girls stemming from the interaction between entrenched gender-biased social norms and household socioeconomic conditions. Affirmative action policies have proven to be a valuable tool in achieving equal legal rights for women (Jayachandran 2015). Widely implemented in India since independence in 1947, these policies, which provide preferential treatment for women in traditionally male-dominated spheres, are applied across various sectors, including higher education, politics, and public sector employment. In other words, these policies help reduce gender inequalities by increasing women's representation in targeted areas through quotas—a set number of positions strictly reserved for them.

Moreover, to address gender inequalities effectively, it is essential to consider their interaction with household socioeconomic conditions. In this regard, policy interventions in the form of financial incentives are frequently utilized. These incentives provide parents with monetary support contingent upon meeting specific requirements designed to benefit girls, thus reducing gender inequalities in targeted areas. The most well-known program, *Progres/Oportunidades* in

Mexico, grants parents monetary payments if they enroll their daughters in school, aiming to close the gender gap in school dropout rates (Schultz 2004). In India, several states have implemented similar incentives to reduce pre- and post-natal gender selection and address the sex imbalance. For example, parents receive monetary compensation upon the birth of a daughter (Anukriti 2013).

To maximize the effectiveness of financial incentives, it is essential for mothers to be the primary recipients. First, mothers generally exhibit less bias in favor of boys compared to men, and second, when women control a larger share of household income, outcomes for girls improve (Thomas 1990; Duflo 2003).

However, to sustainably reduce gender inequalities, it is essential to address their root causes, namely traditional and gender-biased social norms. These norms are particularly entrenched in rural India due to their intergenerational transmission. Indeed, Dhar, Jain, and Jayachandran (2019) show that children of conservative parents are more likely to adopt similar gender-biased norms compared to their peers. In this context, mothers play a crucial role, as children often adopt social norms aligned with their mothers' aspirations and attitudes (Gibby and Luke 2017). Fathers, however, also hold particular significance, as they generally exert more influence within the household regarding decisions that affect girls (Jayachandran 2015).

To shift individuals' perceptions and attitudes concerning traditional gender-biased norms, existing literature highlights the role of role models and media influence (Beaman et al. 2009; Beaman et al. 2012; Jensen and Oster 2009). In India, for instance, commercial television has impacted women's perceptions of the "ideal" family, particularly in terms of family size. Additionally, exposure to women who challenge traditional gender roles can also shift gender-biased social norms. This is particularly evident among women who have accessed traditionally male-dominated spheres, such as politics, through affirmative action policies (Beaman et al. 2009; Beaman et al. 2012). Beaman et al. (2012) find that parents exposed to women in political leadership positions, facilitated by gender quotas, hold more egalitarian aspirations and attitudes for their children, leading to long-term investments, such as schooling, especially for daughters.

In addressing gender-biased social norms, adolescence emerges as a critical period. Indeed, "adolescence is a critical period in the development of gender attitudes and behaviors, which have potentially life-long effects" (John et al. 2017). Consequently, school-based interventions have been developed to specifically target this age group (Dhar, Jain, and Jayachandran 2020; Kumar et al. 2022; Santhya and Francis Xavier 2022). Both girls and boys participate in these interventions, which are based on educational programs promoting gender equality. Studies indicate a positive impact from these programs, with reduced support

for traditional and gender-biased social norms among both girls and boys (Dhar, Jain, and Jayachandran 2020; Santhya and Francis Xavier 2022).

The final two chapters of this thesis contribute to the literature on reducing gender inequalities in rural India. Specifically, they aim at achieving sustainable reductions in gender disparities by focusing primarily on childhood and adolescence as critical periods for intervention.

Chapter 3 examines the importance of adolescence in the context of gender quotas in politics in rural areas of Andhra Pradesh and Telangana, aiming to shift perceptions—especially among mothers—regarding traditional gender-biased social norms. The contributions of this chapter lie in its assessment of intergenerational transmission, as aspirations are measured for both mothers and their children. These children, who themselves were not directly exposed to gender quotas, experience changes in gender-biased social norms largely motivated by the aspirations and attitudes of their mothers. Furthermore, within the existing literature on political gender quotas in rural India, few studies consider the timing of exposure. This chapter thus expands this literature while contributing to the body of work that identifies adolescence as a critical period concerning traditional gender-biased social norms.

Chapter 4 explores the role of community-level variables in educational gender inequalities in rural India. While existing literature on the subject primarily focuses on individual and household-level factors, this study is one of the first to highlight the impact of village-level factors. Specifically, this chapter underscores the importance of policy interventions aimed at improving village conditions, particularly in terms of infrastructure—thereby contributing to the literature on direct policy interventions to reduce gender inequalities. Additionally, it highlights the significance of the social environment and media exposure, both identified as influential factors in addressing the root causes of gender inequality, namely traditional gender-biased social norms.

Outline of the dissertation

This dissertation, organized into four chapters, analyzes gender inequalities in rural India, focusing on two key dimensions: the "new" determinants of gender inequality—new, on the one hand, because of the contemporary relevance and, on the other hand, due to the limited empirical evidence available—and the factors that can sustainably address and reduce these disparities. The first two chapters (Chapters 1 and 2) examine the "new" drivers of inequality that predominantly affect women's outcomes during adulthood. Conversely, the final two chapters (Chapters 3 and 4) explore factors originating in childhood that have

the potential to reduce gender disparities and foster a more equitable society in India.

This structure enables a comprehensive analysis of both certain causes and potential solutions to gender inequality, beginning with its impact on women in adulthood and tracing these inequalities back to their origins in early childhood. As previously highlighted, women face various forms of inequality from early life stages, which tend to intensify over time. This underscores the critical need for early-life interventions to ensure that efforts to reduce gender disparities are not only effective but also sustainable. Addressing gender inequality early in the developmental trajectory can mitigate the compounding effects of inequality, resulting in more durable progress toward gender equity.

In terms of "new" determinants, this dissertation examines the effects of climate change—a contemporaneous factor—(Chapter 1) and financial decision-making power—a relatively little-studied factor—(Chapter 2) on gender inequalities, specifically in the labor market (Chapters 1 and 2) and the credit market, particularly with respect to indebtedness (Chapter 2). The chapters focusing on the sustainable reduction of gender inequalities emphasize the pivotal role of adolescence in the intergenerational transmission of entrenched sexist norms (Chapter 3) and the impact of community-level factors on educational gender disparities (Chapter 4).

Chapter 1 investigates the effects of climate change, measured through the occurrence of drought shocks during the monsoon season, on the rural Indian labor force. The monsoon season is critical to India because the country's water resources, which are highly dependent on the rainfall received, are primarily allocated to the agricultural sector. This sector remains the largest source of employment in rural India, particularly for women. The study aims to assess the impact of these drought shocks and uncover potential gender-specific effects, given the different roles that men and women play in agriculture. To this end, three distinct data sources are employed: the National Sample Survey on Employment and Unemployment, rainfall data from the University of Delaware, and crop and irrigation data from the International Crops Research Institute for the Semi-Arid Tropics. Additionally, an empirical approach was developed to estimate the net effects of drought shocks by gender, providing critical insights into how these shocks differentially affect male and female agricultural workers. Our findings reveal that drought shocks have gender-specific effects. In the absence of wage adjustments in the agricultural labor market—owing to the imperfect nature of rural labor markets—women's working days in agriculture

decrease significantly during droughts, particularly in districts where rice is the primary crop. In contrast, men's agricultural employment remains largely unaffected by droughts. Moreover, irrigation does not mitigate the negative effects of drought shocks on women's employment; on the contrary, it exacerbates the reduction in their agricultural workdays. The opposite is true for men, as irrigation helps buffer the impact of droughts on their employment. Consequently, the few women who have the opportunity tend to shift toward the non-agricultural sector, reflecting a form of labor substitution. In a country where female labor force participation is among the lowest in the world, and predominantly concentrated in rural areas linked to the agricultural sector, it is critical for policymakers to address the negative effects of drought shocks, which are likely to become more frequent due to climate change, on women's employment outcomes. Tackling these challenges is vital not only to meet Sustainable Development Goal 5—focused on achieving gender equality and empowering all women and girls—but also to ensure that economic growth is both sustainable and inclusive. Ignoring these impacts could hinder progress toward equitable development and the full economic empowerment of women.

Chapter 2 presents an exploratory analysis of financial decision-making power as a determinant of gender inequalities in both labor and credit markets. While financial decision-making can grant women status within their households by giving them control over financial resources, it may also add an extra burden. This increased responsibility often intersects with labor market dynamics and debt, creating complex challenges for women who must manage both household duties and financial obligations. The chapter, drawing on the Networks, Employment, Debt, Mobility, and Skills in India Survey and descriptive statistics, questions whether financial decision-making power consistently acts as a tool for women's empowerment, or whether—under certain conditions, particularly in rural India—it exacerbates the structural inequalities they face in the labor and credit markets. In rural Tamil Nadu, decision-making power does not always serve as a means of empowerment; instead, it appears to reinforce gender inequalities in employment and indebtedness. Women who hold decision-making power are overrepresented in precarious employment and face higher levels of debt. In contrast, for men, financial decision-making is associated with a higher likelihood of self-employment. Additionally, the impact of decision-making power on gender inequalities varies significantly depending on household economic conditions. This chapter, therefore, highlights the importance of reassessing, particularly for policymakers, the assumption that decision-making power universally empowers women, especially in contexts with deeply entrenched gender inequalities.

After examining "new" determinants of gender inequality, the remaining two chapters address the question of how to reduce gender inequality in the long term.

Chapter 3 investigates the intergenerational transmission of traditional sexist norms. In India, a country deeply affected by gender inequalities, parents—particularly mothers, as primary caregivers—play a crucial role in passing on these norms through their aspirations and attitudes toward their children. Nevertheless, as the literature suggests, even the most entrenched sexist norms can evolve, especially through educational interventions and public policies targeting women. The goal of this chapter is to assess the significance of adolescence in influencing such change. In this context, we examine how mothers' exposure to gender quotas during adolescence versus adulthood affects the long-term transmission of traditional norms, as evidenced by mothers' aspirations for their children, the activities of the children themselves, and the children's own aspirations. The analysis uses data from the Indian Young Lives Survey and applies intent-to-treat regressions, incorporating the child's gender to assess variations in childhood gender inequalities. The findings indicate that mothers exposed to gender quotas during adolescence, rather than adulthood, tend to raise their children in a more egalitarian manner. These mothers exhibit higher aspirations for their daughters, who are more likely to attend school, spend more time in school, and are less likely to be involved solely in child labor. Furthermore, the career aspirations of these girls have improved, contributing to the narrowing of existing gender gaps. This reflects progress in challenging traditional sexist social norms and their transmission across generations. Overall, these results underscore the importance of interventions aimed at shaping social norms during adolescence. While our data do not provide insights into the role of fathers in these changes, achieving greater gender equality in Indian society will likely require the involvement of all family members. By influencing aspirations and behaviors during adolescence, individuals may contribute to fostering more egalitarian outcomes for future generations.

In line with the theme of reducing gender inequalities from an early age, Chapter 4 is driven by the observed decline in educational gender disparities in India over the past few decades. While much of the existing economic literature has focused on individual and household-level factors to explain these disparities, this chapter offers a novel contribution by investigating community-level factors that may have played a role in improving educational attainment across genders. Using data from two waves of the India Human Development Survey, the chapter employs a three-stage methodology incorporating community fixed

effects, drawing on techniques similar to those used in studies of the gender earnings gap. The findings underscore the significant role that village-level determinants play in narrowing gender disparities in education. Specifically, the chapter highlights the critical influence of village infrastructure, the social environment, and media exposure in reducing these gaps. Therefore, policy interventions aimed at enhancing village-level conditions represent a compelling strategy for addressing gender disparities in schooling. Such interventions complement household-level efforts and are essential for sustaining the progress made in achieving gender parity in education.

Chapter 1

GENDER DIVIDE IN LABOR EFFECTS OF WEATHER SHOCKS: THE ROLE OF CROPS AND IRRIGATION IN INDIA.*

1.1 Introduction

In the Indian subcontinent as a whole (including India, Pakistan, Nepal, and Bangladesh), the monsoon is of particular importance because the water resources of these countries depend heavily on these rains. This phenomenon, unique to South Asia, sets the pace for the lives of the people and is even celebrated by them (Guillame Delacroix 2023). The behavior of the rainy season has always been unpredictable. As Jawaharlal Nehru, the former Indian Prime Minister, once said: "Some years it arrives with pomp and circumstance, and others it comes like a thief." However, its variability has intensified due to climate change. The monsoon is a phenomenon explained by the difference in surface temperatures between the land and the ocean. According to the Intergovernmental Panel on Climate Change, the increase in greenhouse gas emissions has caused the western part of the Indian Ocean to warm, leading to changes in rainfall patterns during the monsoon season (Roxy et al. 2014).

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India's agricultural sector is still largely dependent on monsoon rains, not only for unirrigated crops but also for irrigated crops, as they help recharge water sources (Afridi, Mahajan, and Sandwan 2022). The changing patterns of monsoon rains are therefore a significant concern for the Indian agricultural sector, which contributed 18.3% to the GDP in 2022 (Indian Ministry of Agriculture and Farmers' Welfare) and employed nearly 44% of the Indian workforce in 2021 (World Bank). The sector is also the primary source of employment opportunities for women—58% of working women were employed in agriculture in 2021 (World Bank)—despite their overall participation in the labor market being low (33% in 2023 (World Bank)).

This paper aims to examine how changes in rainfall patterns, particularly droughts during the monsoon season, affect the Indian labor force. We specifically analyze the impact of these drought shocks on rural household members, focusing on daily agricultural wages and labor allocation in India.

Given that in India, the roles and tasks assigned to women in agriculture differ from those of men (Bardhan 1974), we examine whether the effects of drought shocks vary by gender. Additionally, we explore whether irrigation—known for its potential to safeguard crop yields (Fishman 2018)—mitigates the impact of weather shocks on labor outcomes for both men and women in the agricultural sector. Lastly, considering the spatial specialization of crops and the gendered segmentation of agricultural labor based on crop types (Bardhan 1974; Chen 1989), we perform heterogeneity analyses by district type, focusing on the main crop grown (rice or wheat/other), to assess how drought shocks affect labor outcomes among agricultural workers.

We utilize three key data sources in this study. The primary dataset consists of five rounds of the Indian National Sample Survey (NSS) from 2003, 2004, 2005, 2007, and 2009, which provide detailed information on daily wages and the number of days worked during the week prior to the interview (reference period). These survey data are combined with geolocalized monthly rainfall data from the University of Delaware to compute drought shocks. Additionally, we incorporate crop and irrigation data from the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT). The ICRISAT data serve two main purposes: first, to assess the mitigating role of irrigation in the context of drought shocks on labor outcomes; and second, to explore potential heterogeneous effects based on the primary crop cultivated in each district (rice or wheat/other). Our empirical model is designed to estimate the net effects of drought shocks by gender, providing insights into how these shocks affect male and female agricultural workers differently.

We find that men and women experience different impacts from weather shocks. In the absence of price adjustments, specifically daily wage changes,

in the agricultural labor market, it is the number of days worked by women in agriculture that declines during droughts. Conversely, on average, men's agricultural employment remains largely unaffected by droughts. Notably, casual wage laborers among women are the most vulnerable. Additionally, irrigation does not mitigate the negative effects of drought shocks on women's employment; rather, it exacerbates the reduction in their agricultural workdays. The opposite holds true for men, as irrigation helps buffer the impact of droughts on their employment. Consequently, women tend to shift from agricultural work to non-agricultural sectors as a form of substitution.

Furthermore, our district-level heterogeneity analyses, based on the primary crop cultivated (rice vs. wheat/other), suggest that the main findings are driven by districts where rice is the dominant crop. This aligns with previous literature indicating that women's labor allocation is highly crop-dependent (Bardhan 1974; Chen 1989; Chin 2012), and that monsoon crops, particularly rice, employ a significant proportion of female workers. Activities associated with rice cultivation—such as planting, weeding, harvesting, and threshing—are predominantly performed by women. In contrast, “rabi” crops and irrigated crops like wheat require more physical strength and involve fewer intricate tasks, resulting in lower female participation in these sectors (Bardhan 1974).

This paper contributes to the literature on climate shocks, such as rainfall variation and drought, and their effects on rural households, with a particular focus on gender-differentiated impacts (Rose 1999; Björkman-Nyqvist 2013; Mahajan 2018; Asfaw and Maggio 2018; Agamile, Dimova, and Golan 2021; Afridi, Mahajan, and Sandwan 2022; Feeny et al. 2021; Nordman, Sharma, and Sunder 2022). Our contribution is threefold: first, we provide a comprehensive analysis of drought shock effects on agricultural labor supply, considering both price (daily wage) and quantity (number of days worked during the reference week); second, we examine the potential mitigating role of irrigation; and third, we decompose our analysis by district type, based on the primary crop grown in each district. In doing so, this paper engages with the broader literature on the gendered division of labor within the (Indian) agricultural sector (Bardhan 1974; Chen 1989; Chin 2012; Mbiti 2006). By extension, it also contributes to the body of research emphasizing the importance of crop type as a determinant of women's economic value in India (Bardhan 1974; Rosenzweig and Schultz 1982; Mbiti 2006; Qian 2008; Carranza 2014).

The rest of this paper is organized as follows: Section 1.2 is dedicated to a literature review. Sections 1.3 and 1.3.3 present the data and methodology used in this study. Section 1.4 present our results and section 1.5 concludes.

1.2 Literature review

1.2.1 Climate shocks, agricultural sector and rural households

Climate change, through its manifestations - temperature and rainfall shocks, among others - significantly affects the agricultural sector and the people who depend on it (rural households).

First of all, climate shocks have deleterious consequences for crop yields. In India, rising temperatures and more frequent droughts significantly negatively impact crop productivity (Blakeslee and Fishman 2018). As a result, Indian farmers adopt new strategies. For example, in the case of rice crops, Pandey, Bhandari, and Hardy (2007) find that farmers facing drought often decide to change their cultivation methods in the following year, even replacing rice with other crops.

Moreover, rural households –those whose primary source of income is farming– are bearing the full brunt of climate change’s effects, both economically and in terms of well-being. In the labor market, participation, the allocation of labor supply across sectors, and incomes are particularly affected. In India, Kaur (2019) finds that a positive rainfall shock leads to a rise in unemployment, especially among the poorest, because of the downward rigidity of nominal wages. In Brazil, periods of drought not only result in lasting income losses but also cause an increase in the labor supply of rural households in the non-agricultural sector and the time devoted to secondary activities (Mueller and Osgood 2009; Branco and Féres 2020). Additionally, Indian farmers’ level of indebtedness tends to increase following high temperatures and drought periods, linked to the investments required to implement adaptive strategies (Kandikuppa and Gray 2022). Beyond economic issues, the well-being of rural household members is also adversely affected by climate change. For instance, periods of drought are associated with an increase in property crime (Blakeslee and Fishman 2018), a higher probability of girls’ mortality relative to boys in India (Rose 1999), and lower birth weights in Vietnam (Le and Nguyen 2021).

Among household members, females are the most vulnerable. During periods of drought, Indian women suffer from domestic violence and crimes linked to insufficient dowry (Sekhri and Storeygard 2014). In addition, temperature shocks lead to a decrease in the daily calorie intake of Malawian women and in the primary school enrolment of Ugandan girls (Asfaw and Maggio 2018; Björkman-Nyqvist 2013). In the Indian agricultural sector, periods of drought decrease the number of days women work and, therefore, leads to a particular form of unemployment (Afridi, Mahajan, and Sandwan 2022). However, in Uganda, droughts give them more opportunities to grow cash crops, as men

reallocate their labour force to the non-agricultural sector (Agamile, Dimova, and Golan 2021). In addition to temperature shocks, rainfall shocks impact women's outcomes on the labour market. In India, women's agricultural daily wage (Mahajan 2018) decreases, and the probability of working in the formal sector decreases in Vietnam (Feeny et al. 2021).

1.2.2 Gendered division of the agricultural sector and women's value

The Indian agricultural sector is characterized by a marked gender divide. India's two main staple crops are rice and wheat, each requiring different tasks. For example, transplanting and weeding account for 30% of the labor in rice production compared to 20% in wheat farming. Transplanting is the most labor-intensive task, averaging 77 person-days of labor per hectare (Mbiti 2006). Additionally, Mies (1986) describes the challenging working conditions associated with rice production, such as "muddy fields" and the need to spend a large amount of time bending down, conditions which men often feel unable to endure. Consequently, women may have a comparative advantage due to their greater dexterity and agility. This results in women being more likely to work in districts where rice is the main crop, as opposed to wheat districts (Bardhan 1974; Chen 1989). Moreover, Chin (2012) reports a 10 percentage point difference in women's labor market participation between these types of districts, with no significant difference for men. Thus, women's participation in the labor market tends to be higher in the eastern and southern regions of India compared to the north-western regions (Chen 1989).

The gendered division of agriculture has prompted researchers to question the economic value of women in different Indian agricultural regions. Bardhan (1974) raises the question: "Could it be that, in areas with paddy agriculture, the economic value of a woman is more than in other areas?" This suggests that the economic value of Indian women is influenced by differences in female labor within agricultural production. In areas where women have a relatively higher rate of employment, the living conditions of females seem to be better. For instance, in India, districts with a higher rate of female employment have a lower male-to-female survival ratio for children (Rosenzweig and Schultz 1982; Carranza 2014). In addition, positive rainfall shocks in districts where rice is the main crop would increase the relative number of prime-age females - due to a reduction in the marriage rate and a lower dowry amount (Mbiti 2006). This trend is also observed in other countries, where there is a marked preference for boys, such as China. According to Qian (2008), the comparative advantage of women in tea production has positive consequences for the survival rate of girls

in tea-producing regions.

1.3 Data

1.3.1 Sources and variables of interest

For this study, we relied on three different data sources: labor data from the National Sample Surveys (NSS), precipitation data from the University of Delaware (UDEL), and crop and irrigation data from the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT).

1.3.1.1 Labor time: NSS data

Launched in 1950, the NSS collects socio-economic data to inform policymakers and is used in statistical exercises by various players (government, academics, researchers, etc.). More specifically, the Employment/Unemployment survey provides information relating to household characteristics, particularly demographics, the status of individuals in the labor market regarding their main activity and any subsidiary activities, and their use of time in the seven days preceding their interview, as well as data on work-related income.

The fieldwork is carried out by the Field Operation Division (FOD) of the National Sample Survey Office (NSSO) in all the states of India, with a few exceptions (a few villages in Nagaland and the Andaman and Nicobar Islands and certain districts in Jammu and Kashmir — Leh, Kargil, and Poonch). This nationally representative survey covers around 600 districts.

At this date, there are ten waves of Employment/Unemployment surveys covering 1983 to 2011³. Each wave occurs during the agricultural year and is divided into four distinct three-month sub-waves (quarters) : July to September (Q1), October to December (Q2), January to March (Q3), and April to June (Q4). During these periods, households are selected based on a multi-stage stratified sampling principle based on place of residence (rural/urban) and population⁴.

For this study, we mobilize the NSS employment survey-related database constructed by Kaur (2019). We focus on the waves with information on the district of residence of the respondents, i.e. waves 60, 61, 62, 64, and 66, from 2003 to 2009. Within this data, our primary variables of interest are the daily wage and the number of days worked in the seven days preceding

3. After 2011, the NSS Employment/Unemployment survey data were replaced by the Periodic Labor Force Survey (PLFS). We do not use the PLFS because the survey methodology, data collection mechanism and sample design are different from the NSS ones.

4. For more information, consult the site dedicated to the survey.

the interview. This period serves as a reference, providing a snapshot of the individual's employment. To account for the right-skewed distribution, we apply a hyperbolic transformation (inverse hyperbolic sine) to this variable⁵. We also consider the respondents' sector of activity during the above-mentioned reference period - agricultural, non-agricultural, and domestic work. To do this, we use the definition in Kaur (2019) to characterize whether a job is carried out within the agricultural sector. Thus, any day spent working in a household enterprise (as an own-account worker, employer, or unpaid family worker) or as a casual laborer in the agricultural sector is categorized as agricultural employment. We also utilize information regarding the specific type of activity performed in agricultural jobs, distinguishing between manual tasks (such as ploughing, sowing, transplanting, weeding, harvesting, or other manual labor) and non-manual tasks. Additionally, domestic work includes both household duties and engagement in the free collection of goods, such as vegetables, roots, firewood, or livestock feed. Consequently, all other activities are classified as non-agricultural, including regular salaried/wage employment and casual wage labor in public works.

1.3.1.2 Drought: UDEL data

The University of Delaware has established a global monthly 0.5° precipitation dataset spanning from 1900 to the near present (Willmott and Matsuura 1995), using rain gauges from GHCN version 2, GHCN-Daily, and station records from other countries and organizations. The latest version of the UDEL dataset extends to 2017. Climatologically aided interpolation and an enhanced distance-weighting method, using the spherical version of Shepard's algorithm, were employed to perform spatial interpolation in this dataset.

We use the UDEL precipitation data to create our explanatory variable of interest: the prevalence of drought shocks during the monsoon season. In India, the monsoon generally begins on June 1st in Kerala, then spreads from the west coast to the east coast, concluding around the autumnal equinox (end of September) in the Himalayan mountains. In this paper, a drought shock is defined as average monsoon rainfall for the years under consideration (2003, 2004, 2005, 2007, and 2009) that falls within the lowest two deciles of the rainfall distribution from 1977 to 2017—a measure used by Jayachandran (2006) and Afridi, Mahajan, and Sandwan (2022), among others.

5. The inverse hyperbolic sine of x is defined as $\ln(x + [(x)^2 + 1]^{1/2})$.

1.3.1.3 Crop and irrigation: ICRISAT data

The ICRISAT data has been constructed based on Indian districts⁶ to provide a better understanding of the agricultural sector in India, particularly its implications in rural areas.

For this paper, we use data based on the 2015 district delimitation, focusing specifically on information related to crops and irrigation. Our database included details of the area under cultivation in 2003 - the first year considered in the NSS and used as a reference here⁷ - and the irrigated area by type of crop for each year considered (2003, 2004, 2005, 2007, and 2009). This allows us to construct variables related to the share of rice, wheat, and other crops (including sorghum, pearl millet, maize, finger millet, chickpea, pigeon pea, minor pulses, soybean, oil seeds, sugarcane, vegetables, fruits and vegetables, potatoes, and onion) cultivated, as well as the share of irrigated area for each of these three crop categories. These variables enable us to account for potential heterogeneity between districts based on the main crop cultivated (rice or wheat/other) and to examine the role of irrigation as a potential mitigating factor in the impact of drought on the number of days worked in the agricultural sector by men and women.

1.3.2 Descriptive statistics

Table 1.1 presents a description of our sample in terms of individual characteristics. The sample comprises 1.1 million observations, with nearly 49% being women. The average age is approximately 36 for both men and women. For more than half of the sample, the educational level is unknown. However, 16% of the individuals are illiterate, with a marked difference between genders: 21% of women are illiterate compared to 10% of men. About 8% of the sample belongs to landless households. Additionally, 44% of the sample was interviewed in the first and second quarters, while nearly 30% were interviewed in the third quarter (January to March) or the fourth quarter of the Indian agricultural year, with no significant gender differences in this distribution.

Regarding labor market outcomes, significant gender differences are observed. First, in terms of the (log) daily wage in agriculture, women earn less than men, with an average of 3.74 compared to 4.2 for men. Additionally, on average, women worked 0.64 days in the agricultural sector, with 0.34 days in manual labor, 0.06 days in the non-agricultural sector, and 1.32 days on domestic

6. Both the 1966 and 2015 delimitations have been considered, resulting in two separate databases.

7. We decide to consider crop shares in a reference year, in this case 2003, given that drought shocks can alter the cultivated areas for each of the crops considered (rice, wheat/other).

tasks. In comparison, men worked 1.44 days in agriculture, 0.75 days in manual labor, 0.23 days in the non-agricultural sector, and 0.05 days on domestic tasks. We also observe seasonality in women's agricultural employment (see Figure 1.1), reflected by the average number of days worked in the sector. Women are more likely to work in agriculture during the monsoon and post-monsoon periods—between the first and second quarters of the Indian agricultural year (July to December). During this time, the average number of days worked ranges from 0.65 to 0.75, peaking at 0.75 days in July, the first month of the monsoon. In contrast, men show only slight fluctuations in the number of days worked throughout the year, ranging from 1.41 to 1.46 days. These findings highlight the importance of our research question, which seeks to account for potential gender-differentiated effects of drought shocks during the rainy season.

Table 1.2 provides a district-level account of rainfall shocks—droughts or floods—that may have occurred between 2003 and 2009. Of the 2,810 district-year observations considered during our study period, 25% experienced a drought and 16% experienced a flood.

The fact that women experience seasonality in their employment is evidence of the gender segmentation of agricultural employment in rural India during the period under consideration. Since women's activity within the agricultural sector is relatively higher during the monsoon period, it can be hypothesized that this is related to the agricultural calendar by crop type. Crops grown during the rainy season are known as "kharif" crops, including rice, millet, sorghum, and groundnuts. These crops are then replaced by "rabi" crops, which are sown and harvested during the dry season, including wheat, maize, and vegetables such as chickpeas and tomatoes (Kaur 2019).

Of the 2,810 district-year observations, 41% have rice as their main crop, 20% grow mainly wheat, and the remaining 39% primarily cultivate other crops (*cf.* Table 1.2). The definition of the category "other crops" is summarized in Table 1.3. It includes fourteen crops (sorghum, pearl millet, maize, finger millet, chickpea, pigeon pea, minor pulses, soybean, oil seeds, sugarcane, vegetables, fruits and vegetables, potatoes, and onions), which are the main crop in 511 districts. Moreover, the prevalence of certain crops within a district is influenced by various geographical factors, resulting in a marked regional specialization of crops in India. Figure 1.3 shows that wheat is primarily grown in India's northern and northwestern states, while rice is the main crop in most of the eastern states. Other crops are mainly cultivated in the South and along the country's western flank.

Figure 1.2 illustrates the importance of considering the district of residence and, more specifically, the type of crop grown there in this study. It shows that women living in "rice" or "wheat" districts experience a peak in their average

number of days worked in the agricultural sector during the cultivation season –"kharif" and "rabi"– for these two crop types. In "rice" districts, the peak occurs in July (0.67), while in wheat districts, it occurs in April (0.63). For women living in districts where the main crop is other than rice or wheat, the graph shows cyclical variations, both upwards and downwards. This may be due to the grouping of different crops in this category, which can be grown during either the "rabi" or the "kharif" seasons. For men, the same figure shows little variation either in terms of seasonality (months) or in terms of the main crop grown by district, with the exception of men living in wheat districts, who experience a peak in April (1.59).

Irrigation can play a crucial role in mitigating the impact of drought by providing artificial water supply, which helps sustain crop growth and maintain a certain level of production, particularly during periods of rainfall shortages. As shown in Table 1.2, 29% of the crop area in the districts where individuals in our sample reside is irrigated. Wheat, a "rabi" crop, is especially reliant on irrigation to meet its water requirements, with over 83% of wheat crops benefiting from irrigation. In comparison, rice is irrigated on about half of its cultivated area.

1.3.3 Empirical strategy

1.3.4 Main specification

Since the purpose of this paper is to analyze the gender-differentiated effects of drought shocks on agricultural employment, we estimate the following equation:

$$\begin{aligned}
 Y_{i,d,t} = & \beta_0 + \beta_1 Female_{i,d,t} + \beta_2 Male_{i,d,t} \times Drought_{d,t} \\
 & + \beta_3 Female_{i,d,t} \times Drought_{d,t} \\
 & + \beta_4 X_{i,d,t} + \pi S_{d,t} + D_d + D_t + \epsilon_{i,d,t}
 \end{aligned} \tag{1.1}$$

Where $Y_{i,d,t}$ is the outcome of interest for individual i , residing in district d at year t .

The interaction terms $Male_{i,d,t} \times Drought_{d,t}$ and $Female_{i,d,t} \times Drought_{d,t}$ are our main explanatory variables. These variables capture the effect of being male or female in district d , which experiences a drought shock—*i.e.*, a deficit in rainfall during the monsoon season—in year t . Following the approach of Afridi, Mahajan, and Sandwan (2022), we assume that drought shocks are uncorrelated with other shocks to labor demand or supply in a given district and year. Therefore, the coefficients β_2 and β_3 on $Male_{i,d,t} \times Drought_{d,t}$ and $Female_{i,d,t} \times Drought_{d,t}$, respectively, can be interpreted as causal effects of drought shocks on labor market outcomes for males and females.

For the control variables, we include individual-level characteristics ($X_{i,d,t}$) such as age, age squared, education and quarter of interview, as well as excess rain in district d , at year t ($S_{d,t}$) - i.e. a dummy variable indicating whether district d experiences monsoon rainfalls in year t belonging to the two upper deciles of the monsoon rainfall distribution between 1977 to 2017. For this latter control variable, we have no prior with respect to whether heavy rainfalls reflect a positive or negative shock (as in the case of flooding).

D_t are year dummies that control for changes that could affect labor outcomes in India as a whole in a given year (such as institutional reforms, or agricultural prices, etc...) and D_d are district dummies control for district level characteristics that are fixed over time⁸. The standard errors are clustered at the district level.

1.3.5 Considering irrigation role

Given the mitigating potential of irrigation concerning the effects of drought shocks on agricultural employment, we also include the irrigated share of crops considered and its interaction with our main explanatory variables ($Male \times Drought_{i,d,t}$ and $Female \times Drought_{i,d,t}$).

Thus, we estimate the following equation:

$$\begin{aligned}
 Y_{i,d,t} = & \delta_0 + \delta_1 Female_{i,d,t} + \delta_2 Male_{i,d,t} \times Drought_{d,t} \\
 & + \delta_3 Female_{i,d,t} \times Drought_{d,t} \\
 & + \delta_4 Male_{i,d,t} \times Drought_{d,t} \times IrrigatedShare_d \\
 & + \delta_5 Female_{i,d,t} \times Drought_{d,t} \times IrrigatedShare_d \\
 & + \delta_6 Male_{i,d,t} \times IrrigatedShare_d \\
 & + \delta_7 Female_{i,d,t} \times IrrigatedShare_d \\
 & + \delta_8 X_{i,d,t} + \pi S_{d,t} + D_d + D_t + \epsilon_{i,d,t}
 \end{aligned} \tag{1.2}$$

Coefficients δ_2 and δ_3 capture the effects of drought shocks on agricultural employment for men and women, respectively, in the absence of irrigation (0%). $IrrigatedShare_d$ is the share of irrigated area in district d , such that δ_4 and δ_5 captures the marginal effect of irrigation on labor allocation when there is a drought.

8. Note that we use pooled cross-sections, such that our identification of the effect of the drought relies on the assumption that the changes in labor allocation that we observe within district over time following a drought are not driven by compositional effects. As the waves of the NSS that we use are representative at the district level, compositional effects on such a short period of time are likely not to be a concern. We also control for individual level characteristics. However, we cannot fully rule out that part of the effect that we observe could be driven by unobserved characteristics that vary over time.

1.4 Results

1.4.1 Agricultural sector

First, we analyze the impact of drought shocks on daily wages in the agricultural sector for both men and women. In theory, under a perfectly functioning labor market, labor market shocks, such as droughts, would primarily lead to price adjustments (Benjamin 1992)—in this case, changes in daily wages. However, the results presented in Table 1.4 show no significant effect of drought shocks on daily agricultural wages for either men or women. The only noteworthy finding is the persistent wage gap, with women’s daily wages being consistently lower than men’s.

This result is consistent with the findings of Kaur (2019), who identifies downward wage rigidity in the agricultural sector during temporary shocks to labor demand, such as droughts. In the context of an imperfect labor market in India, adjustments occur not through wage changes, but through quantities—that is, by varying the number of days worked in agriculture. As shown in Table 1.5, drought shocks have a negative impact on women’s agricultural employment, leading to a reduction of approximately 4 percent, even though women already work fewer days than men in the absence of such shocks.

Agricultural employment can be categorized into four types: own-account worker, employer, casual laborer, and unpaid family worker. Given the connection between these categories and land ownership, it is useful to assess the effect of drought shocks on each of these employment types. Specifically, being an unpaid family worker typically applies only to landowning households. Therefore, in our analysis, we separate estimates based on household land ownership.

The results in Table 1.6 show important differences in the effect of droughts depending on the land ownership status of individuals. For men, there is actually a positive effects of droughts on labor time in agriculture for non-landowners, and a negative effect for land-owners. For men in non-landowning households, the positive effect is driven by an increase in the number of days of work as own account worker and casual wage labor. For men in landowning households, the negative effect is only driven by a decrease by the number of days worked as own account worker. For women, droughts negatively affect labor time in both types of households. The effect for women from non-landowning households is quite large, and is almost entirely driven by the 11% decrease in the number of days that they work as casual laborers. For women from landowning households, the aggregate decrease in labor time that we observe comes from several categories of labor: women have a significant decrease in the number of days that they work as an employer, as a casual laborer, and as an unpaid family worker, which decrease

by less than 1 percent, 3 percent, and 2 percent, respectively. The increase of 2% in time spent working as own account worker does not compensate the decrease in the other categories.

1.4.2 Irrigation role

Since irrigation has the potential to mitigate the effects of droughts on agricultural employment, we investigate in Table 1.7 whether the proportion of irrigated crops influences the impact of droughts on time spent working in agriculture. On the one hand, we find that the absence of irrigation during drought shocks has no significant effect on women's agricultural employment but leads to a reduction of approximately 9 percent in men's agricultural employment. For men, irrigation helps mitigate these effects. Specifically, if 50% of the area is irrigated, the net effect on men's agricultural employment is approximately 3.5 percent ($0.5 \times 0.25 - 0.09$), effectively reducing the negative impact of drought shocks.

However, this is not the case for women. Rather than mitigating the impact, the proportion of irrigated crops exacerbates the reduction in the number of days women work in the agricultural sector in response to drought shocks. For instance, with 50% of crops irrigated, the net effect for women is approximately 7 percent ($-0.2 \times 0.5 + 0.03$), indicating an amplified reduction in their agricultural employment. This result aligns with previous findings on technological changes, such as the use of machinery and fertilizers, which Chen (1989) argue displace women from traditionally female-dominated agricultural activities. In this sense, irrigation may have a similar effect, displacing women from agricultural work during drought shocks.

1.4.3 Labor supply reallocation

Our previous results show that drought shocks primarily affect women, leading to a reduction in the number of days they work in the agricultural sector. This raises an important question: how do women reallocate their time when their agricultural employment declines? We hypothesize that women who experience a reduction in agricultural work may either seek alternative employment in the non-agricultural sector or reduce their overall labor market participation by increasing their involvement in domestic work.

Tables 1.8 present the estimated effects of drought shocks by gender on the number of days worked in the non-agricultural sector and in domestic work. The results suggest that women increase their number of workdays in the non-agricultural sector by approximately 1 percentage point during the reference period. However, in terms of domestic work, we do not observe any significant

reallocation of labor. In contrast, for men, there is no significant effect of drought shocks on the number of days worked in either the non-agricultural sector or domestic work.

Our analyses reveal several key findings. First, drought shocks do not affect agricultural daily wages for either men or women, a result that may be explained by the presence of downward wage rigidity within the agricultural sector (Kaur 2019). Second, drought shocks significantly reduce the number of days women work in the agricultural sector during the week preceding their interview, while no similar effect is observed for men. This impact is consistent across women from both landowning and non-landowning households and is particularly pronounced for women engaged in casual wage labor. This adjustment in labor supply quantity suggests that the persistence of downward nominal wage rigidity may drive this gender-specific response.

Moreover, contrary to our expectations, irrigation does not mitigate the negative impact of drought shocks on women’s agricultural employment, even though it has a moderating effect for men. As a result, women tend to reallocate their labor supply within the agricultural sector when facing drought-induced reductions in employment. These findings underscore the differentiated impacts of drought on labor market participation by gender, highlighting the challenges women face in adapting to climatic shocks.

1.4.4 Heterogeneous effects by type of districts

Given the existence of spatial specialization related to the primary crop cultivated (see Figure 1.3), we aim to understand the potential heterogeneous effects based on the type of district. Specifically, we distinguish between rice districts and other districts, which primarily grow wheat and other crops. This distinction is informed by the observation that women are more likely to engage in agricultural employment in rice districts (Bardhan 1974; Chen 1989; Chin 2012).

For our analysis related to the agricultural sector, labor supply reallocation, and the role of irrigation, we apply the same equations (1) and (2). The only modification is the separation of estimates into two panels, categorized by district type (*i.e.*, rice or wheat/other as the main crop).

1.4.4.1 Agricultural sector

The results presented in Table 1.9 reveal the heterogeneity across districts in terms of the impact of drought shocks on agricultural employment. Specifically, the negative effect on women’s employment, highlighted in our main findings, is primarily driven by women residing in districts where rice is the predominant

crop, with a reduction in the number of days worked of approximately 7 percent. In contrast, for women living in districts where wheat or other crops dominate, drought shocks have no significant impact on the number of days worked in the agricultural sector. Although our main results suggest no significant effect of drought shocks on men's agricultural employment, the district-level analysis indicates that men residing in wheat- or other crop-dominant districts experience a reduction of around 4 percent in the number of days worked.

Furthermore, recognizing that the tasks associated with agricultural employment may vary by crop or in terms of their intensity, we account for these variations in our analyses. For instance, transplanting and weeding comprise 30% of the labor required for rice production, compared to 20% for wheat farming (Mbiti 2006). Accordingly, we differentiate between days worked in the agricultural sector based on the nature of tasks performed, distinguishing between manual tasks (e.g., ploughing, sowing, transplanting, weeding, harvesting, and other manual activities) and non-manual tasks. However, due to missing data for approximately 15% of individuals with agricultural jobs, the results of these analyses should be interpreted cautiously. Table 1.10 provides the results of these estimates, showing a gendered variation according to task type. Specifically, men in wheat- or other crop-dominant districts experience a 5 percent decrease in the number of days worked on manual tasks in response to drought shocks. In contrast, for women in rice-dominant districts, it is primarily non-manual agricultural employment that is affected by drought shocks, though the effect is relatively small (less than 1 percent). Breaking down the manual tasks further (see Table 1.11), we find that men in wheat- or other crop-dominant districts experience a significant reduction in the number of days worked on harvesting activities as a direct consequence of drought shocks.

1.4.4.2 Irrigation role

The results in Table 1.12 underscore that our main findings are largely driven by residents of rice-dominant districts. Indeed, the outcomes observed in panel A of this table closely mirror those in Table 1.7. Specifically, men in rice districts experience a reduction of approximately 6 percent in the number of days worked in the agricultural sector in response to drought shocks when there is no irrigation. However, as the percentage of irrigated crops increases, irrigation serves as a mitigating factor for men's agricultural employment. For instance, with 50% of rice crops irrigated, the net effect for men is approximately $(0.33 \times 0.5 - 0.06)$, effectively neutralizing the initial negative impact of drought shocks. This effect, however, does not hold for women. On the contrary, the proportion of irrigated rice exacerbates the negative effect of drought shocks on women's agricultural employment, with a net effect of approximately $(-0.33 \times 0.5 + 0.02)$.

In panel B, which pertains to residents of wheat- or other crop-dominant districts, the primary observation is that, in the absence of drought shocks, irrigation reduces the number of days women work in the agricultural sector, while it increases the number of days worked by men. However, we do not find any evidence of irrigation playing a mitigating role in alleviating the effects of drought shocks on agricultural employment for either men or women in these districts.

1.4.4.3 Labor supply reallocation

Consistent with our main findings, the results from Table 1.13 indicate a reallocation of women's labor supply, but only for those residing in rice-dominant districts. Specifically, the number of days worked in the non-agricultural sector increases by 3 percent, while the number of days worked in domestic tasks rises by 7 percent in response to drought shocks. Although no reallocation into domestic work was observed for women across all districts in the aggregate analysis, the district-level heterogeneity reveals this effect for women in rice districts. Conversely, no such reallocation is observed for women in wheat- or other crop-dominant districts, aligning with the absence of drought shock effects on their agricultural employment. Finally, despite the negative impact of drought shocks on men's agricultural employment in wheat/other districts, no corresponding reallocation of their labor supply to other sectors was detected.

The heterogeneity analyses by district highlight two key findings. First, our main results are largely driven by individuals living in districts where rice is the primary crop. In these districts, women are significantly affected by drought shocks, experiencing a decline in the number of days worked in the agricultural sector. Due to the lack of mitigating effects from irrigation, these women tend to reallocate their labor supply to the non-agricultural sector and, to a lesser extent, to domestic work. Second, the analyses reveal that men are also affected by drought shocks in terms of agricultural employment, particularly in districts where wheat or other crops are predominant. This impact is primarily driven by a reduction in the number of days worked in harvesting activities.

1.5 Conclusion

India is particularly affected by meteorological phenomena resulting from climate change. For example, in 2024, the country experienced both a heatwave in May and June, with temperatures reaching 49.2 degrees in Delhi and torrential rain in July, leading to major landslides.

In addition to the direct impact in terms of health and even mortality, the Indian population is also suffering deleterious economic effects. India's agricultural sector, which in 2022 will account for 18.3% of GDP (Indian Ministry of Agriculture and Farmers' Welfare), is still largely dependent on the monsoon and, more broadly, on climatic conditions. So-called rural households, whose income depends mainly on the agricultural sector, are the most vulnerable. Moreover, among them, women are even more vulnerable. This is because the agricultural sector is the main source of employment for women (58% in 2021 (World Bank)), even though their participation in the labor market is one of the lowest in the world (33% in 2023 (World Bank)).

In this study, we examine the potential gender-differentiated effects of monsoon drought shocks on agricultural daily wages and employment, with employment measured by the number of days worked in the agricultural sector during the seven days preceding the interviews. To conduct this analysis, we utilize national employment survey data (NSS) from 2003 to 2009, complemented by meteorological data from the University of Delaware (UDEL) to quantify the impact of drought shocks. Furthermore, we incorporate data from the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) regarding crops and irrigation in Indian districts to explore the potential mitigating role of irrigation on the effects of drought shocks on agricultural employment. This dataset also enables us to analyze heterogeneous effects based on individuals' districts of residence, specifically focusing on the primary crop cultivated—either rice or wheat/other. Our empirical strategy allows for a detailed examination of the net effects of drought shocks, disaggregated by gender.

Our results indicate that drought shocks do not lead to adjustments through price mechanisms, but rather solely through quantity adjustments. In other words, only agricultural employment is affected. More specifically, it is the number of days worked in the agricultural sector by women that declines, particularly for those engaged as casual wage laborers and residing in districts where rice is the primary crop. For men, only those living in districts where wheat or another crop is predominant experience the effects of drought shocks on their agricultural employment, particularly in terms of the number of days worked on harvesting activities.

As anticipated, irrigation serves as a mitigating factor for the effects of drought on agricultural employment. However, this mitigation is limited to men residing in rice-dominant districts. For women in these same districts, irrigation exacerbates the negative impact of drought shocks on their number of days worked in the agricultural sector. Consequently, these women reallocate their labor supply, both to the non-agricultural sector and by withdrawing from the labor market to focus on domestic work.

In a country where women’s labor market participation is among the lowest in the world, it is critical for policymakers to address the negative effects of drought shocks, which are likely to become more frequent due to climate change, on women’s employment outcomes. Tackling these challenges is vital not only to meet Sustainable Development Goal 5—focused on achieving gender equality and empowering all women and girls—but also to ensure that economic growth is both sustainable and inclusive. Ignoring these impacts could hinder progress toward equitable development and the full economic empowerment of women.

1.6 Tables

Descriptive statistics

Table 1.1: Descriptive statistics at individual-level.

	Sex subsamples		Total	Test
	Females	Males		
Observations	564,047 (48.62%)	596,000 (51.38%)	1,160,047 (100.00%)	
Age	36.52 (15.44)	36.35 (15.85)	36.43 (15.65)	<0.00
No information on level of education	0.54 (0.50)	0.53 (0.50)	0.54 (0.50)	<0.00
Not literate	0.21 (0.41)	0.10 (0.30)	0.16 (0.36)	<0.00
Literate without formal schooling	0.03 (0.18)	0.04 (0.19)	0.04 (0.19)	<0.00
Below primary	0.05 (0.21)	0.06 (0.24)	0.05 (0.22)	<0.00
Primary	0.06 (0.23)	0.07 (0.26)	0.06 (0.25)	<0.00
Middle	0.05 (0.23)	0.08 (0.27)	0.07 (0.25)	<0.00
Secondary	0.03 (0.18)	0.05 (0.22)	0.04 (0.20)	<0.00
Higher secondary	0.02 (0.13)	0.03 (0.18)	0.03 (0.16)	<0.00
Higher education	0.01 (0.10)	0.02 (0.16)	0.02 (0.13)	<0.00
Landless household member	0.08 (0.27)	0.08 (0.27)	0.08 (0.27)	<0.00
(Log)Daily wage in agriculture	3.74 (0.49)	4.20 (0.51)	4.07 (0.55)	<0.00
No. days worked in farm sector	0.64 (1.04)	1.44 (1.21)	1.05 (1.20)	<0.00
No. manual work days in cultivation	0.34 (0.83)	0.75 (1.13)	0.54 (1.01)	<0.00
No. non-manual work days in cultivation	0.01 (0.11)	0.03 (0.26)	0.02 (0.20)	<0.00
No. days worked in non-farm sector	0.06 (0.38)	0.23 (0.74)	0.15 (0.60)	<0.00
No. days worked in domestic work	1.32 (1.27)	0.05 (0.31)	0.67 (1.11)	<0.00
Q1-Interview	0.22 (0.41)	0.21 (0.41)	0.22 (0.41)	<0.00
Q2-Interview	0.22 (0.41)	0.22 (0.41)	0.22 (0.41)	0.00
Q3-Interview	0.28 (0.45)	0.29 (0.45)	0.29 (0.45)	0.04
Q4-Interview	0.28 (0.45)	0.28 (0.45)	0.28 (0.45)	<0.00

Source: NSS data.

Note: ‘Females,’ ‘Males,’ and ‘Total’ columns present the means, with standard errors in parentheses, for the characteristics of individuals (except for the number of observations). Information about education is not for all waves. The ‘Test’ column reports the p-values from the group comparison test.

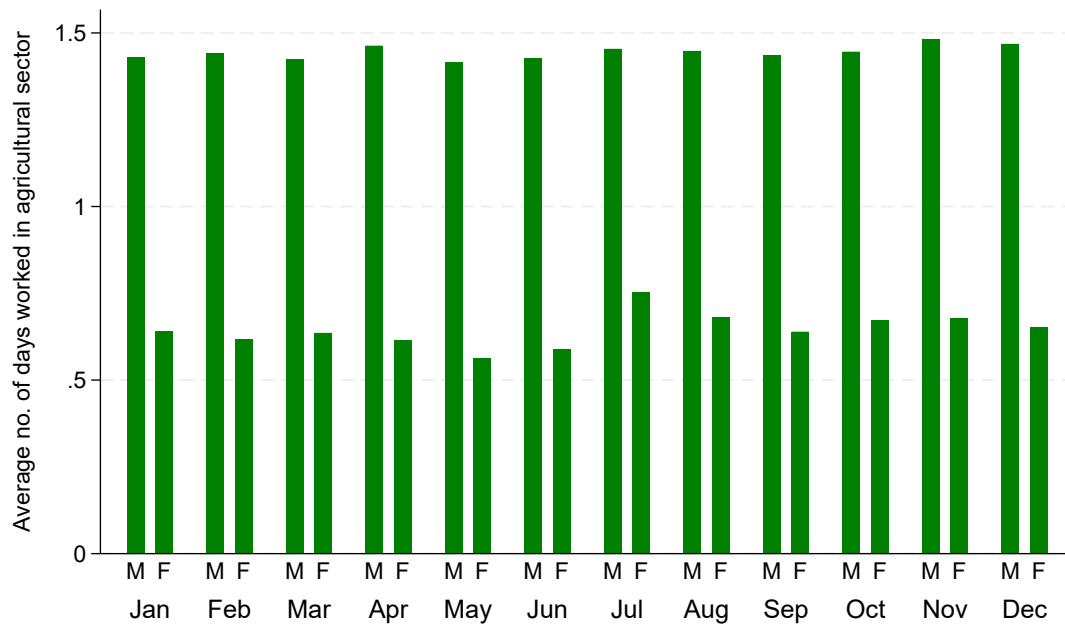


Figure 1.1: Average no. of days worked in agricultural sector by sex (male and female) and month.

Source: NSS data; authors' calculations.

Table 1.2: Descriptive statistics at district-year level.

	Summary
Observations	2810
Drought	0.25 (0.43)
Excess rain	0.16 (0.37)
Rice is main crop	0.41 (0.49)
Wheat is main crop	0.20 (0.40)
Other crop is main crop	0.40 (0.49)
Irrigated share of total cultivated area	0.29 (0.18)
Irrigated share of rice	0.54 (0.41)
Irrigated share of wheat	0.83 (0.27)

Source: NSS, UDEL and ICRISAT data.

Note: Means and standard errors in parentheses.

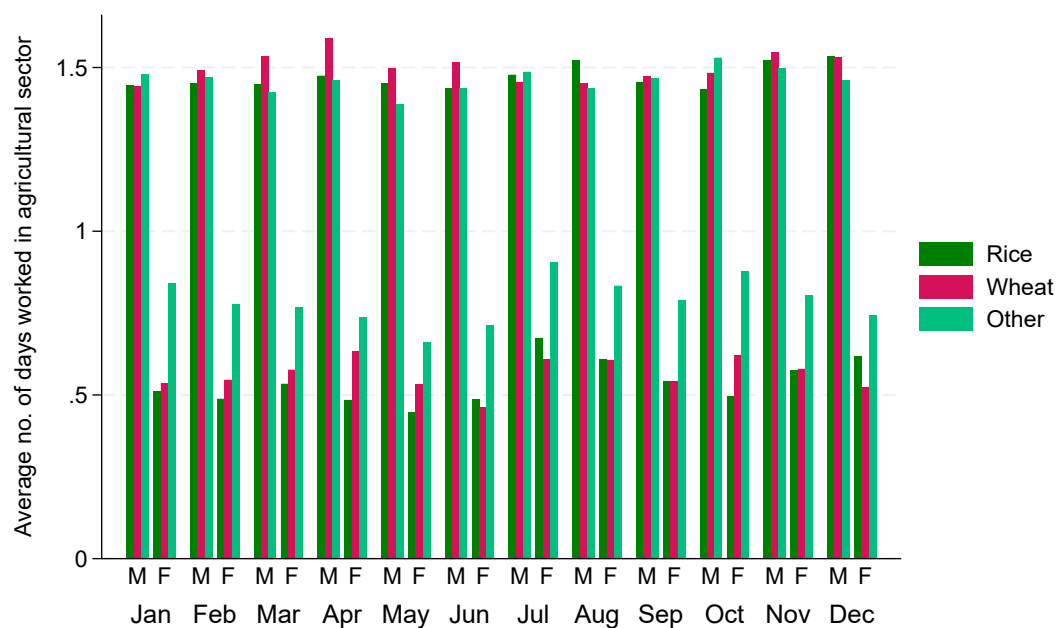


Figure 1.2: Average no. of days worked in agricultural sector by crop, sex (male and female) and month.

Source: NSS and ICRISAT data; authors' calculations.

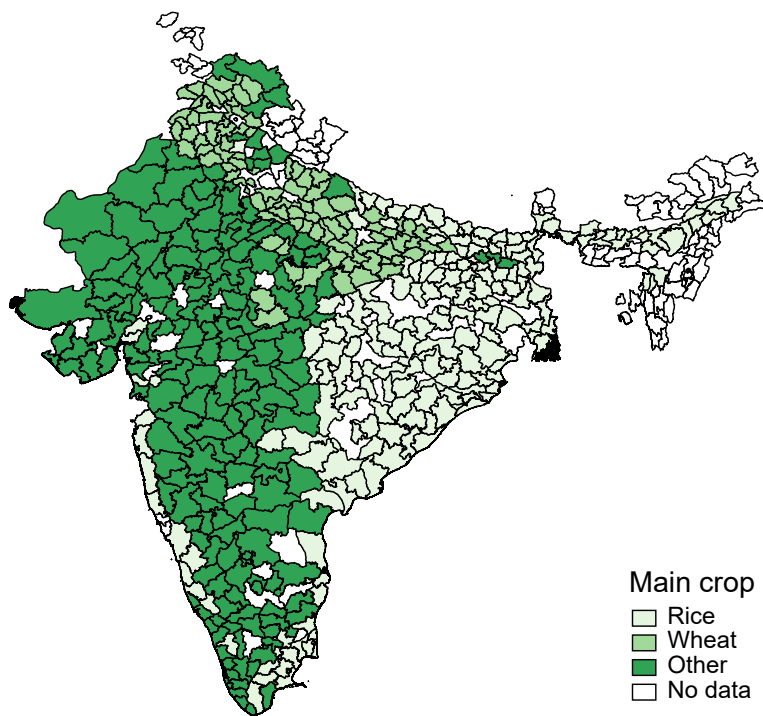


Figure 1.3: Geography of main crop by district.
Source: NSS and ICRISAT data; authors' calculations.

Table 1.3: No. of districts where the main crop is "other" (than rice or wheat)

"Other" main crop type	No. of districts
Sorghum	18
Pearl millet	18
Maize	15
Finger millet	8
Chickpea	6
Pigeon pea	2
Minor pulses	11
Soybean	76
Oil seeds	8
Sugarcane	15
Vegetables	9
Potatoes	1
Onion	10
Total	197

Source: NSS and ICRISAT data; authors' calculations.

Main results

Table 1.4: Daily wage in agricultural sector.

	(1) (Log)Daily wage in agricultural sector
Female	-0.35*** (0.01)
Female X Drought	-0.01 (0.02)
Male X Drought	0.01 (0.01)
Constant	3.47*** (0.16)
Obs.	137397
Mean	4.07
Controls	YES
District FE	YES
Year FE	YES

Source: NSS, UDEL, and ICRISAT data.

Note: Our dependent variable is the (log) daily wage in the agricultural sector. The agricultural sector is defined as any activity conducted within a household enterprise or as casual labor, excluding public sector employment (*cf.* (Kaur 2019)). The interaction term *Sex* (i.e., Female/-Male) \times *Drought* is our primary explanatory variable of interest, capturing the effect of a drought shock during the monsoon season on females and males separately. All estimations include the following control variables: age, age squared, education, and excess rainfall (defined as the last two deciles of the monsoon rainfall distribution from 1977 to 2017), as well as the quarter of interview. We also include district-level and year fixed effects to account for time-invariant district characteristics and time trends, respectively. Standard errors are clustered at the district level and reported in parentheses (* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$).

Table 1.5: No. days worked (last 7 days) in agricultural sector.

<i>No. days worked in agricultural sector</i>	(1) All occupation
Female	-0.87*** (0.02)
Male X Drought	-0.02 (0.02)
Female X Drought	-0.04** (0.02)
Constant	2.16*** (0.24)
Obs.	1159942
Mean	1.05
Controls	YES
District FE	YES
Year FE	YES

Source: NSS, UDEL, and ICRISAT data.

Note: Our dependent variable is the number of days worked in the agricultural sector during the week preceding the respondent's interview. The agricultural sector is defined as any activity conducted within a household enterprise or as casual labor (excluding public jobs)(*cf.* (Kaur 2019)). We applied a hyperbolic transformation to this variable to account for its right-skewed distribution. The interaction term *Sex* (i.e., Female/Male) \times *Drought* is our primary explanatory variable of interest, capturing the effect of a drought shock during the monsoon season on females and males separately. All estimations include the following control variables: age, age squared, education, and excess rainfall (defined as the last two deciles of the monsoon rainfall distribution from 1977 to 2017), as well as the quarter of interview. We also include district-level and year fixed effects to account for time-invariant district characteristics and time trends, respectively. Standard errors are clustered at the district level and reported in parentheses (* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$).

Table 1.6: No. days worked (last 7 days) in agricultural sector by landownership.

<i>No. days worked in agricultural sector</i>	(1)	(2)	(3)	(4)	(5)
	All occupation	Own account worker	Employer	Casual wage labor	Unpaid family worker
Panel A: Non-Landowner					
Female	-0.72*** (0.03)	-0.31*** (0.01)	-0.00*** (0.00)	-0.43*** (0.02)	0.02*** (0.01)
Male X Drought	0.09** (0.05)	0.05 (0.03)	-0.00 (0.00)	0.04 (0.04)	0.00 (0.01)
Female X Drought	-0.13*** (0.05)	-0.03 (0.03)	0.00 (0.00)	-0.11*** (0.03)	0.01 (0.02)
Constant	0.72* (0.40)	-0.61*** (0.11)	-0.01* (0.00)	1.22** (0.47)	0.12 (0.16)
Obs.	89362	89362	89362	89362	89362
Panel B: Landowner					
Female	-0.88*** (0.02)	-0.63*** (0.01)	-0.01*** (0.00)	-0.31*** (0.01)	0.07*** (0.01)
Male X Drought	-0.03** (0.01)	-0.04*** (0.01)	0.00 (0.00)	-0.01 (0.01)	0.01 (0.01)
Female X Drought	-0.03* (0.02)	0.02*** (0.01)	-0.00* (0.00)	-0.03*** (0.01)	-0.02** (0.01)
Constant	2.16*** (0.23)	0.79*** (0.15)	-0.01** (0.00)	0.69*** (0.14)	0.70*** (0.10)
Obs.	1070580	1070580	1070580	1070580	1070580
Mean	1.06	0.47	0.01	0.26	0.31
Controls	YES	YES	YES	YES	YES
District FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES

Source: NSS, UDEL, and ICRISAT data.

Note: Our dependent variable is the number of days worked in the agricultural sector during the week preceding the respondent's interview. The agricultural sector is defined as any activity conducted within a household enterprise or as casual labor, excluding public sector jobs (*cf.* (Kaur 2019)). To account for the right-skewed distribution of this variable, we applied a hyperbolic transformation. Panels A and B present the estimation results according to the household type: Panel A for non-landowners and Panel B for landowners. Column (1) includes all occupations, while columns (2) through (5) present the results for each specific agricultural activity type: own account worker, employer, casual wage labor, and unpaid family worker, respectively. The interaction term *Sex* (i.e., Female/Male) \times *Drought* is our primary explanatory variable of interest, capturing the differential impact of a drought shock during the monsoon season on women and men. We control for several covariates, including age, age squared, education, and excess rainfall (defined as the last two deciles of the monsoon rainfall distribution from 1977 to 2017), as well as the quarter of interview. District-level and year fixed effects are included to account for time-invariant district characteristics and broader time trends. Standard errors are clustered at the district level and are reported in parentheses. Significance levels are denoted as follows: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 1.7: Role of irrigation in the effects of drought shocks on the agricultural sector.

<i>No. days worked in agricultural sector</i>	(1) All occupation
Female	-0.86*** (0.04)
Male X Drought	-0.09*** (0.03)
Female X Drought	0.03 (0.03)
Female X Irrigated Share	-0.06 (0.12)
Male X Irrigated Share	0.07 (0.12)
Female X Drought X Irrigated Share	-0.20*** (0.08)
Male X Drought X Irrigated Share	0.25*** (0.08)
Constant	2.11*** (0.22)
Obs.	882186
Mean	1.05
Controls	YES
District FE	YES
Year FE	YES

Source: NSS, UDEL, and ICRISAT data.

Note: Our dependent variable is the number of days worked in the agricultural sector during the week preceding the respondent's interview. The agricultural sector is defined as any activity conducted within a household enterprise or as casual labor, excluding public sector jobs (*cf.* (Kaur 2019)). We applied a hyperbolic transformation to this variable to account for its right-skewed distribution. The variable *Irrigated Share* is a continuous measure representing the percentage of surface area that is irrigated. To calculate the net effect of irrigation on agricultural employment in the presence of drought shocks, we account for gender differences. Specifically, for a given share of irrigation (e.g., 50% or 0.5), the net effect for each gender is calculated by multiplying the *Sex* (i.e., Female/Male) \times *Drought* \times *Irrigated Share* coefficient by the irrigation share (e.g., 0.5), and then adding this to the *Sex* \times *Drought* coefficient. For instance, for women, the irrigation net effect is computed as $(-0.2 \times 0.5 + 0.03)$. Additionally, all estimations control for age, age squared, education, and excess rainfall (defined as the last two deciles of the monsoon rainfall distribution from 1977 to 2017). District-level and year fixed effects are included to account for time-invariant district characteristics and temporal trends. Standard errors are clustered at the district level and are reported in parentheses. Significance levels are denoted as follows: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 1.8: No. days worked (last 7 days) in non-agricultural sector and domestic work.

<i>No. days worked in...</i>	(1) Non- agricultural sector	(2) Domestic work
Female	-0.11*** (0.00)	1.29*** (0.02)
Male X Drought	0.00 (0.01)	0.01 (0.01)
Female X Drought	0.01* (0.00)	0.02 (0.02)
Constant	0.24*** (0.04)	-0.16 (0.14)
Obs.	1159942	1159942
Mean	0.15	0.67
Controls	YES	YES
District FE	YES	YES
Year FE	YES	YES

Source: NSS, UDEL, and ICRISAT data.

Note: Our dependent variables are the number of days worked in the non-agricultural sector and in domestic work during the week preceding the respondent's interview. The non-agricultural sector is defined as any activity conducted outside a household enterprise or outside casual labor, excluding public sector jobs. Domestic work includes household duties and the unpaid collection of goods. We applied a hyperbolic transformation to these variables to account for their right-skewed distribution. The interaction term *Sex* (i.e., Female/Male) \times *Drought* is our primary explanatory variable of interest, capturing the differential impact of a drought shock during the monsoon season on women and men. All estimations control for age, age squared, education, and excess rainfall (defined as the last two deciles of the monsoon rainfall distribution from 1977 to 2017). Additionally, we include the quarter of interview, district-level fixed effects to account for time-invariant district characteristics, and year fixed effects to capture time trends. Standard errors are clustered at the district level and are reported in parentheses. Significance levels are denoted as follows: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 1.9: No. days worked (last 7 days) in agricultural sector by type of districts.

<i>No. days worked in agricultural sector</i>	(1) All occupation
Panel A: Rice districts	
Female	-0.95*** (0.03)
Male X Drought	0.03 (0.03)
Female X Drought	-0.07** (0.03)
Constant	1.76*** (0.18)
Obs.	411233
Panel B: Wheat or other districts	
Female	-0.81*** (0.03)
Male X Drought	-0.04** (0.02)
Female X Drought	-0.03 (0.02)
Constant	0.98*** (0.37)
Obs.	545475
Mean	1.09
Controls	YES
District FE	YES
Year FE	YES

Source: NSS, UDEL, and ICRISAT data.

Note: Our dependent variable is the number of days worked in the agricultural sector during the week preceding the respondent's interview. The agricultural sector is defined as any activity conducted within a household enterprise or as casual labor (excluding public jobs)(*cf.* (Kaur 2019)). We applied a hyperbolic transformation to this variable to account for its right-skewed distribution. Panels A and B present the estimation results according to the type of district of residence, classified by the main crop cultivated: Panel A for rice-dominant districts and Panel B for wheat or other crop districts. Column (1) includes all occupations, while columns (2) through (5) present the results for specific agricultural activity types: own account worker, employer, casual wage labor, and unpaid family worker, respectively. The interaction term *Sex* (i.e., Female/Male) \times *Drought* is our primary explanatory variable of interest, capturing the effect of a drought shock during the monsoon season on females and males separately. All estimations include the following control variables: age, age squared, education, and excess rainfall (defined as the last two deciles of the monsoon rainfall distribution from 1977 to 2017), as well as the quarter of interview. We also include district-level and year fixed effects to account for time-invariant district characteristics and time trends, respectively. Standard errors are clustered at the district level and reported in parentheses (* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$).

Table 1.10: No. days worked (last 7 days) in agricultural sector by operation and type of districts.

<i>No. days worked in agricultural sector</i>	(1)	(2)
	Manual work in cultivation	Non-manual work in cultivation
Panel A: Rice districts		
Female	-0.50*** (0.03)	-0.02*** (0.00)
Male X Drought	-0.01 (0.02)	-0.00 (0.00)
Female X Drought	-0.01 (0.02)	-0.00** (0.00)
Constant	0.84*** (0.14)	-0.03*** (0.01)
Obs.	378887	378887
Panel B: Wheat or other districts		
Female	-0.42*** (0.02)	-0.02*** (0.00)
Male X Drought	-0.05** (0.02)	-0.00 (0.00)
Female X Drought	-0.03 (0.02)	-0.00 (0.00)
Constant	0.87*** (0.24)	0.00 (0.01)
Obs.	502618	502618
Mean	0.56	0.02
Controls	YES	YES
District FE	YES	YES
Year FE	YES	YES

Source: NSS, UDEL, and ICRISAT data.

Note: Our dependent variable is the number of days worked in the agricultural sector during the week preceding the respondent's interview. The agricultural sector is defined as any activity conducted within a household enterprise or as casual labor (excluding public jobs)(*cf.* (Kaur 2019)). We applied a hyperbolic transformation to this variable to account for its right-skewed distribution. Panels A and B present the estimation results according to the type of district of residence, classified by the main crop cultivated: Panel A for rice-dominant districts and Panel B for wheat or other crop districts. Column (1) includes all manual work in cultivation, while column (2) present the results for non-manual work in cultivation. The interaction term *Sex* (i.e., Female/Male) \times *Drought* is our primary explanatory variable of interest, capturing the effect of a drought shock during the monsoon season on females and males separately. All estimations include the following control variables: age, age squared, education, and excess rainfall (defined as the last two deciles of the monsoon rainfall distribution from 1977 to 2017), as well as the quarter of interview. We also include district-level and year fixed effects to account for time-invariant district characteristics and time trends, respectively. Standard errors are clustered at the district level and reported in parentheses (* p < 0.10, ** p < 0.05, *** p < 0.01).

Table 1.11: No. days worked (last 7 days) in manual work in cultivation by type of districts.

<i>No. days worked in agricultural sector</i>	(1)	(2)	(3)	(4)	(5)	(6)
	Ploughing	Sowing	Transplanting	Weeding	Harvesting	Other manual work
Panel A: Rice districts						
Female	-0.09*** (0.01)	-0.02*** (0.00)	-0.01** (0.00)	-0.02** (0.01)	-0.09*** (0.01)	-0.27*** (0.01)
Male X Drought	-0.00 (0.01)	-0.00 (0.01)	0.01 (0.01)	0.01 (0.01)	0.00 (0.01)	-0.03 (0.02)
Female X Drought	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	-0.00 (0.01)	0.00 (0.01)	-0.01 (0.01)
Constant	0.12*** (0.03)	0.04*** (0.01)	0.16*** (0.02)	0.17*** (0.02)	0.01 (0.03)	0.34*** (0.10)
Obs.	378887	378887	378887	378887	378887	378887
Panel B: Wheat or other districts						
Female	-0.07*** (0.00)	-0.02*** (0.00)	-0.00* (0.00)	0.01 (0.01)	-0.08*** (0.01)	-0.26*** (0.01)
Male X Drought	0.00 (0.01)	0.00 (0.00)	-0.00 (0.00)	-0.01 (0.01)	-0.05*** (0.01)	-0.00 (0.02)
Female X Drought	0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	-0.02** (0.01)	-0.02* (0.01)	-0.00 (0.01)
Constant	0.11*** (0.02)	-0.01 (0.01)	0.03*** (0.01)	0.31*** (0.08)	0.19* (0.11)	0.24 (0.16)
Obs.	502618	502618	502618	502618	502618	502618
Mean	0.03	0.03	0.01	0.09	0.12	0.28
Controls	YES	YES	YES	YES	YES	YES
District FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES

Source: NSS, UDEL, and ICRISAT data.

Note: Our dependent variable is the number of days worked in the agricultural sector during the week preceding the respondent's interview. The agricultural sector is defined as any activity conducted within a household enterprise or as casual labor (excluding public jobs)(*cf.* (Kaur 2019)). We applied a hyperbolic transformation to this variable to account for its right-skewed distribution. Panels A and B present the estimation results according to the type of district of residence, classified by the main crop cultivated: Panel A for rice-dominant districts and Panel B for wheat or other crop districts. Columns (1) through (6) present the results for specific manual labor activities in cultivation: ploughing, sowing, transplanting, weeding, harvesting, and other manual work, respectively. The interaction term *Sex* (i.e., Female/Male) \times *Drought* is our primary explanatory variable of interest, capturing the effect of a drought shock during the monsoon season on females and males separately. All estimations include the following control variables: age, age squared, education, and excess rainfall (defined as the last two deciles of the monsoon rainfall distribution from 1977 to 2017), as well as the quarter of interview. We also include district-level and year fixed effects to account for time-invariant district characteristics and time trends, respectively. Standard errors are clustered at the district level and reported in parentheses (* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$).

Table 1.12: Role of irrigation in the effects of drought shocks on the agricultural sector by type of districts.

<i>No. days worked in agricultural sector</i>	(1)
	All occupation
Panel A: Rice districts	
Female	-1.08*** (0.04)
Male X Drought	-0.06* (0.03)
Female X Drought	0.02 (0.03)
Female X Irrigated Share	0.24 (0.15)
Male X Irrigated Share	-0.25 (0.17)
Female X Drought X Irrigated Share	-0.33*** (0.10)
Male X Drought X Irrigated Share	0.33*** (0.12)
Constant	1.82*** (0.20)
Obs.	399184
Panel B: Wheat or other districts	
Female	-0.49*** (0.04)
Male X Drought	-0.05 (0.04)
Female X Drought	-0.04 (0.04)
Female X Irrigated Share	-0.51*** (0.15)
Male X Irrigated Share	0.55*** (0.15)
Female X Drought X Irrigated Share	0.02 (0.11)
Male X Drought X Irrigated Share	0.11 (0.10)
Constant	0.89** (0.35)
Obs.	482223
Mean	1.09
Controls	YES
District FE	YES
Year FE	YES

Source: NSS, UDEL, and ICRISAT data.

Note: Our dependent variable is the number of days worked in the agricultural sector during the week preceding the respondent's interview. The agricultural sector is defined as any activity conducted within a household enterprise or as casual labor, excluding public sector jobs (*cf.* (Kaur 2019)). We applied a hyperbolic transformation to this variable to account for its right-skewed distribution. Panels A and B present the estimation results according to the type of district of residence, classified by the main crop cultivated: Panel A for rice-dominant districts and Panel B for wheat or other crop districts. The variable *Irrigated Share* is a continuous measure representing the percentage of surface area that is irrigated. To calculate the net effect of irrigation on agricultural employment in the presence of drought shocks, we account for gender differences. Specifically, for a given share of irrigation (e.g., 50% or 0.5), the net effect for each gender is calculated by multiplying the *Sex* (i.e., Female/Male) \times *Drought* \times *Irrigated Share* coefficient by the irrigation share (e.g., 0.5), and then adding this to the *Sex* \times *Drought* coefficient. For instance, for women in rice districts, the irrigation net effect is computed as $(-0.33 \times 0.5 + 0.24)$. Additionally, all estimations control for age, age squared, education, and excess rainfall (defined as the last two deciles of the monsoon rainfall distribution from 1977 to 2017). District-level and year fixed effects are included to account for time-invariant district characteristics and temporal trends. Standard errors are clustered at the district level and are reported in parentheses. Significance levels are denoted as follows: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 1.13: No. days worked (last 7 days) in non-agricultural sector and domestic work by type of districts.

	(1) Work in non-agricultural sector	(2) Domestic work
Panel A: Rice districts		
Female	-0.09*** (0.00)	1.40*** (0.04)
Male X Drought	-0.01 (0.01)	-0.02 (0.02)
Female X Drought	0.03*** (0.01)	0.07** (0.03)
Constant	0.21*** (0.03)	-0.07 (0.14)
Obs.	411233	411233
Panel B: Wheat or other districts		
Female	-0.12*** (0.01)	1.20*** (0.03)
Male X Drought	0.01 (0.01)	0.02 (0.01)
Female X Drought	0.00 (0.01)	0.01 (0.02)
Constant	0.08 (0.05)	0.04 (0.17)
Obs.	545475	545475
Mean	0.14	0.63
Controls	YES	YES
District FE	YES	YES
Year FE	YES	YES

Source: NSS, UDEL, and ICRISAT data.

Note: Our dependent variables are the number of days worked in the non-agricultural sector and in domestic work during the week preceding the respondent's interview. The non-agricultural sector is defined as any activity conducted outside a household enterprise or outside casual labor, excluding public sector jobs. Domestic work includes household duties and the unpaid collection of goods. We applied a hyperbolic transformation to these variables to account for their right-skewed distribution. Panels A and B present the estimation results according to the type of district of residence, classified by the main crop cultivated: Panel A for rice-dominant districts and Panel B for wheat or other crop districts. The interaction term *Sex* (i.e., Female/Male) \times *Drought* is our primary explanatory variable of interest, capturing the differential impact of a drought shock during the monsoon season on women and men. All estimations control for age, age squared, education, and excess rainfall (defined as the last two deciles of the monsoon rainfall distribution from 1977 to 2017). Additionally, we include the quarter of interview, district-level fixed effects to account for time-invariant district characteristics, and year fixed effects to capture time trends. Standard errors are clustered at the district level and are reported in parentheses. Significance levels are denoted as follows: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Chapter 2

THE ROLE OF DECISION-MAKING POWER IN SHAPING GENDER INEQUALITIES IN EMPLOYMENT AND INDEBTEDNESS IN RURAL TAMIL NADU.*

2.1 Introduction

Achieving gender equality and empowering all women and girls, as outlined in the United Nations' Sustainable Development Goal 5 (SDG 5), is a critical global challenge. A key mechanism for achieving this objective lies in increasing women's decision-making power within households. Research has shown that when women have greater control over resources and decision-making processes, they can influence the allocation of household assets in ways that improve both their own and their family's welfare (Doss 2013; Nordman and Sharma 2016; Basu and Maitra 2020). Additionally, decision-making power can promote self-confidence, learning, and personal development, enabling female decision-makers to challenge deeply entrenched social norms and act as role models for future generations (Agarwal 1997).

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Decision-making power manifests in various forms, including control over financial resources, decisions related to human capital (such as education and healthcare), social choices (e.g., marriage), and economic decisions concerning employment and investment. Financial decision-making power can give rise to debate regarding its influence on women's empowerment and gender inequality. While it has the potential to enhance women's autonomy by increasing their control over household finances, it may also place additional burdens on them. This expanded role can intersect with outcomes related to labor market participation and indebtedness.

The intersection between gender and financial decision-making power within the household highlights the potential for exacerbating gender inequalities. As Agarwal (1997) points out, women's participation in household decision-making does not always translate into equal power dynamics, particularly in societies where patriarchal norms persist like rural India. This raises the question of whether decision-making power for women always serves as a tool of empowerment or if, under certain circumstances-related to the context and the type of decision-making power-, it magnifies the structural inequalities women face in both the household and the broader economy.

This paper represents a first step in analyzing the role of financial decision-making power as a determinant of gender inequalities in rural India, specifically within the rural areas of the Indian state of Tamil Nadu. To this end, the study utilizes data from the Network, Employment, Debt, Mobility and Skills in India survey (NEEMSI) (Nordman et al. 2024) and, given its exploratory nature, relies on descriptive statistics analysis. The findings reveal that financial decision-making power does not always empower women by providing them with an elevated status within their households. In fact, in our study area, financial decision-making power deepens gender inequalities in terms of employment and indebtedness. More specifically, it increases the precariousness of women within their households, as they are over-represented in casual agricultural and public-sector jobs, as well as in indebtedness. In contrast, for men, financial decision-making power is associated with greater representation in self-employment in the non-agricultural sector. Furthermore, the heterogeneity analysis, based on household economic conditions, highlights the types of households most affected by the negative influence of financial decision-making power on gender inequalities. The amplification of women's precariousness due to financial decision-making power is primarily observed among wealthy, landowning households, whereas the over-representation of male decision-makers in self-employment within the non-agricultural sector is particularly evident in households with the lowest asset values.

By doing so, this paper contributes to the existing literature on gender in-

equalities, particularly in terms of labor market outcomes and indebtedness in (rural) India (Afridi, Dinkelman, and Mahajan 2018; Reboul et al. 2019; Guérin 2020; Costagliola 2021; Reboul, Guérin, and Nordman 2021; Di Santolo et al. 2024). Furthermore, it also adds to the body of literature focused on decision-making power and its influence on gender inequalities (Quisumbing and Maluccio 2003; Smith and Byron. 2005; Afridi 2010; Reggio 2011; Garikipati et al. 2016; Misra 2021).

The remainder of this paper is organized as follows: Sections 2.2 and 2.3 present the data and methodology employed in this study. Section 2.4 discuss our findings on the role of decision-making power in shaping gender inequalities in both primary occupation and indebtedness. Section 2.5 examines the heterogeneity of household economic conditions and its impact on the relationship between gender inequalities and decision-making power. Finally, Section 2.6 offers concluding remarks and insights.

2.2 Data

This paper draws on data from the Networks, Employment, Debt, Mobility and Skills in India survey (NEEMSIS) (Nordman et al. 2024). This survey is part of the Observatory of Rural Dynamics and Inequalities in South India (ODRIIS). Hosted by the French Institute of Pondicherry, ODRIIS aims to collect and share quantitative and qualitative data to better understand structural changes within the study area and the effects of economic crises. For more information, please refer to the dedicated website: <https://odriis.hypotheses.org/>.

2.2.1 The Study Area

2.2.1.1 Tamil Nadu

The NEEMSIS survey's study area is located in the South Arcot region of Tamil Nadu. Tamil Nadu is one of the most socially developed states in India, due to its progressive policies on education and social programs (Kalaiyarasan and Vijayabaskar. 2021; Drèze and Sen 2013). For instance, it was one of the first states to implement free and universal midday meals in primary schools (Di Santolo et al. 2024). As a result, the state's growth and per capita income are among the highest in the country, and poverty levels are below the national average, as reflected in its ranking of 6th out of 28 Indian states in 2011, according to the Human Development Index (0.544 in 2011) (Suryanarayana, Agrawal, and Prabhu 2016). Additionally, Tamil Nadu is recognized as an industrial state due

to its large number of production units, located in major cities and urban centers. However, the state retains strong ties to its rural areas. This is evident, on the one hand, from the absence of significant rural exodus (Racine 1994), with 48.4% of the state's population residing in urban areas (Government of India, 2011), and, on the other hand, from the continued importance of agriculture, which, although contributing modestly to the state's gross domestic product (Michiels 2016), remains the primary source of employment in rural areas.

2.2.1.2 The 10 Villages

The South Arcot region was selected in 2010, the starting year of the survey, based on perceived trends in Tamil Nadu at the time. These trends included the diversification of rural activities, the significance of the agricultural sector despite its low productivity, the growth of medium-sized subaltern towns, and the various connections between urban and rural areas. Specifically, 10 villages from the districts of Cuddalore and Kallakurichi (formerly part of Villupuram) were selected: Manappakam, Semakottai, Manamthavizhthaputhur, Natham, Korattore, Karumbur, Oraiyur, Govulapuram, Elamthampattu, and Kuvagam (*cf.* Figure 2.1). It is noteworthy that the district of Villupuram (data for Kallakurichi are not available) had a relatively lower level of human development compared to Tamil Nadu as a whole—0.561 versus 0.709 in 2017 (Government of Tamil Nadu, 2017). Additionally, the districts of Cuddalore and Villupuram experience high poverty rates—50.73% and 63.56% respectively, compared to 24.9% for Tamil Nadu as a state (Mohanty et al. 2016).

The selection of these villages was driven by their reflection of the diverse characteristics and dynamics of the regional economy. These include a combination of irrigated and dryland farming, depending on their proximity to the Pennai River, as well as their closeness to two industrial towns (Neyveli and Cuddalore) and a regional business hub (Panruti). Five of these villages practice irrigated agriculture, while the other five rely on dryland farming. Additionally, these villages vary in their distance and accessibility to Neyveli, Cuddalore, and Panruti.

2.2.1.3 The Household as the Unit of Analysis

In these 10 villages, households were selected as the primary unit of analysis. The definition of a household used here aligns with that of the Government of India's census, which defines a household as a group of people who live together and share meals (*i.e.*, have a common kitchen). In each village, households were selected based on caste, with 50% Dalits and 50% from middle or upper castes. Adhering to these selection criteria, in each of the 10 villages, one household

was chosen for every five houses.

2.2.1.4 Representativeness

Given the selection criteria for villages in the NEEMSIS survey, the resulting data are not representative at the national level. Therefore, findings based on this data cannot be generalized. However, these data hold significant value for research purposes. They offer a deeper understanding of inter-household and intra-individual heterogeneities over time for the population under study, across various dimensions (employment, debt, social networks, and (non-) cognitive skills). Furthermore, the long-term presence of researchers and survey team members in the study area, dating back to 2003, has enabled the accumulation of diverse data (quantitative, qualitative, and ethnographic), providing a rich understanding of the context. This prolonged engagement has also fostered trust with the local population, as evidenced by the various forms of assistance provided (e.g., information on social programs and employment opportunities, food distribution during the COVID-19 pandemic).

2.2.2 NEEMSIS unbalanced panel data

The NEEMSIS survey currently comprises three waves: 2010 (Rural Microfinance and Employment (RUME)), 2016-17 (NEEMSIS-1), and 2020-21 (NEEMSIS-2), with RUME serving as the baseline survey (Nordman et al. 2024).

In 2010, as part of the RUME survey, 405 households were interviewed. Specifically, the head of each household, as recognized by other household members, responded to a household questionnaire that covered all members of the household. As a result, the RUME dataset provides information on 1,928 individuals.

In 2016-17 (NEEMSIS-1), 388 households from RUME were re-interviewed, and 104 new households were added to the sample. In each village, 10 new households were included, consisting of 5 Dalit households and 5 from middle or upper castes, bringing the total number of individuals surveyed to 2,696. Additionally, an individual-level questionnaire was introduced alongside the household questionnaire. The respondents for this individual questionnaire included the household head (Ego1) and another household member, aged between 18 and 35, who was randomly selected (Ego2). This individual questionnaire provided detailed personal information for Ego1 and Ego2—953 individuals in total—across various domains (employment, social networks, personality traits, behavior, and (non-)cognitive skills).

In NEEMSIS-2 (2020-21), 485 households from NEEMSIS-1 were successfully re-contacted and re-interviewed, and 147 new households were added to the

sample. Among these, 86 were randomly selected using the same principles as NEEMSSIS-1, and 61 were chosen due to their connections with households already surveyed in NEEMSSIS-1, as well as to "refresh" the sample by adding younger households. This expanded the sample to 3,647 individual observations. Additionally, to track intra-individual changes for Ego1 and Ego2, the individual questionnaire was administered to them again in 2020-21. Furthermore, a third individual, Ego3, was selected using the same criteria as Ego2 in 2016-17 and was also interviewed. As a result, NEEMSSIS-2 provides detailed information on 1,693 "egos".

2.3 Method

2.3.1 Sample of analysis

The aim of this chapter is to conduct an exploratory and descriptive analysis of the relationship between gender inequality and decision-making power. Since decision-financial making status is only available for 2020, the analysis is restricted to wave NEEMSSIS-2 (2020-21) (Nordman et al. 2021). As a result, the analytical sample includes 3,005 individuals from 632 households. Table 2.1 presents the key descriptive statistics for this sample. Of the 3,005 individuals, 48.5% are women and 51.5% are men, with an average age of 32.6 years. Consistent with the NEEMSSIS selection criteria, 52% of the individuals belong to the Dalit caste, while the remaining 48% come from middle or upper castes, with almost the entire sample identifying as Hindu (98%). Additionally, nearly half of the individuals have no formal education (47%). Regarding household roles, approximately 21% are heads of household, 18% are spouses, and around 36% are children (sons or daughters). Lastly, 54% of the individuals are married, while among the remaining 46%, 40% are single, and 6% are widowed, separated, or divorced.

2.3.2 Variables

2.3.2.1 Decision-making status

In the NEEMSSIS-2 dataset, two questions from the household survey—answered exclusively by the household head—relate to decision-making authority.

The first question addresses decisions regarding major purchases: “Who usually makes decisions about making major household purchases?” The second question focuses on healthcare expenses: “Who usually makes decisions about healthcare in the household?”. Since both questions pertain to decisions

involving household expenditures, we opted to treat these two types of decision-making power jointly. In our analytical sample, 705 individuals are identified as decision-makers, 75% of whom are responsible for both major purchases and healthcare decisions.

Additionally, decision-making authority can be either individual or joint, meaning that two people make spending decisions together. However, in the study region, joint decision-making is rare, with only 73 household heads reporting joint decisions on either healthcare or major purchases, out of a total of 632 household heads (11%). Therefore, individual and joint decision-making are not analyzed separately in this context.

For the purposes of this study, we constructed an indicator variable to capture individuals' decision-making status within households for the 2020-21 period, covering at least one of the two expenditure categories—major purchases or healthcare. A value of 0 indicates no financial decision-making power, while a value of 1 represents either individual or joint financial decision-making authority.

2.3.2.2 Outcomes of interest

Regarding the type of decision-making power under consideration—namely, financial decision-making—the outcomes examined in the context of gender inequalities are primarily related to the labor market and debt. Given the financial responsibilities inherent in this form of decision-making, it is reasonable to focus on outcomes that address these responsibilities. For example, we can hypothesize that, due to these financial obligations, key decision-makers may adjust their labor force participation and debt levels as strategies for adaptation.

With regard to the labor market, we consider employment status, particularly the type of main occupation. Eight dummies have been created to reflect different employment categories: (1) having no activity, (2) being self-employed in the agricultural sector, (3) being self-employed in the non-agricultural sector, (4) being a casual worker in the agricultural sector, (5) being a casual worker in the non-agricultural sector, (6) holding a regular job in the non-agricultural sector (skilled), (7) holding a regular job in the non-agricultural sector (unskilled), and (8) being a casual worker in NREGA-type public employment. The value 1 is assigned to one of these eight variables to represent an individual's main occupation, and 0 otherwise.

For debt-related outcomes, we consider debt status, indicating whether an individual is in debt or not. This is represented by a dummy variable with a value of 1 for being in debt, and 0 otherwise.

2.3.3 Methodology

This paper provides an initial exploration into the role of financial decision-making power as a contributing factor to gender inequality in rural India. Adopting an exploratory approach, the analysis is based solely on descriptive statistics. The interpretations presented in the following sections are drawn from tables of descriptive statistics (means and standard errors), disaggregated by groups. These tables also include *p*-values from statistical tests, which identify significant differences in the outcomes of interest across the groups analyzed.

2.4 Does Decision-Making Power Reinforce Gender Inequalities?

2.4.1 Gender Inequalities in Main Occupation and Debt Status

Before examining the role of financial decision-making power in relation to gender inequalities in the labor market and debt, it is important to first acknowledge the existence of these inequalities in 2020-21. Specifically, we analyze two factors: primary occupation and debt status, i.e., whether an individual is indebted or not. Since the study focuses on gender differences, the two groups considered are women and men.

As shown in Table 2.2, significant gender inequalities exist in terms of primary occupation, though no notable differences are observed in debt status between the two groups. Women are more likely to be inactive in the labor market, with a 9 percentage point difference compared to men. Additionally, women are more likely to engage in occasional work in the agricultural sector or in public employment programs like NREGA, with differences of 7.4 and 9.2 percentage points, respectively. It is not surprising to observe significant gender differences in favor of women for NREGA public employment, as it offers 100 days of guaranteed work in a context where women face fewer employment opportunities than men, and gender-based wage discrimination is prohibited in NREGA jobs (Desai 2018; Dasgupta and Sudarshan 2011). In contrast, men are more frequently employed in occasional non-agricultural jobs, regular skilled or unskilled employment, and self-employment in agriculture, with differences of 7, 3, 7.9, and 5 percentage points, respectively.

Despite these occupational differences, there is no significant disparity in indebtedness between the two groups, although 46.6% of women report having debts compared to 42.1% of men.

These findings are consistent with those of Di Santolo et al. (2024), who also highlight pronounced gender inequalities in employment within our study area,

particularly in terms of participation rates and main occupation.

2.4.2 Role of Decision-Making Power in Gender Inequalities

Now that we have observed gender inequalities in terms of primary occupation and indebtedness within our study area for 2020-21, we can proceed with our exploratory analysis regarding the influence of financial decision-making power on these inequalities. In other words, we aim to determine whether financial decision-making power exacerbates gender inequalities, has no effect, or, on the contrary, helps reduce them. Table 2.3 presents the results concerning the relationship between financial decision-making power and the gender inequalities under consideration.

First, to quantify the influence of financial decision-making power, we divided our sample into two subgroups for the descriptive statistics: decision-makers and non-decision-makers. Within these groups, we analyze the differences between men and women in terms of primary occupation and indebtedness. Second, to interpret potential variations in gender inequalities linked to decision-making power, we examine two new subgroups: men and women, distinguishing between those who hold decision-making power and those who do not. Thus, for each gender, we analyze the differences in labor market outcomes and indebtedness between decision-makers and non-decision-makers. The objective is to determine whether one or both genders contribute to potential variations in gender inequalities related to financial decision-making power, in order to provide meaningful interpretations of our findings.

When comparing men and women based on their financial decision-making status—whether they are decision-makers or not—it is evident that financial decision-making power amplifies gender inequalities in casual agricultural work, public-sector jobs like NREGA, and self-employment in the non-agricultural sector. Specifically, compared to the gender inequalities observed in 2020-21 for the entire population—7.4, 9.2, and 5 percentage points, respectively—these figures increase to 18.9, 11.8, and 9.3 percentage points for primary decision-makers. Additionally, financial decision-making power exacerbates gender disparities in indebtedness, with a significant difference of 10.1 percentage points between male and female decision-makers, whereas this difference is non-significant for the overall sample.

To interpret this intensification of gender inequalities in terms of the occupations mentioned and indebtedness, we now focus on the sub-samples by gender. The increased gender inequality in casual agricultural work and indebtedness is primarily driven by the differences between women decision-makers and women non-decision-makers, with gaps of 28.3 and 57.7 percentage points, respectively. For men, there are also significant differences between decision-

makers and non-decision-makers, but they are relatively smaller—11.6 and 46.4 percentage points, respectively. The rise in gender inequality related to self-employment in the non-agricultural sector is entirely due to the difference between male decision-makers and non-decision-makers, with a significant gap of 8 percentage points. Finally, the increase in gender inequalities in NREGA public employment cannot be conclusively interpreted, as the differences between decision-makers and non-decision-makers are not statistically significant for either females or males. It is also important to highlight the growing gender inequality in labor force participation among non-decision-makers, with a significant difference of 15 percentage points between men and women. This is due to both sexes, as non-decision-making men and women participate in the labor market significantly less than their same-sex counterparts, with gaps of 38.9 and 52.5 percentage points, respectively.

In conclusion, financial decision-making power can be linked to an increase in gender inequalities in casual agricultural employment, NREGA public employment, and self-employment in the non-agricultural sector. Moreover, holding this type of decision-making power creates gender inequality in terms of indebtedness. The analysis by gender sub-samples reveals that, for women, financial decision-making power introduces a form of vulnerability in employment and indebtedness—particularly related to the precariousness of casual jobs and the financial implications of debt, including interest payments. In contrast, for men, financial decision-making power further reinforces their over-representation in independent activities within the non-agricultural sector.

2.5 Heterogeneity by Household Economic Status

In the study area, inter-household inequalities have increased between 2010 and 2020. These disparities are evident in income, expenditure, and assets ownership, especially land ownership (Di Santolo et al. 2024).

Given this context, it is valuable to examine the economic status of households in relation to the link between gender inequalities and financial decision-making power. Economic status is emphasized over caste as a more precise indicator of household living conditions, as caste has become a less reliable proxy for economic status in recent decades due to factors such as economic development and urbanization (Gille 2013).

Thus, after classifying and characterizing households based on their economic status, we will analyze potential heterogeneous relationship between gender inequalities in labor market outcomes and indebtedness, with particular focus on the household's economic standing.

2.5.1 Household Economic Condition Groups

To assess the economic status of households, we first identified variables that best reflect this status within our study area. At the household level, the variables considered include annual earned income, net transfers (pensions and remittances), total assets value (excluding land), land ownership (i.e., being a landowner), and the debt coverage ratio, defined as the ratio of total debt cost (repayment and interest) to annual labor income.

Subsequently, to classify households according to their economic status, a hierarchical cluster analysis was conducted. This method determines the optimal number of clusters (Sardá-Espinosa 2019; Husson, Lê, and Pagès 2017). Specifically, in this paper, we apply Ward's method and use the squared Euclidean distance as the measure of dissimilarity. These choices are motivated by the superior performance of Ward's method compared to other hierarchical clustering methods (Ferreira and Hitchcock 2009), as well as recommendations from Lance and Williams (1967), Kaufman and Rousseeuw (1990), and Everitt et al. (2011) regarding distance measures for interpreting results.

Figure 2.2 presents the results of the hierarchical cluster analysis, revealing a clear division into 5 clusters based on the dendrogram. The clusters consist of 142, 5, 110, 49, and 326 households, respectively. The third and fourth clusters can be merged, as they share similar characteristics regarding economic status variables. As shown in Table 2.4, households in these two groups are around 40% landowners, possess the highest total income (earned and net transfers), the highest assets values, and have a debt coverage ratio ranging from 20% to 32% of annual earned income.

After merging the third and fourth clusters, the distribution of households is as follows: 142 households in the first group, 5 households in the second group, 159 households in the third group, and 326 households in the fourth group. The characteristics of these groups, based on variables summarizing their economic condition, are detailed in Table 2.5. The first group consists of nearly 100% landowning households, with the second-highest total annual income (earned and transfers) and a debt coverage ratio of 50%. The second group represents over-indebted households, with notably high debt levels reflected in a debt coverage ratio of nearly 113%. This can be partially explained by their relatively lowest earned income—the lowest among the four groups. In addition, households in this group, on average, have negative net transfers, which could account for remittances. However, 60% of these households are landowners and possess a moderate level of assets, ranking second in asset value among the groups. The third group consists of the wealthiest households, ranking first in total annual income (earned and net transfers) and assets value. About 44% of them are landowners, and their debt coverage ratio is 24%. Finally, the fourth

group consists of households with the lowest assets value. These households are all landless, rank last in terms of assets value, and have a debt coverage ratio of 65%.

Based on the characteristics of these groups, we refer to them as follows for the remainder of the paper: the "landowning" households (Group 1), the "over-indebted" households (Group 2), the "wealthiest" households (Group 3), and the "lowest assets value" households (Group 4).

Even though we consider household economic status rather than caste—due to their imperfect correlation—we still aim to test the dependence between caste and our household groups categorized by economic condition. Since caste is an invariant household characteristic, we can conduct a Pearson χ^2 test. Table 2.6 presents the results of this test. With a p -value of less than 1%, we can conclude that caste is a significant determinant of household economic status. Specifically, Dalits are over-represented in the "lowest assets value" group, while Middles and Uppers are over-represented among the "wealthiest" households—with χ^2 values of approximately 4.9, 0.7, and 0.4 per cell, respectively. Dalits are also under-represented in the "wealthiest" households; they should account for 76 out of 159 households, but there are only 67 (with a χ^2 of 1.1). Middles are under-represented in the "lowest assets value" group, constituting 107 households instead of the expected 137 (with a χ^2 of 6.9).

2.5.2 Gender Inequalities and Decision-Making Power by Household Economic Status

2.5.2.1 Gender Inequalities by Household Economic Status

In this section, we employ the same methodology as outlined earlier, first identifying gender inequalities and then analyzing the role of financial decision-making power. The main distinction here is the consideration of household type, categorized by economic status (landowning, over-indebted, wealthiest, and lowest assets value).

Table 2.7 offers insights into household heterogeneity concerning the influence of financial decision-making power on gender inequalities. It shows that gender disparities in labor force participation are particularly pronounced among the wealthiest households, where the difference is approximately 16.7 percentage points. Given the strong correlation between household economic status and caste (see Table 2.6), this finding aligns with existing literature. Traditional social norms, particularly among high-caste, often lead to lower female labor market participation, motivated by concerns of social prestige (Datta, Endow, and Mehta 2020). Moreover, the wealthiest households also show the largest gender gap in NREGA-type public-sector employment, with a disparity

of approximately 10.9 percentage points. Similar gender inequalities are also observed in "lowest assets value" and "landowning" households, where the gaps are 8.6 and 7.8 percentage points, respectively.

Women also exhibit a higher presence in casual agricultural employment, with a difference of 7.4 percentage points compared to men (*cf.* Table 2.2). This gender gap is most pronounced in landowning households, with an 11.8 percentage point difference, though significant disparities are also found among "lowest assets value" households (6.7 percentage points). These findings are consistent with Di Santolo et al. (2024), who document the over-representation of Dalits in casual agricultural employment, a group also over-represented in "lowest assets value" households.

In terms of casual employment in the non-agricultural sector, as well as regular employment and self-employment, Table 2.2 reveals that these roles are predominantly occupied by men. For casual non-agricultural jobs, the gender gap is most pronounced among "lowest assets value" households, with a difference of approximately 7.8 percentage points (*cf.* Table 2.7). However, significant disparities also exist in "wealthiest" and "landowning" households, where the differences are around 6.9 and 6.2 percentage points, respectively. This pattern mirrors the one observed for women in casual agricultural employment. Notably, Dalits are over-represented in "lowest assets value" households in the study area (Di Santolo et al. 2024).

For regular employment, both skilled and unskilled, as well as self-employment in non-agricultural sector, the gender disparity is largely driven by wealthier households (see Table 2.7). This can be attributed to the educational requirements for such jobs, with upper-caste individuals being over-represented in these households and having relatively higher education levels compared to Dalits and middle-caste groups (Di Santolo et al. 2024).

2.5.2.2 Gender Inequalities and Decision-Making Power by Household Economic Status

To account for the heterogeneity in household economic status when analyzing the role of financial decision-making power in gender inequalities, four tables of descriptive statistics were created, each corresponding to one of the following household groups: "landowning", "over-indebted", "wealthiest", and "lowest assets value."

For landowning households, Table 2.8 reveals that the only significant gender differences are related to primary occupation in specific activities, such as casual agricultural and non-agricultural employment, as well as public-sector jobs like those under the NREGA program. Women are over-represented in casual agricultural work and NREGA jobs, with differences of 11.8 and 7.8 percentage points,

respectively. Conversely, men dominate casual non-agricultural employment, with a 6.2 percentage point difference. When considering financial decision-making power, it becomes evident that this exacerbates gender inequalities in casual agricultural employment and indebtedness. For example, the gender gap in casual agricultural employment rises to 28.3 percentage points among primary decision-makers, compared to 11.8 points for the entire landowning group. Additionally, while there is no overall gender gap in indebtedness, financial decision-making power creates one: women decision-makers are significantly more indebted, with a gender gap of 19 percentage points.

This increase in gender inequality appears to be driven mainly by women. Among females, the gap in casual agricultural employment is 32.6 percentage points between decision-makers and non-decision-makers, while the gap in indebtedness is an even larger 62.4 percentage points—much higher than the 38.2 point difference observed among men. Therefore, in landowning households, decision-making power tends to amplify gender inequalities in primary occupation and creates new inequalities in indebtedness. In other words, financial decision-making power among women is associated with increased precariousness in both casual employment and indebtedness.

For over-indebted households, due to the small sample size (5 households), no meaningful interpretation of the descriptive statistics can be made (see Table 2.9). Furthermore, no significant gender inequalities or effects of financial decision-making power are observed for this group.

In wealthiest households, Table 2.10 indicates that gender inequalities primarily relate to labor force participation, non-agricultural activities, and NREGA public employment. Women are more likely to be inactive, with a participation gap of 16.7 percentage points, and are over-represented in NREGA jobs, with a gap of 10.9 percentage points. However, they are less likely to hold casual, regular skilled, or self-employment positions in non-agricultural sector, with gaps of 6.9, 13, and 7.1 percentage points, respectively. Financial decision-making power amplifies gender disparities in NREGA employment, with a gap of 14.3 percentage points between male and female decision-makers, compared to 10.9 percentage points in the entire wealthiest group. However, this trend is difficult to interpret, as no significant differences are found between decision-making and non-decision-making women or men. Similarly, gender inequalities in non-agricultural employment among non-decision-makers are difficult to interpret, with the exception of inactivity. The gender gap in inactivity is 21.5 percentage points among non-decision-makers, compared to 16.7 points for the whole group, primarily driven by non-decision-making women, who have a 46.1 percentage point gap in labor force participation compared to their decision-making counterparts. For men, this gap is also significant but

smaller, at 31.4 percentage points. Thus, in wealthiest households, financial decision-making power influences gender inequalities in NREGA employment, though its interpretation remains unclear. However, non-decision-making status increases gender inequalities in labor force participation, largely because nearly two-thirds of non-decision-making women are inactive.

For lowest assets value households, significant gender differences primarily relate to the type of employment, particularly in non-agricultural sector (casual, regular skilled, and self-employment), casual agricultural employment, and NREGA public jobs (see Table 2.11). As with other household types (except over-indebted households), women are more likely to hold casual agricultural jobs and NREGA positions, with gaps of 6.7 and 8.6 percentage points, respectively. Like in wealthiest households, women are less likely to be employed in non-agricultural sector, with gaps of 7.8 points for casual jobs, 6.6 points for regular skilled jobs, and 4.4 points for self-employment. Financial decision-making power further increases gender inequalities in non-agricultural self-employment and NREGA employment, with gaps of 12.1 and 11.7 percentage points, respectively. However, we can only interpret the increase in non-agricultural self-employment inequality, as no differences are found between decision-makers and non-decision-makers in NREGA employment, regardless of gender. Thus, this increase in gender inequality can only be noted as a factual observation without further interpretation. In terms of non-agricultural self-employment, the increase in gender inequality appears to be driven by men. Table 2.11 shows a significant 11.3 percentage point gap between decision-making and non-decision-making men. Additionally, the gender gap in inactivity among non-decision-makers also increases, with a gap of 12 percentage points, mainly due to non-decision-making women. Like their wealthiest counterparts, nearly two-thirds of non-decision-making women in lowest assets value households are inactive, compared to less than 10% of decision-making women. The gap between decision-making and non-decision-making men is also significant, at 40.5 percentage points. Therefore, in lowest assets value households, the link between financial decision-making power and gender inequalities is most evident in non-agricultural self-employment, driven by the gap between decision-making and non-decision-making men.

In conclusion, when considering household economic status, the relationship between financial decision-making power and gender inequalities varies. In landowning households, financial decision-making power among women is associated with increased precariousness in casual agricultural employment and indebtedness. In wealthiest households, gender inequalities in NREGA

employment rise with financial decision-making power, though this is difficult to interpret. In lowest assets value households, financial decision-making power increases gender inequalities in non-agricultural self-employment, driven by differences between decision-making and non-decision-making men.

2.6 Conclusion

This paper has analyzed the intricate relationship between financial decision-making power and gender inequalities in rural India, focusing on Tamil Nadu's rural areas. By utilizing NEEMIS survey data and employing an exploratory approach based on descriptive statistics, this study sheds light on the complex role decision-making power plays in either empowering or burdening women within households.

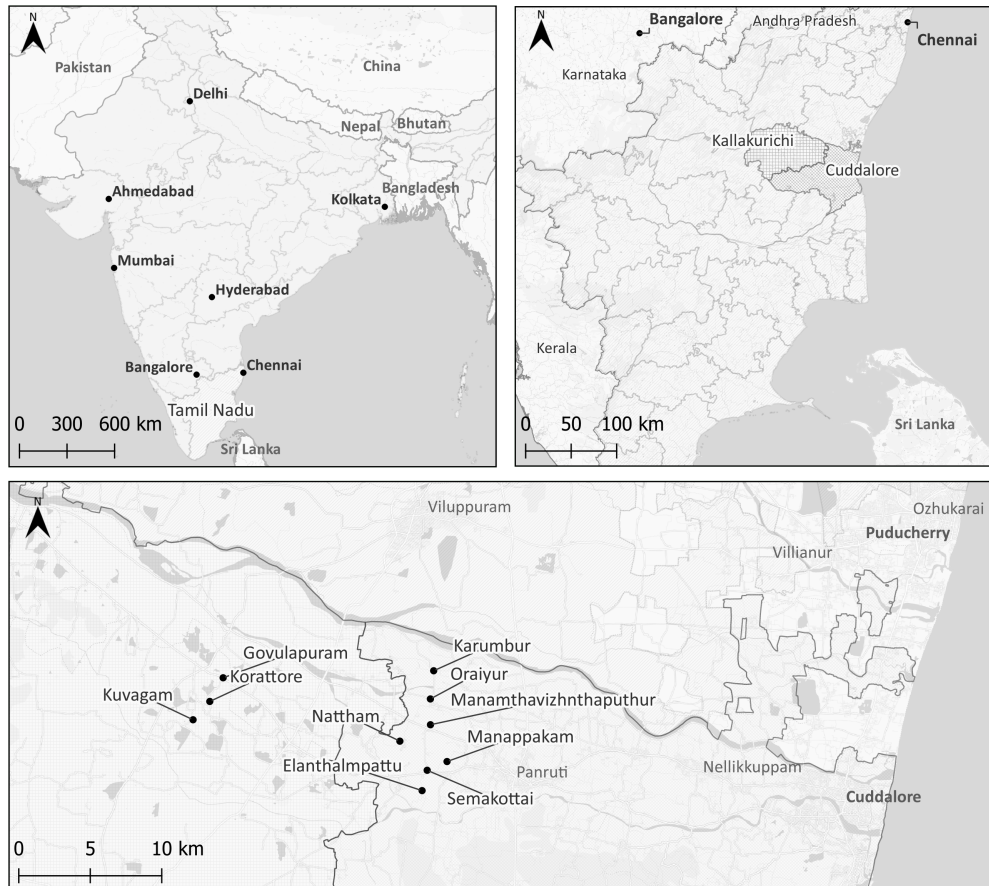
The findings indicate that while financial decision-making power can elevate women's status by increasing their agency over household resources, it also has the potential to exacerbate existing gender inequalities, particularly in terms of employment and indebtedness. In Tamil Nadu, financial decision-making power often places an undue burden on women, intensifying their precariousness in casual agricultural and public-sector jobs, as well as their vulnerability to debt. These challenges are more pronounced in landowning and wealthy households. In contrast, for men, financial decision-making power is linked to increased representation in self-employment in the non-agricultural sector, particularly among those in households with lower asset values.

This study highlights the dual nature of decision-making power: while it can be a tool for empowerment, it can also reinforce structural inequalities depending on its type and on the socio-economic context. By examining the heterogeneity of household economic conditions, we gain a clearer understanding of the varying impacts financial decision-making power has on different household groups.

This study adds to the existing literature on gender inequalities by illustrating how financial decision-making power within households influences gendered labor market outcomes and indebtedness in rural India. It highlights the importance of reassessing, particularly for policymakers, the assumption that decision-making power universally empowers women, especially in contexts with deeply entrenched gender inequalities. Future research should focus on exploring the causal mechanisms between financial decision-making power and gender inequalities to better inform effective policy solutions.

2.7 Tables and Figures

Descriptive statistics



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Figure 2.1: NEEMISIS study area

Source: NEEMISIS data; author: Arnaud Natal.

Table 2.1: Descriptive statistics of the analysis sample

	Summary
Observations	3,005
Female	0.485 (0.500)
Age in 2020	32.656 (19.135)
<i>Caste</i>	
Dalits	0.518 (0.500)
Middle	0.400 (0.490)
Upper	0.083 (0.275)
<i>Religion</i>	
Hindu	0.979 (0.143)
Christian	0.005 (0.068)
Muslim	0.016 (0.127)
<i>Education level</i>	
No education	0.470 (0.499)
Elementary	0.107 (0.309)
Secondary	0.146 (0.353)
Sr. secondary	0.120 (0.326)
Bachelors or above	0.124 (0.330)
<i>Relationship to head</i>	
Head	0.208 (0.406)
Wife/husband	0.180 (0.384)
In-laws	0.101 (0.302)
Son/daughter	0.359 (0.480)
Brother/sister/cousin	0.008 (0.091)
Father/mother	0.034 (0.182)
Grandparents	0.001 (0.026)
Grandchild	0.106 (0.309)
Nephew/niece	0.002 (0.048)
<i>Marital status</i>	
Married	0.540 (0.498)
Unmarried	0.400 (0.490)
Widowed/separated/divorced	0.060 (0.238)

Source: NEEMSIS-2 data.

Note: Means and standard errors in parentheses.

Results

Table 2.2: Gender inequalities in main occupation and debt status

	Female	Male	Total	Test
Observations	1,458 (48.5%)	1,547 (51.5%)	3,005 (100.0%)	
<i>Main occupation</i>				
No activity	0.477 (0.500)	0.387 (0.487)	0.431 (0.495)	<0.001
Agri S-E	0.076 (0.265)	0.103 (0.304)	0.090 (0.286)	0.009
Agri casual	0.183 (0.387)	0.109 (0.312)	0.145 (0.352)	<0.001
Non-agri casual	0.087 (0.282)	0.157 (0.364)	0.123 (0.329)	<0.001
Non-agri reg non-qual	0.028 (0.164)	0.058 (0.234)	0.043 (0.204)	<0.001
Non-agri reg qual	0.026 (0.160)	0.105 (0.307)	0.067 (0.250)	<0.001
Non-agri S-E	0.023 (0.151)	0.073 (0.259)	0.049 (0.215)	<0.001
NREGA	0.099 (0.299)	0.007 (0.084)	0.052 (0.221)	<0.001
<i>Debt status</i>				
Indebted	0.466 (0.499)	0.421 (0.494)	0.443 (0.497)	0.013

Source: NEEMIS-2 data.

Note: Mean and standard errors in parentheses (except for the number of observations). The 'Test' column reports p-values from group comparison tests.

Table 2.3: Gender Inequalities and Decision-Making Power

	Observations	Labour market						Credit market		
		No activity	Agri. S-E	Agri. casual	Non-agri. casual	Non-agri. regular non-qualified	Non-agri. regular qualified	Non-agri. S-E	NREGA	Indebted
<i>Sample 1: Non-decision-makers</i>										
Males	1202 (53.30%)	0.471 (0.499)	0.073 (0.26)	0.083 (0.277)	0.143 (0.351)	0.053 (0.225)	0.113 (0.317)	0.056 (0.23)	0.006 (0.076)	0.321 (0.467)
Females	1052 (46.70%)	0.621 (0.485)	0.048 (0.213)	0.105 (0.306)	0.073 (0.261)	0.021 (0.143)	0.027 (0.161)	0.016 (0.126)	0.089 (0.284)	0.309 (0.462)
Total	2254 (100%)	0.541 (0.498)	0.061 (0.239)	0.093 (0.291)	0.111 (0.314)	0.038 (0.192)	0.073 (0.26)	0.037 (0.19)	0.044 (0.206)	0.315 (0.465)
Test		<0.001	0.014	0.082	<0.001	<0.001	<0.001	<0.001	<0.001	0.534
<i>Sample 2: Decision-makers</i>										
Males	331 (45.70%)	0.082 (0.274)	0.215 (0.411)	0.199 (0.4)	0.211 (0.409)	0.076 (0.265)	0.069 (0.255)	0.136 (0.343)	0.012 (0.109)	0.785 (0.411)
Females	394 (54.30%)	0.096 (0.296)	0.153 (0.361)	0.388 (0.488)	0.128 (0.334)	0.041 (0.198)	0.02 (0.142)	0.043 (0.204)	0.13 (0.337)	0.886 (0.318)
Total	725 (100%)	0.09 (0.286)	0.181 (0.385)	0.302 (0.459)	0.166 (0.372)	0.057 (0.231)	0.043 (0.203)	0.086 (0.28)	0.076 (0.265)	0.84 (0.367)
Test		0.486	0.033	<0.001	0.002	0.044	0.001	<0.001	<0.001	<0.001
<i>Sample 3: Females</i>										
Decision-makers	394 (27.20%)	0.096 (0.296)	0.153 (0.361)	0.388 (0.488)	0.128 (0.334)	0.041 (0.198)	0.02 (0.142)	0.043 (0.204)	0.13 (0.337)	0.886 (0.318)
Non-decision-makers	1052 (72.80%)	0.621 (0.485)	0.048 (0.213)	0.105 (0.306)	0.073 (0.261)	0.021 (0.143)	0.027 (0.161)	0.016 (0.126)	0.089 (0.284)	0.309 (0.462)
Total	1446 (100%)	0.478 (0.5)	0.076 (0.266)	0.182 (0.386)	0.088 (0.283)	0.026 (0.16)	0.025 (0.156)	0.024 (0.152)	0.1 (0.3)	0.466 (0.499)
Test		<0.001	<0.001	<0.001	0.001	0.036	0.498	0.002	0.019	<0.001
<i>Sample 4: Males</i>										
Decision-makers	331 (21.60%)	0.082 (0.274)	0.215 (0.411)	0.199 (0.4)	0.211 (0.409)	0.076 (0.265)	0.069 (0.255)	0.136 (0.343)	0.012 (0.109)	0.785 (0.411)
Non-decision-makers	1202 (78.40%)	0.471 (0.499)	0.073 (0.26)	0.083 (0.277)	0.143 (0.351)	0.053 (0.225)	0.113 (0.317)	0.056 (0.23)	0.006 (0.076)	0.321 (0.467)
Total	533 (100%)	0.387 (0.487)	0.103 (0.304)	0.108 (0.311)	0.158 (0.365)	0.058 (0.234)	0.104 (0.305)	0.073 (0.261)	0.007 (0.085)	0.421 (0.494)
Test		<0.001	<0.001	<0.001	0.003	0.128	0.02	<0.001	0.234	<0.001

Source: NEMESIS-2 data.

Note: The columns present the mean values, with standard errors in parentheses (except for the number of observations), for labor market and credit market outcomes, disaggregated by subsamples (1–4). The ‘Test’ row reports p-values from group comparison tests for each subsample.

Heterogeneity by Household Economic Status

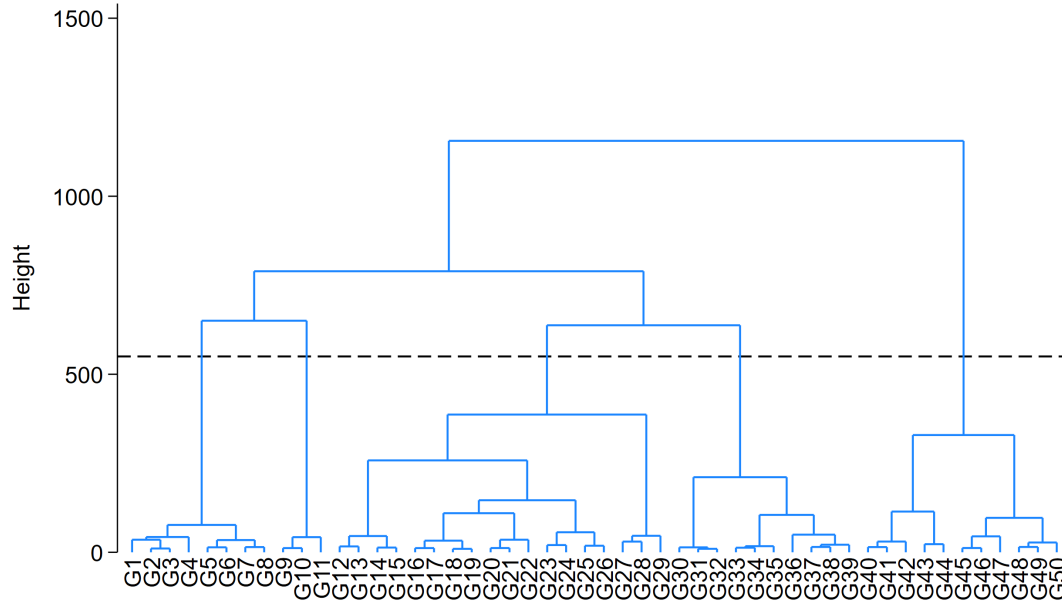


Figure 2.2: Dendrogram

Source: NEEMSIS-2 data; authors' calculations.

Table 2.4: Clusters characteristics

	Group 1	Group 2	Group 3	Group 4	Group 5	Total	Test
Observations	142 (22.5%)	5 (0.8%)	110 (17.4%)	49 (7.8%)	326 (51.6%)	632 (100.0%)	
Annual earned income	144,736.599 (102,706.886)	8,288.000 (9,005.483)	408,675.245 (342,625.444)	258,936.735 (149,694.563)	138,536.294 (113,492.871)	195,251.655 (204,312.445)	<0.001
Net HH transferts	3,465.493 (14,669.189)	-100.000 (6,024.948)	11,498.182 (21,672.106)	92,428.735 (52,870.810)	3,280.420 (8,226.323)	11,637.381 (30,594.389)	<0.001
Total assets (savings included and land excluded)	504,528.415 (242,752.158)	650,960.000 (440,806.401)	1,142,636.073 (531,369.648)	594,784.857 (265,205.161)	368,094.252 (165,761.964)	553,371.815 (402,105.433)	<0.001
Landowner	0.993 (0.084)	0.600 (0.548)	0.436 (0.498)	0.469 (0.504)	0.012 (0.110)	0.347 (0.476)	<0.001
DSR	0.508 (0.648)	11.290 (2.972)	0.208 (0.278)	0.327 (0.477)	0.655 (1.113)	0.603 (1.327)	<0.001

Source: NEEMSIS-2 data.
 Note: 'Group 1', 'Group 2', 'Group 3', 'Group 4' and 'Total' columns present the means, with standard errors in parentheses, for the characteristics of household clusters (except for the number of observations). The 'Test' column reports the p-values from the group comparison test.

Table 2.5: Economic status groups characteristics

	Landowning	Over-indebted	Wealthiest	Lowest assets value	Total	Test
Observations	142 (22.5%)	5 (0.8%)	159 (25.2%)	326 (51.6%)	632 (100.0%)	
Annual earned income	144,736.599 (102,706.886)	8,288.000 (9,005.483)	362,529.415 (304,309.077)	138,536.294 (113,492.871)	195,251.655 (204,312.445)	<0.001
Net HH transferts	3,465.493 (14,669.189)	-100.000 (6,024.948)	36,439.044 (50,778.944)	3,280.420 (8,226.323)	11,637.381 (30,594.389)	<0.001
Total assets (savings included and land excluded)	504,528.415 (242,752.158)	650,960.000 (440,806.401)	973,801.421 (529,671.289)	368,094.252 (165,761.964)	553,371.815 (402,105.433)	<0.001
Landowner	0.993 (0.084)	0.600 (0.548)	0.447 (0.499)	0.012 (0.110)	0.347 (0.476)	<0.001
DSR	0.508 (0.648)	11.290 (2.972)	0.245 (0.354)	0.655 (1.113)	0.603 (1.327)	<0.001

Source: NEEMSIS-2 data.
 Note: 'Landowning', 'Over-indebted', 'Wealthiest', 'Lowest assets value' and 'Total' columns present the means, with standard errors in parentheses, for the characteristics of household economic status group (except for the number of observations). The 'Test' column reports the p-values from the group comparison test.

Table 2.6: Castes and 2020-Household Economic Status Groups

Castes	Over-indebted	Landowing	Wealthiest	Lowest assets value	Total
	50	2	67	184	303
Dalits	68.1 (4.8)	2.4 (0.1)	76.2 (1.1)	156.3 (4.9)	303.0 (10.9)
	83	3	74	107	267
Middles	60.0 (8.8)	2.1 (0.4)	67.2 (0.7)	137.7 (6.9)	267.0 (16.7)
	9	0	18	35	62
Uppers	13.9 (1.7)	0.5 (0.5)	15.6 (0.4)	32.0 (0.3)	62.0 (2.9)
	142	5	159	326	632
Total	142.0 (15.4)	5.0 (0.9)	159.0 (2.2)	326.0 (12.1)	632.0 (30.5)

Pearson $\chi^2(6)=30.5$ p-value=0.00 Source: NEEMSI-2 data; authors' calculations.

Table 2.7: Gender Inequalities by Household Economic Status Groups

	Observations	Labour market						Credit market		
		No activity	Agri. S-E	Agri. casual	Non-agri. casual	Non-agri. regular non-qualified	Non-agri. regular qualified	Non-agri. S-E	NREGA	Indebted
<i>Sample 1: Landowning</i>										
Males	346 (52,60%)	0,387 (0,488)	0,269 (0,444)	0,087 (0,282)	0,081 (0,273)	0,049 (0,216)	0,066 (0,249)	0,049 (0,216)	0,012 (0,107)	0,439 (0,497)
Females	312 (47,40%)	0,439 (0,497)	0,189 (0,392)	0,205 (0,404)	0,019 (0,138)	0,01 (0,098)	0,026 (0,158)	0,022 (0,148)	0,09 (0,286)	0,484 (0,501)
Total	658 (100%)	0,412 (0,493)	0,231 (0,422)	0,143 (0,35)	0,052 (0,222)	0,03 (0,172)	0,047 (0,212)	0,036 (0,188)	0,049 (0,215)	0,46 (0,499)
Test		0,178	0,015	<0,001	<0,001	0,003	0,014	0,068	<0,001	0,252
<i>Sample 2: Over-indebted</i>										
Males	8 (47,10%)	0,125 (0,354)	0,5 (0,535)	0,125 (0,354)	0 (0)	0 (0)	0 (0)	0,25 (0,463)	0 (0)	0,875 (0,354)
Females	9 (52,90%)	0,444 (0,527)	0,111 (0,333)	0,111 (0,333)	0 (0)	0 (0)	0 (0)	0 (0)	0,333 (0,5)	0,556 (0,527)
Total	17 (100%)	0,294 (0,47)	0,294 (0,47)	0,118 (0,332)	0 (0)	0 (0)	0 (0)	0,118 (0,332)	0,176 (0,393)	0,706 (0,47)
Test		0,169	0,088	0,935				0,125	0,08	0,169
<i>Sample 3: Wealthiest</i>										
Males	448 (52,50%)	0,344 (0,475)	0,114 (0,318)	0,078 (0,269)	0,118 (0,323)	0,078 (0,269)	0,17 (0,376)	0,098 (0,298)	0 (0)	0,451 (0,498)
Females	405 (47,50%)	0,511 (0,5)	0,099 (0,299)	0,126 (0,332)	0,049 (0,217)	0,04 (0,195)	0,04 (0,195)	0,027 (0,163)	0,109 (0,312)	0,449 (0,498)
Total	853 (100%)	0,423 (0,494)	0,107 (0,309)	0,101 (0,301)	0,086 (0,28)	0,06 (0,237)	0,108 (0,31)	0,064 (0,246)	0,052 (0,221)	0,45 (0,498)
Test		<0,001	0,477	0,021	<0,001	0,018	<0,001	<0,001	<0,001	0,965
<i>Sample 4: Lowest assets value</i>										
Males	745 (50,40%)	0,416 (0,493)	0,015 (0,121)	0,139 (0,346)	0,217 (0,412)	0,051 (0,221)	0,085 (0,279)	0,066 (0,249)	0,009 (0,097)	0,389 (0,488)
Females	732 (49,60%)	0,474 (0,5)	0,014 (0,116)	0,206 (0,405)	0,139 (0,346)	0,029 (0,167)	0,019 (0,137)	0,022 (0,147)	0,095 (0,293)	0,466 (0,499)
Total	1477 (100%)	0,445 (0,497)	0,014 (0,119)	0,172 (0,378)	0,178 (0,383)	0,04 (0,196)	0,052 (0,223)	0,044 (0,206)	0,052 (0,221)	0,427 (0,495)
Test		0,025	0,861	<0,001	<0,001	0,029	<0,001	<0,001	<0,001	0,003

Source: NEMESIS-2 data.

Note: The columns present the mean values, with standard errors in parentheses (except for the number of observations), for labor market and credit market outcomes, disaggregated by subsamples (1-4). The 'Test' row reports p-values from group comparison tests for each subsample.

Table 2.8: Gender Inequalities and Decision-Making Power in Landowning Households

	Observations	No activity				Labour market				Credit market			
		Agri. S.E	Agri. casual	Non-agri. casual	Non-agri. regular non-qualified	Agri. S.E	Agri. casual	Non-agri. casual	Non-agri. regular non-qualified	Non-agri. regular qualified	Non-agri. S.E	NREGA	Indebted
<i>Sample 1: Non-decision-makers</i>													
Males	267 (54.80%)	0.491 (0.501)	0.195 (0.97)	0.067 (0.251)	0.071 (0.258)	0.056 (0.231)	0.075 (0.264)	0.037 (0.19)	0.007 (0.086)	0.352 (0.479)			
Females	220 (45.20%)	0.614 (0.488)	0.114 (0.318)	0.109 (0.312)	0.023 (0.149)	0.009 (0.095)	0.027 (0.163)	0.018 (0.134)	0.086 (0.282)	0.3 (0.459)			
Total	487 (100%)	0.546 (0.498)	0.158 (0.365)	0.086 (0.281)	0.049 (0.217)	0.035 (0.184)	0.053 (0.225)	0.029 (0.167)	0.043 (0.203)	0.329 (0.47)			
Test		0.007	0.015	0.103	0.014	0.005	0.02	0.206	<0.001	0.224			
<i>Sample 2: Decision-makers</i>													
Males	79 (46.20%)	0.038 (0.192)	0.519 (0.503)	0.152 (0.361)	0.114 (0.32)	0.025 (0.158)	0.038 (0.192)	0.088 (0.286)	0.025 (0.185)	0.734 (0.445)			
Females	92 (53.80%)	0.022 (0.147)	0.37 (0.485)	0.435 (0.498)	0.011 (0.104)	0.011 (0.104)	0.022 (0.147)	0.033 (0.179)	0.098 (0.299)	0.924 (0.267)			
Total	171 (100%)	0.029 (0.169)	0.439 (0.498)	0.304 (0.461)	0.058 (0.235)	0.018 (0.132)	0.029 (0.169)	0.058 (0.235)	0.064 (0.246)	0.836 (0.371)			
Test		0.533	0.05	<0.001	0.004	0.476	0.533	0.121	0.054	<0.001			
<i>Sample 3: Females</i>													
Decision-makers	92 (29.50%)	0.022 (0.147)	0.37 (0.485)	0.435 (0.498)	0.011 (0.104)	0.011 (0.104)	0.022 (0.147)	0.033 (0.179)	0.098 (0.299)	0.924 (0.267)			
Non-decision-makers	220 (70.50%)	0.614 (0.488)	0.114 (0.318)	0.109 (0.312)	0.023 (0.149)	0.009 (0.095)	0.027 (0.163)	0.018 (0.134)	0.086 (0.282)	0.3 (0.459)			
Total	312 (100%)	0.439 (0.497)	0.189 (0.392)	0.205 (0.404)	0.019 (0.138)	0.01 (0.098)	0.026 (0.158)	0.022 (0.148)	0.09 (0.286)	0.484 (0.501)			
Test		<0.001	<0.001	<0.001	0.488	0.884	0.779	0.434	0.748	<0.001			
<i>Sample 4: Males</i>													
Decision-makers	79 (22.80%)	0.038 (0.192)	0.519 (0.503)	0.152 (0.361)	0.114 (0.32)	0.025 (0.158)	0.038 (0.192)	0.088 (0.286)	0.025 (0.158)	0.734 (0.445)			
Non-decision-makers	267 (77%)	0.491 (0.501)	0.195 (0.397)	0.067 (0.251)	0.071 (0.258)	0.056 (0.231)	0.075 (0.264)	0.037 (0.19)	0.007 (0.086)	0.352 (0.479)			
Total	346 (100%)	0.387 (0.488)	0.269 (0.444)	0.087 (0.282)	0.081 (0.273)	0.049 (0.216)	0.066 (0.249)	0.049 (0.216)	0.012 (0.107)	0.439 (0.497)			
Test		<0.001	<0.001	0.019	0.222	0.266	0.249	0.065	0.194	<0.001			

Source: NEMESIS-2 data.
 Note: The columns present the mean values, with standard errors in parentheses (except for the number of observations), for labor market and credit market outcomes, disaggregated by subsamples (1-4). The 'Test' row reports p-values from group comparison tests for each subsample.

Table 2.9: Gender Inequalities and Decision-Making Powe in Over-Indebted Households

	Observations	No activity	Labour market				Credit market				
			Agri. S-E	Agri. casual	Non-agri. casual	Non-agri. regular non-qualified	Non-agri. regular qualified	Non-agri. S-E	NREGA	Indebted	
<i>Sample 1: Non-decision-makers</i>											
Males	5 (41,70%)	0,2 (0,447)	0,4 (0,548)	0,2 (0,447)	0 (0)	0 (0)	0 (0)	0,2 (0,447)	0 (0)	0 (0,447)	0,8 (0,429)
Females	7 (58,30%)	0,571 (0,535)	0,143 (0,378)	0,143 (0,378)	0 (0)	0 (0)	0 (0)	0 (0)	0,143 (0,378)	0,143 (0,535)	0,429 (0,583)
Total	12 (100%)	0,417 (0,515)	0,25 (0,452)	0,167 (0,389)	0 (0)	0 (0)	0 (0)	0,083 (0,289)	0,083 (0,289)	0,083 (0,515)	0,583 (0,515)
Test		0,235	0,356	0,815				0,255	0,424	0,235	0,235
<i>Sample 2: Decision-makers</i>											
Males	3 (60%)	0 (0)	0,667 (0,577)	0 (0)	0 (0)	0 (0)	0 (0)	0,333 (0,577)	0 (0)	0 (0)	1 (0)
Females	2 (40%)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0)	1 (0)	1 (0)
Total	5 (100%)	0 (0)	0,4 (0,548)	0 (0)	0 (0)	0 (0)	0 (0)	0,2 (0,447)	0,4 (0,548)	0,2 (0,447)	1 (0)
Test		0,219						0,495			0,219
<i>Sample 3: Females</i>											
Decision-makers	2 (22,20%)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0)	1 (0)	1 (0)
Non-decision-makers	7 (77,80%)	0,571 (0,535)	0,143 (0,378)	0,143 (0,378)	0 (0)	0 (0)	0 (0)	0 (0)	0,143 (0,378)	0,143 (0,535)	0,429 (0,583)
Total	9 (100%)	0,444 (0,527)	0,111 (0,333)	0,111 (0,333)	0 (0)	0 (0)	0 (0)	0 (0)	0,333 (0,527)	0,333 (0,527)	0,556 (0,527)
Test		0,193	0,626	0,626				0,193	0,018	0,193	0,193
<i>Sample 4: Males</i>											
Decision-makers	3 (37,50%)	0 (0)	0,667 (0,577)	0 (0)	0 (0)	0 (0)	0 (0)	0,333 (0,577)	0 (0,577)	0 (0)	1 (0)
Non-decision-makers	5 (62,50%)	0,2 (0,447)	0,4 (0,548)	0,2 (0,447)	0 (0)	0 (0)	0 (0)	0,2 (0,447)	0 (0)	0,2 (0,447)	0,8 (0,487)
Total	8 (100%)	0,125 (0,354)	0,5 (0,535)	0,125 (0,354)	0 (0)	0 (0)	0 (0)	0,25 (0,463)	0 (0)	0,25 (0,463)	0,875 (0,487)
Test		0,482	0,537	0,482				0,725	0	0,482	0,482

Source: NEMESIS-2 data.

Note: The columns present the mean values, with standard errors in parentheses (except for the number of observations), for labor market and credit market outcomes, disaggregated by subsamples (1-4). The 'Test' row reports p-values from group comparison tests for each subsample.

Table 2.10: Gender Inequalities and Decision-Making Power in Wealthiest Households

	Observations	Labour market						Credit market		
		No activity	Agri. S-E	Agri. casual	Non-agri. casual	Non-agri. regular non-qualified	Non-agri. regular qualified	Non-agri. S-E	NREGA	Indebted
<i>Sample 1: non-decision-makers</i>										
Males	350 (53,40%)	0,409 (0,492)	0,074 (0,263)	0,06 (0,238)	0,117 (0,322)	0,071 (0,258)	0,18 (0,385)	0,089 (0,285)	0 (0)	0,531 (0,471)
Females	306 (46,60%)	0,624 (0,485)	0,062 (0,242)	0,082 (0,274)	0,039 (0,194)	0,036 (0,186)	0,046 (0,209)	0,013 (0,114)	0,098 (0,298)	0,31 (0,493)
Total	656 (100%)	0,509 (0,5)	0,069 (0,253)	0,07 (0,256)	0,081 (0,273)	0,055 (0,228)	0,117 (0,322)	0,053 (0,225)	0,046 (0,209)	0,322 (0,467)
Test		<0,001	0,538	0,278	<0,001	0,047	<0,001	<0,001	<0,001	0,567
<i>Sample 2: decision-makers</i>										
Males	95 (49,20%)	0,091 (0,294)	0,263 (0,448)	0,137 (0,346)	0,126 (0,334)	0,105 (0,309)	0,137 (0,346)	0,137 (0,346)	0 (0)	0,895 (0,309)
Females	98 (50,80%)	0,163 (0,72)	0,214 (0,412)	0,265 (0,44)	0,082 (0,275)	0,051 (0,221)	0,01 (0,101)	0,071 (0,259)	0,143 (0,352)	0,888 (0,317)
Total	193 (100%)	0,13 (0,337)	0,238 (0,427)	0,202 (0,403)	0,104 (0,306)	0,078 (0,268)	0,073 (0,26)	0,104 (0,306)	0,073 (0,26)	0,891 (0,312)
Test		0,158	0,428	0,026	0,311	0,161	<0,001	0,137	<0,001	0,877
<i>Sample 3: Females</i>										
Decision-makers	98 (24,30%)	0,163 (0,372)	0,214 (0,412)	0,265 (0,444)	0,082 (0,275)	0,051 (0,221)	0,01 (0,101)	0,071 (0,259)	0,143 (0,352)	0,888 (0,317)
Non-decision-makers	306 (75,70%)	0,624 (0,485)	0,062 (0,242)	0,082 (0,274)	0,039 (0,194)	0,036 (0,186)	0,046 (0,209)	0,013 (0,114)	0,098 (0,298)	0,31 (0,463)
Total	404 (100%)	0,512 (0,5)	0,099 (0,299)	0,126 (0,333)	0,05 (0,217)	0,04 (0,195)	0,037 (0,189)	0,027 (0,163)	0,109 (0,312)	0,45 (0,498)
Test		<0,001	<0,001	<0,001	0,092	0,507	0,106	0,002	0,216	<0,001
<i>Sample 4: Males</i>										
Decision-makers	95 (21,30%)	0,091 (0,294)	0,263 (0,443)	0,137 (0,346)	0,126 (0,334)	0,105 (0,309)	0,137 (0,346)	0,137 (0,334)	0 (0,309)	0,895 (0,346)
Non-decision-makers	350 (78,70%)	0,409 (0,492)	0,074 (0,263)	0,06 (0,238)	0,117 (0,322)	0,071 (0,258)	0,18 (0,385)	0,089 (0,285)	0 (0)	0,331 (0,471)
Total	445 (100%)	0,342 (0,475)	0,115 (0,319)	0,076 (0,266)	0,119 (0,324)	0,079 (0,269)	0,171 (0,377)	0,099 (0,299)	0 (0)	0,452 (0,498)
Test		<0,001	<0,001	0,012	0,807	0,278	0,323	0,163	<0,001	<0,001

Source: NEMESIS-2 data.

Note: The columns present the mean values, with standard errors in parentheses (except for the number of observations), for labor market and credit market outcomes, disaggregated by subsamples (1-4). The 'Test' row reports p-values from group comparison tests for each subsample.

Table 2.11: Gender Inequalities and Decision-Making Power in Lowest Assets Value Households

	Observations	Labour market						Credit market		
		No activity	Agri. S-E	Agri. casual	Non-agri. casual	Non-agri. regular non-qualified	Non-agri. regular qualified	Non-agri. S-E	NREGA	Indebted
<i>Sample 1: non-decision-makers</i>										
Males	580 (52,80%)	0,502 (0,5)	0,012 (0,11)	0,104 (0,306)	0,194 (0,396)	0,042 (0,2)	0,092 (0,289)	0,043 (0,204)	0,009 (0,093)	0,297 (0,457)
Females	519 (47,20%)	0,622 (0,485)	0,01 (0,098)	0,116 (0,321)	0,116 (0,321)	0,017 (0,131)	0,015 (0,124)	0,017 (0,131)	0,083 (0,276)	0,31 (0,463)
Total	1099 (100%)	0,559 (0,497)	0,011 (0,104)	0,11 (0,313)	0,157 (0,364)	0,03 (0,171)	0,056 (0,23)	0,044 (0,174)	0,044 (0,205)	0,303 (0,46)
Test		<0,001	0,697	0,524	<0,001	0,02	<0,001	0,014	<0,001	0,623
<i>Sample 2: decision-makers</i>										
Males	154 (43,30%)	0,097 (0,297)	0,019 (0,139)	0,266 (0,443)	0,318 (0,467)	0,084 (0,279)	0,045 (0,209)	0,156 (0,364)	0,013 (0,114)	0,74 (0,44)
Females	202 (56,70%)	0,099 (0,299)	0,025 (0,157)	0,43 (0,496)	0,205 (0,405)	0,05 (0,218)	0,025 (0,157)	0,035 (0,184)	0,13 (0,337)	0,866 (0,341)
Total	356 (100%)	0,098 (0,298)	0,023 (0,149)	0,359 (0,48)	0,254 (0,436)	0,065 (0,247)	0,034 (0,181)	0,088 (0,283)	0,079 (0,27)	0,812 (0,391)
Test		0,96	0,73	0,001	0,015	0,194	0,293	<0,001	<0,001	0,002
<i>Sample 3: Females</i>										
Decision-makers	202 (28%)	0,099 (0,299)	0,025 (0,157)	0,43 (0,496)	0,205 (0,405)	0,05 (0,218)	0,025 (0,157)	0,035 (0,184)	0,13 (0,337)	0,866 (0,341)
Non-decision-makers	519 (72%)	0,622 (0,485)	0,01 (0,098)	0,116 (0,321)	0,116 (0,321)	0,017 (0,131)	0,015 (0,124)	0,017 (0,131)	0,083 (0,276)	0,31 (0,463)
Total	721 (100%)	0,476 (0,5)	0,014 (0,117)	0,204 (0,403)	0,141 (0,348)	0,026 (0,161)	0,018 (0,134)	0,022 (0,148)	0,096 (0,295)	0,466 (0,499)
Test		<0,001	0,117	<0,001	0,002	0,015	0,392	0,153	0,057	<0,001
<i>Sample 4: Males</i>										
Decision-makers	154 (21%)	0,097 (0,297)	0,019 (0,139)	0,266 (0,443)	0,318 (0,467)	0,084 (0,279)	0,045 (0,209)	0,156 (0,364)	0,013 (0,114)	0,74 (0,44)
Non-decision-makers	580 (79%)	0,502 (0,5)	0,012 (0,11)	0,104 (0,306)	0,194 (0,396)	0,042 (0,2)	0,092 (0,289)	0,043 (0,204)	0,009 (0,093)	0,297 (0,457)
Total	734 (100%)	0,417 (0,493)	0,014 (0,116)	0,138 (0,345)	0,22 (0,415)	0,051 (0,219)	0,082 (0,275)	0,067 (0,25)	0,01 (0,097)	0,39 (0,488)
Test		<0,001	0,486	<0,001	<0,001	0,031	0,062	<0,001	0,625	<0,001

Source: NEMESIS-2 data.

Note: The columns present the mean values, with standard errors in parentheses (except for the number of observations), for labor market and credit market outcomes, disaggregated by subsamples (1-4). The 'Test' row reports p-values from group comparison tests for each subsample.

Chapter 3

TIMING OF MOTHERS' EXPOSURE TO THE GENDER QUOTA SYSTEM AND GENDER INEQUALITIES IN CHILDHOOD. EMPIRICAL EVIDENCE FROM SOUTH RURAL INDIA.*

3.1 Introduction

In India, despite significant progress for girls and women in recent decades, substantial gender inequalities persist. In 2020, India ranked 131st out of 189 countries on the Gender Inequality Index.

Gender inequalities manifest throughout the lives of Indian females. In 2021, the sex ratio at birth and at age five was 107.7 and 109.18 males per 100 females, respectively (Population Division of the United Nations). Moreover, disparities are evident in childhood, with girls facing disadvantages in childcare, health care (Barcellos, Carvalho, and LLeras-Muney 2014; Dasgupta 2016), and education. For instance, in 2015-2016, there were only 0.92 girls enrolled in higher education for every boy (Government of India and Literacy 2018). During adulthood, women encounter barriers to physical mobility and labor force participation and

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are vulnerable to violence (Sabarwal, Santhya, and J. 2014; Klasen and Pieters 2015; Afridi, Iversen, and Sharan 2017; Ahmad, Khan, and Mozumdar 2019).

Globally, the persistence of gender inequalities is largely driven by the transmission of entrenched sexist social norms (Duflo 2012; Alesina, Giuliano, and Nunn 2013; Bertrand, Kamenica, and Pan 2015; Jayachandran 2015), and India exemplifies this phenomenon. Son preference is deeply rooted in Indian society (Ghani, Mani, and O’Connell 2013; Dhar, Jain, and Jayachandran 2019; Bhalotra, Chakravarty, and Gulesci 2020), underpinned by patrilineal and patrilocal traditions. Inheritance, including names and property, is typically passed from father to son, while daughters, upon marriage, leave their family and often their home village to join their husband’s household. Despite being legally prohibited, dowry payments by the bride’s family remain common, further reinforcing the financial burden associated with daughters. Additionally, men hold a predominant role in religious rituals, contributing to the perception of daughters as a financial liability, in contrast to sons, who are viewed as a form of economic security for their parents. Given the high prevalence of informal employment in India (88.8% in 2023, according to the International Labor Organization), sons often help support their families, especially during economic hardship.

Parents play a crucial role in perpetuating these ancient social norms that discriminate against girls and women. Through their aspirations and behavior toward their children, parents, especially mothers, who are primarily responsible for the domestic sphere and child-rearing, instill in their children societal roles and expectations from an early age (Smith and Self 1980; Moen, Erickson, and Dempster-McClain 1997; Cunningham 2001; Farré and Vella 2013; Vidal et al. 2021).

Nevertheless, even deeply entrenched social norms can change (Beaman et al. 2009; Dhar, Jain, and Jayachandran 2019). Such changes are often driven by educational interventions (Dhar, Jain, and Jayachandran 2019; Chzen et al. 2021; Kipchumba et al. 2021) and public policies specifically targeting women (Beaman et al. 2009; Beaman et al. 2012; Kalsi 2017; O’Connell 2018), all aimed at weakening gender stereotypes.

The timing of exposure to these interventions or public policies is particularly important. Evidence suggests that interventions targeting adolescents have been especially successful in challenging sexist norms in India and Tanzania (Dhar, Jain, and Jayachandran 2019; Chzen et al. 2021). Indeed, it appears that adolescence (10 to 19 years old⁹) is a critical period for bringing about lasting change in deeply-rooted sexist social norms. According to the psychology literature (Kohlberg 1976; Markus and Nurius 1986), adolescence is a crucial time for

9. The World Health Organization defines an adolescent as any person aged between 10 and 19 years old.

development and identity formation, during which individuals' gender beliefs and attitudes are more malleable, while they possess the cognitive maturity to reflect on complex moral issues.

In this paper, we aim to investigate the potential long-term effects of differential exposure to the gender quota system in the political sphere on childhood gender inequalities, focusing on the impact of mothers' exposure during adolescence versus adulthood. Our central research question is whether exposure during adolescence has enduring effects on the intergenerational transmission of traditional sexist social norms. Specifically, we examine how mothers' aspirations for their children, children's activities, and children's self-aspirations vary by gender.

We focus on this type of public policy because, beyond its direct effects on political representation, granting women access to positions traditionally held by men can generate indirect effects, particularly by challenging gender roles within Indian society. This shift may positively influence women's beliefs about their self-efficacy and that of other women (Beaman et al. 2012; Porter and Serra 2020; Dahl, Kotsadam, and Rooth 2021). Consequently, these changes could shape how mothers raise their children, fostering more egalitarian aspirations and attitudes.

To address our research question, we utilize data from two sources: the Young Lives Survey, which covers the southern states of Andhra Pradesh and Telangana, and electoral data from the Andhra Pradesh State Election Commission¹⁰. We employ a two-stage analysis using intent-to-treat regressions, incorporating the child's sex to evaluate variations in gender inequalities during childhood.

The results show that mothers exposed to a female *sarpanch* during adolescence, as opposed to adulthood, raise their job and educational aspirations for their daughters by 24 and 21 percentage points, respectively. These increased aspirations effectively reverse the gender gap in favor of girls. Additionally, these changes in aspirations lead to shifts in maternal attitudes, with daughters more likely to attend school and spend more time studying—by an increase of 5 percentage points and 36 minutes, respectively. The gender gaps in these areas also narrow, benefiting girls. Furthermore, the likelihood of girls engaging solely in child labor (and consequently dropping out of school) decreases by 4 percentage points. Finally, these shifts in long-standing sexist social norms appear to be transmitted intergenerationally, as these girls have increased their job aspirations by 11 percentage points.

In terms of contribution, this paper builds on the literature that identifies adolescence as a critical period for challenging traditional social norms and their transmission (Dhar, Jain, and Jayachandran 2019; Chzen et al. 2021; Kumar

10. Telangana became a separate state from Andhra Pradesh in 2014.

et al. 2021; Leer et al. 2022; Santhya and Francis Xavier 2022). It also contributes to the body of research on the indirect effects of gender quotas in rural India (Chattopadhyay and Duflo 2004; Ban and Rao 2008; Beaman et al. 2009; Clots-Figueras 2011; Beaman et al. 2012; Ghani, Mani, and O'Connell 2013), providing evidence of indirect long-term effects on childhood gender inequalities. While prior literature has focused on the impact of the number of exposures on these indirect effects, our study is one of the few, alongside Pathak and Macours (2017)¹¹ and Priyanka (2020)¹², to explore the importance of the timing of exposure.

The remainder of this paper is structured as follows: Section 2 discusses the institutional context, while Sections 3 and 4 detail the data and methodology used in this study. Sections 5 and 6 present the main results and their robustness, followed by the conclusion in Section 7.

3.2 Institutional context: the 73rd amendment to the Indian Constitution

The 73rd amendment to the Indian Constitution was adopted in December 1992, and it established the *Indian Panchayat Raj System* in April 1993, introducing a framework for decentralization (Motghare 2019).

Local governments, commonly known as *Panchayats*, had existed since the early 1950s, but prior to the 73rd amendment, they lacked structure and were often inactive. Moreover, their members were not always democratically elected, as elections were not consistently held. The need for reforming these institutions became increasingly apparent, particularly in light of the political debates at the time concerning the allocation of public services, infrastructure development, and the implementation of poverty alleviation programs. There was a growing consensus to empower *Panchayats* with these responsibilities, aiming to better address the needs and preferences of local populations (Chaudhuri 2003; Jha, Nag, and Nagarajan 2011).

The 73rd amendment established a three-tiered pyramidal system of local councils tasked with preparing and implementing plans for economic development, social justice, and the provision of public goods (Motghare 2019). At the

11. Pathak and Macours (2017) examines the impact of India's gender quota system on children exposed in utero and early childhood compared to those exposed after age five, finding significant improvements in educational and health outcomes for the former group.

12. Priyanka (2020) investigates the timing of exposure to female politicians, particularly its effects on young adult women's labor market outcomes based on their age when the quota system was implemented. The study finds the most significant impact on wage employment among women exposed at ages 18-20.

base is the *Gram Panchayat* (GP) at the village level, followed by the *Panchayat Samiti* at the block level¹³, and finally, the *Zilla Parishad* at the district level. The block level connects village and district *Panchayats*, while the district level coordinates between GPs and the central government (Kalsi 2017).

The amendment also introduced the reservation of seats in all local councils, including the position of *Sarpanch* (village leader), for historically disadvantaged groups in India: Scheduled Castes (SC), Scheduled Tribes (ST), Other Backward Castes (OBC), and women. For women, gender quotas mandated at least one-third of all seats, while quotas for SCs, STs, and OBCs were proportional to their respective shares in the district population (Motghare 2019). Additionally, only individuals from the reserved categories were eligible to contest these reserved seats.

All Indian states were required to comply with this amendment within one year of its implementation (Chaudhuri 2003). This led to a rotating reservation process that depended on the proportion of women in each GP. First, a list of GPs in each block was compiled, and for each GP, the share of the female population was calculated. The GPs were then ranked in descending order according to this proportion. The GP with the highest proportion of women was placed at the top of the list. Following this, three reservation groups were formed: the first group included GPs ranked first, fourth, seventh, and so on, skipping two in sequence; the second group included GPs ranked second, fifth, eighth, etc.; and the third group comprised GPs ranked third, sixth, ninth, and so forth (Ban and Rao 2008). This process created an exogenous and quasi-random assignment of gender quotas, as the reservations were not allocated based on observable characteristics, and the proportion of females in each group was effectively random.

In the context of our study, which focuses on the southern states of Andhra Pradesh and Telangana, the first elections with political reservations were held in March 1995 for the first group of GPs. Due to the five-year mandate, subsequent elections were held in the summer of 2001 for the second group and in the summer of 2006 for the third group (Pathak and Macours 2017). Due to administrative procedures, including a cap of 50% on quotas for backward castes and tribes, the first group underwent a second reservation in July 2013 (instead of the scheduled summer of 2011).

13. The block level is the administrative unit below the district.

3.3 Data

Our analysis relies on two primary data sources: i) the Young Lives Survey (YLS) dataset and ii) electoral data from the Andhra Pradesh State Election Commission.

3.3.1 Young Lives Survey

The YLS is an international study aimed at gaining a deeper understanding of childhood poverty. The survey has tracked 12,000 children over fifteen years across four countries: Ethiopia, Peru, Vietnam, and India (focusing on the two southern states of Andhra Pradesh and Telangana). This dataset is particularly valuable for our research as it provides highly detailed information about the lives of the surveyed children and their households. In each country, 2,000 children were selected to be part of the Younger Cohort (YC), defined by their age—between 6 and 18 months at the time of the first round conducted in 2002¹⁴. In Andhra Pradesh and Telangana, five rounds of data collection have been conducted (in the field): 2002, 2007, 2009, 2013, and 2016¹⁵.

In India, the sample design was based on four geographical levels: regions, districts, *mandals*¹⁶, and villages. The former state of Andhra Pradesh was divided into three agro-climatic regions: Coastal Andhra, Rayalaseema, and Telangana. Within each region, two districts were selected based on their level of development¹⁷. One district was chosen to represent the poorest areas, while the other represented relatively better-off districts. Similarly, 20 *mandals* were selected within each district. Each *mandal* was then divided into four contiguous geographical areas, and one village was randomly selected from each area. In total, 150 households were interviewed within each *mandal*¹⁸. As such, the YLS data is not intended to be nationally representative¹⁹, which is an important consideration for the interpretation of our results.

14. Another 1,000 children, aged between 7.5 and 8.5 years in 2002, constitute the Older Cohort.

15. A sixth wave was conducted during COVID-19 (2020-21) but by telephone only.

16. *Mandals* refer to the block-level administrative units defined earlier.

17. Three categories of indicators were considered: economic, human development, and infrastructure.

18. Of these, 100 families had a younger child, and 50 had an older child. Notably, if a household had both an older and a younger child, only the younger child was included in the survey.

19. The YLS team compared data from the first wave (2001) with the Demographic Health Survey (DHS) of the same period and noted that the households in the YLS sample tend to be relatively wealthier and have better access to services compared to the average household in Andhra Pradesh, as per the DHS. This discrepancy may introduce some bias into the analyses.

The initial Young Lives Survey sample included 2,011 children from the Younger Cohort. For our analysis, we restrict this sample to 1,503 children, focusing only on those from rural areas. This decision stems from the fact that urban areas are governed by municipalities, which operate under a different electoral system and political reservation process, potentially introducing confounding factors into our analysis.

3.3.2 Electoral Data

The electoral data used in this study is sourced from the Andhra Pradesh State Election Commission. For each village, it provides detailed information on election results, including the identities of elected members and whether political reservations were enforced for Scheduled Castes (SC), Scheduled Tribes (ST), Other Backward Castes (OBC), and women. This data allows us to determine the specific year when the villages of the children and their families in our study were subject to gender quota reservations for the *sarpanch* seat in local rural government.

The Young Lives Survey Office merged these electoral data with their central databases, as the available YLS data do not contain disaggregated geographical information. Out of a total of 83 *Gram Panchayats* (GPs), 57 were successfully merged with the electoral data. We conducted tests to ensure that the merged and unmerged villages²⁰ were not statistically different from each other. Tables 3.11 and 3.12 show that villages with or without electoral data differ significantly in only two dimensions: villages excluded from our sample are 32.3 percentage points more likely to engage in trade as a main economic activity, and women in these villages are 12.2 percentage points less likely to be from a ST. Overall, we can reasonably conclude that the selected sample is, on average, representative of the overall YLS sample²¹.

3.3.3 Final Dataset

After merging the two central databases, our final sample consists of 997 children from rural areas in the southern states of Andhra Pradesh and Telangana. The reduction in sample size, from 1,503 to 997 children, is due to two main factors: attrition between the first and fourth waves of the YLS, which resulted in the loss of 96 children, and the fact that only 57 out of 83 villages could be included in the analysis, as discussed in the previous subsection.

20. Given that each village in the Young Lives Survey corresponds to a different GP, the terms "village" and "GP" are used interchangeably.

21. Similar findings were reported by Pathak and Macours (2017), who used the same final dataset.

In this final dataset, we have comprehensive information on the children and their families (particularly their mothers), as well as data on the specific years during which their village was reserved for a female *sarpanch* under the gender quota system. This allows to analyze the impact of these gender reservations over time on the outcomes of interest, which are detailed in the following subsection.

3.3.4 Outcomes

Our study primarily investigates the significance of the timing of mothers' exposure to gender quotas—specifically during adolescence (ages 10-19) compared to adulthood—and its impact on their children's outcomes, with a particular focus on potential gender inequalities during childhood. To this end, we utilize data from the fourth wave of the YLS panel²². This wave was conducted between August 2013 and February 2014 in the study area, during which the children were, on average, around 12 years old.

The age of 12 is particularly relevant for our analysis because it allows us to examine mothers' child-rearing behaviors (including aspirations and attitudes) and the potential transmission of entrenched sexist social norms (such as children's aspirations for themselves). It is reasonable to assume that by this age, mothers have begun to shape realistic aspirations for their children. Moreover, at this age, children's activities are still largely influenced by their parents, particularly their mothers, which enables us to assess the impact of maternal attitudes on these activities. Additionally, since 12 years old falls within the period of adolescence, it aligns with a developmental stage where individuals begin to reflect on their future aspirations and goals. Below, we provide a detailed description of the variables considered for each outcome category.

Mother's aspirations: In our study, we examine three specific areas of mothers' aspirations: educational attainment, preferred occupation, and expected age of marriage for their children. To assess these, we analyzed responses to the following questions from the YLS questionnaire: "Ideally, what level of formal education would you like your child to complete?"; "What job would you most like your child to pursue in the future?"; and "At what age do you expect your child to marry and start living with their partner?". Based on the responses, we created three dummy variables: one for aspirations for higher education (defined as completion of either a (post-)graduate degree or a post-secondary technological institute program), another for aspirations for high-skill jobs (as

22. This wave was selected because, in the earlier waves (1 to 3), not all mothers had been exposed to the gender quota policy under study. By the fifth wave, some women had experienced a second exposure to this policy in their village, which could confound the analysis.

classified by the 2015 Indian National Classification of Occupations), and a third for aspirations for marriage at or above the legal age (18 for girls and 21 for boys). Additionally, we constructed a normalized composite measure of these three variables. To achieve this, we first normalized each variable individually by subtracting the mean for mothers exposed to gender quotas during adulthood and dividing it by the standard deviation of this same group. We then averaged these normalized variables and further normalized the resulting average.

Children’s activities: In analyzing children’s activities—used as proxies for mothers’ attitudes—we consider both the extensive and intensive margins. The extensive margin refers to whether a child is engaged in schooling or child labor. For this, we created two dummy variables indicating whether the child is involved in child labor and whether he/she is enrolled in school. If the child is enrolled in school, we further specify the type of school, using a dummy variable that equals one if the school is private. For child labor, we consider the type of labor, with one dummy for domestic work and another for work on a family farm, as well as whether the labor is paid, indicated by a dummy variable that equals one if the work is compensated. Additionally, we created three more dummy variables to capture the child’s overall status: whether they are only enrolled in school, both enrolled in school and engaged in child labor, or only engaged in child labor.

For the intensive margin, we utilized the time-use module of the YLS questionnaire, which reports on eight activities: sleeping, caregiving (for both young and elderly individuals), performing domestic tasks, working on the family farm, doing paid work, attending school, studying, and participating in leisure activities. We aggregated these activities into five categories: domestic work (including caregiving and household tasks), child labor (including paid work and work on the family farm), schooling (including both attending school and studying), sleeping, and leisure. Each of these time-use variables is measured in daily hours.

Children’s aspirations: Similarly to how we examined mothers’ aspirations, we also considered children’s aspirations regarding education and employment, as well as a normalized average of these two aspirations²³. To assess these aspirations, we analyzed responses to the following questions: "Imagine you had no constraints and could study for as long as you like or return to school if you have already left. What level of formal education would you like to complete?" and "When you are about 25 years old, what job would you like to be doing?"

23. For children, there was no question related to the desired age at marriage.

3.4 Empirical strategy

3.4.1 Specification

For our empirical strategy, we employ a two-stage analysis using intent-to-treat regressions. This includes a first-difference approach and an interaction with the child’s sex to account for gender inequalities during childhood.

3.4.1.1 First difference

First, we use a first-difference model to quantify the effects of the timing of mothers’ exposure to gender quotas—comparing adolescence to adulthood—on outcomes for all children, irrespective of gender.

Thus the equation is as follows:

$$Y_{i,g,m} = \beta_0 + \beta_1 \text{Adolescence}_{i,g,m} + \gamma X'_{i,g,m} + \theta_{g,m} + \epsilon_{i,g,m} \quad (3.1)$$

Let $Y_{i,g,m}$ denote the outcome of interest for child i , in GP g , in *mandal* m .

The variable $\text{Adolescence}_{i,g,m}$ is the main explanatory variable. It is a dummy equal to one if the child’s mother was exposed to the gender quota system during adolescence and zero if she was exposed during adulthood. Due to the quasi-random assignment of the quota system at the GP level, β_1 can be interpreted causally²⁴.

The vector $X'_{i,g,m}$ includes control variables that were found to be significant in the difference in group means (see Table 3.13) at both the child and household levels: child’s age, birth order (firstborn), religion (Christian), and the education levels of the household head and mother (completed primary education and highest grade attained).

We also include village reservation group dummies (first, second, and third) and *mandal* fixed effects ($\theta_{g,m}$) to control for spatial time-invariant characteristics. Standard errors are robust to heteroskedasticity and clustered at the village level.

3.4.1.2 Interaction with children’s gender

In the second stage, we extend the same model by adding an interaction with the children’s gender. This allows us to examine how the timing of mothers’ exposure affects boys and girls differently, thereby investigating gender inequalities in childhood.

24. However, we acknowledge that accounting for the age of mothers at the time of exposure could potentially undermine the exogeneity of the gender quota policy. Unobserved factors may have influenced the age of the mothers in a non-exogenous manner, and consequently, the timing of their exposure to a female *sarpanch* in their village of residence.

Thus, we estimate the following equation:

$$Y_{i,g,m} = \beta_0 + \beta_1 \text{Adolescence}_{i,g,m} + \beta_2 \text{Girl}_{i,g,m} + \beta_3 \text{Adolescence}_{i,g,m} * \text{Girl}_{i,g,m} + \gamma X'_{i,g,m} + \theta_{g,m} + \epsilon_{i,g,m} \quad (3.2)$$

As before, $Y_{i,g,m}$ represents the outcome of interest for child i , in GP g , and *mandal* m .

The coefficient on $\text{Adolescence}_{i,g,m}$ captures the effect of being a boy whose mother was exposed to the gender quota system during adolescence, compared to a boy whose mother was exposed to the reform during adulthood.

The coefficient on $\text{Girl}_{i,g,m}$ captures the difference between boys and girls born to mothers exposed to a female *sarpanch* during adulthood. Thus, β_2 represents the gender gap in this control group.

The interaction term $\text{Adolescence}_{i,g,m} * \text{Girl}_{i,g,m}$ represents the effect for a girl whose mother was exposed to gender quotas during adolescence, compared to a boy whose mother was exposed to the same policy during adulthood. The coefficient β_3 is of primary interest as it captures the marginal effect of mothers' exposure to gender quotas during their adolescence on girls. Comparing β_3 to β_2 reveals the differential impact of the timing of exposure to the policy reform on the gender gap.

As in the first stage, we include the same vector of controls $X'_{i,g,m}$, village reservation group dummies, and *mandal* fixed effects ($\theta_{g,m}$). Standard errors remain robust to heteroskedasticity and are clustered at the village level.

3.5 Main results

3.5.1 Mothers' aspirations

We began by examining mothers' aspirations for their children, differentiated by sex. These aspirations—regarding education, employment, and age at marriage—reflect mothers' beliefs, particularly with respect to social norms.

The results presented in Panel A of Table 3.1 indicate that there is no significant difference in mothers' aspirations between children whose mothers were exposed to gender quotas during adolescence and those whose mothers were exposed during adulthood. Thus, if we ignore the child's sex, the timing of mothers' exposure to a female *sarpanch* does not appear to have an impact.

However, Panel B, which includes the child's sex, reveals that mothers exposed to gender quotas during adolescence increased their aspirations for their daughters in terms of education and employment—by 21 and 24 percentage

points, respectively—and the normalized average increased by 0.39 standard deviations compared to mothers of boys exposed during adulthood. This is a notable effect considering that, within the control group (indicated by the "Girl" coefficient), mothers' aspirations for daughters are lower than for sons—by 23 percentage points for education and a decrease of 0.29 standard deviations in the normalized average. In this control group, 80% of mothers aspire for their sons to achieve a high level of education. In contrast, when considering all mothers exposed during adulthood (including mothers of daughters), this percentage drops to 71%, highlighting a significant gender gap in educational aspirations. Thus, the gap in educational aspirations between boys and girls is nearly eliminated when accounting for mothers exposed to gender quotas during adolescence.

Nonetheless, these findings should be nuanced. Mothers exposed to gender quotas during adolescence have relatively lower aspirations for their sons compared to those exposed during adulthood. The differences are approximately 11 and 13 percentage points for aspirations related to higher education and high-skill jobs, respectively, and about 0.29 standard deviations for the normalized average.

Regarding compliance with the legal age of marriage (column 3), we find no significant effect of the timing of mothers' exposure to a female *sarpanch* or its interaction with the child's sex. This result is not surprising, as 95% of mothers exposed during adulthood adhere to the legal marriage age of 18 years for girls and 21 years for boys. Therefore, the implementation of gender quotas has not resulted in imbalances in this regard.

Overall, these findings highlight significant long-term effects of the timing of mothers' exposure to gender quotas on their aspirations. Specifically, mothers exposed during adolescence substantially increased their educational and employment aspirations, particularly for their daughters, thereby reducing the existing educational gender gap.

3.5.2 Children's activities

According to the theory of change, we expect that variations in mothers' aspirations will translate into less gender-biased attitudes toward their children, particularly in the realms of education and labor.

Panel A of Table 3.2 shows no significant differences between children of the two groups considered. However, Panel B reveals notable disparities between boys and girls whose mothers were exposed to gender quotas during adulthood. Specifically, girls are less likely to be enrolled in school and even less likely to attend private institutions compared to boys—by 3 and 19 percentage points, respectively. Additionally, girls are more likely to engage in child labor, particularly domestic chores—by 12 and 16 percentage points, respectively.

The presence of a female *sarpanch* during mothers' adolescence positively impacts girls' school attendance, as indicated by the "Mother exposed during adolescence X Girl" coefficient. Compared to boys whose mothers were exposed to quotas during adulthood, the increase in school enrollment for girls is 5 percentage points, effectively closing the existing gender gap. However, there is no significant improvement in terms of child labor. Notably, boys whose mothers were exposed to gender quotas during adolescence are more likely to perform domestic tasks—by 11 percentage points—compared to their counterparts whose mothers were exposed during adulthood. This suggests that mothers exposed to gender quotas during adolescence may adopt more egalitarian practices, involving boys in domestic tasks more than mothers exposed during adulthood.

Beyond analyzing individual activities, it is also insightful to consider them collectively. Table 3.3 presents results on children's status—whether they are studying only, studying while doing child labor, or engaging in child labor only. Panel A shows no difference between the two groups. However, Panel B reveals gender disparities among children whose mothers were exposed during adulthood. Girls are less likely to be engaged solely in studying—by approximately 13 percentage points—and are more likely to be involved in both studying and child labor—by around 10 percentage points. The exposure of mothers during adolescence does not appear to affect these gender gaps, although girls with mothers exposed during adolescence are less likely to be engaged solely in child labor—by about 4 percentage points—compared to boys whose mothers were exposed in adulthood.

Regarding the intensive margin of children's activities, measured by daily hours spent on each activity, the results in Table 3.4 show no significant differences between the two groups, except for leisure time, which is about 13 minutes less for children whose mothers were exposed to gender quotas during adolescence. However, notable gaps remain between girls and boys whose mothers were exposed to gender quotas during adulthood: nearly 18 minutes less in schooling and 26 minutes more in domestic chores for girls. While the gap in domestic chores remains unchanged, there is a positive shift in the time dedicated to schooling for girls whose mothers were exposed during adolescence. Specifically, compared to boys in the control group, girls experience an increase of nearly 40 minutes in time dedicated to schooling, even if it comes at the expense of leisure time.

Thus, for girls whose mothers were exposed during adolescence, the timing of exposure has significant implications for both the extensive and intensive margins of their educational outcomes. We observe an increase in the duration of schooling and daily time spent studying, as well as a more equitable distribution of household tasks between girls and boys in households where the mother was

exposed to gender quotas during adolescence.

3.5.3 Children’s aspirations

As we observe positive changes in mothers’ aspirations and attitudes—approximated by children’s activities—we also anticipate changes in children’s own aspirations, which may reflect an inter-generational transmission of more egalitarian social norms.

The results presented in Panel A of Table 3.5 indicate no significant effect of the timing of mothers’ exposure on children’s aspirations. However, Panel B reveals differences among children whose mothers were exposed to gender quotas during adulthood. Specifically, girls in the control group exhibit relatively lower aspirations for higher education—by about 12 percentage points—compared to their male counterparts, but higher aspirations for high-skill jobs—by approximately 19 percentage points. For girls whose mothers were exposed to gender quotas during adolescence, there is a notable increase in job aspirations—by 10 percentage points. This effect, however, should be considered in the context of the control group’s averages. In the control group, 75% of children aspire to higher education levels, reflecting generally high aspirations in this area regardless of the timing of exposure to gender quotas. Therefore, it is not surprising that we do not find a significant effect for girls whose mothers were exposed to a female *sarpanch* during adolescence.

Conversely, given that 58% of boys in the control group aspire to high-skill jobs, the observed positive and significant effect on job aspirations for daughters of mothers exposed to gender quotas during adolescence is noteworthy. This finding may indicate a shift in previously entrenched sexist norms.

3.5.4 Heterogeneous effects

We examine potential heterogeneous marginal effects across three dimensions: mothers’ marital status during their exposure to gender quotas, caste, and sibling composition.

Firstly, we are interested in how marital status may influence the effects of gender quotas on entrenched sexist social norms. Specifically, we hypothesize that marriage, even if the mother was exposed to gender quotas during adolescence, could hinder changes in beliefs and attitudes related to traditional gender norms - as "marriage in India is considered as an important social event and is supposed to transmit traditional values across generations"(Biswas and Mukhopadhyay 2018). Since 36% of women exposed to quotas during adolescence were married, incorporating this dimension into our heterogeneity analysis is crucial.

Secondly, higher castes are generally more conservative regarding women's roles within the household (Hoff, Kshetramade, and Fehr 2011). Thus, we anticipate that being from Scheduled Castes (SC) or Scheduled Tribes (ST) might magnify the effects of exposure to gender quotas, highlighting a potential intersectional impact related to caste-based social norms.

Finally, sibling composition is an important factor to consider. Specifically, the presence of at least one brother may reflect the strong son preference prevalent in India (Bhalotra, Chakravarty, and Gulesci 2020; Dhar, Jain, and Jayachandran 2019; Ghani, Mani, and O'Connell 2013), while having at least one older sister could influence domestic responsibilities. In India, the eldest daughter often assumes significant domestic and caregiving responsibilities – "elder daughter syndrome" (Mishra and Singh 2024). Therefore, a daughter who is not the eldest and who has, at least, one brother may experience different effects from the timing of her mother's exposure to gender quotas, potentially amplifying or mitigating the impact of such exposure.

To this end, we estimate the same model presented in Equation 3.2, incorporating each of the three dimensions of heterogeneity independently:

$$\begin{aligned}
 Y_{i,g,m} = & \beta_0 + \beta_1 \text{Adolescence}_{i,g,m} + \beta_2 \text{Girl}_{i,g,m} + \beta_3 \text{Adolescence}_{i,g,m} * \text{Girl}_{i,g,m} \\
 & + \delta_1 \text{Het}_{i,g,m} + \delta_2 \text{Adolescence}_g * \text{Het}_{i,g,m} + \delta_3 \text{Girl}_{i,g,m} * \text{Het}_{i,g,m} \quad (3.3) \\
 & + \delta_4 \text{Adolescence}_{i,g,m} * \text{Girl}_{i,g,m} * \text{Het}_{i,g,m} + \gamma X'_{i,g,m} + \theta_{g,m} + \epsilon_{i,g,m}
 \end{aligned}$$

With $\text{Het}_{i,g,m}$ being a dummy variable equal to 1 if the mother was single during her exposure to a female *sarpanch*, if the child belongs to Scheduled Castes (SC) or Scheduled Tribes (ST), or if the child has at least one brother or one elder sister; and equal to 0 otherwise.

The results reported in Tables 3.6, 3.7, 3.8, and 3.9 reveal no significant heterogeneous effects across the dimensions studied. There is no marginal effect associated with being a SC or ST daughter of a mother exposed to gender quotas during adolescence. This finding also holds for girls with at least one brother.

However, girls whose mothers were exposed to gender quotas during adolescence and who were single at the time of exposure experience an additional marginal effect, particularly in terms of a reduction in child labor—by approximately 6 percentage points. Despite this, the test for equality of coefficients (as indicated by the p -value at the bottom of the table) does not allow us to reject the null hypothesis that the coefficients are the same.

Additionally, girls whose mothers were exposed to gender quotas during adolescence and who have at least one older sister show an increase in aspirations for high-skill jobs—by about 20 percentage points. Nonetheless, the test

for equality of coefficients does not provide sufficient evidence to conclude a significant difference between these coefficients.

Thus, contrary to our initial hypotheses, we cannot identify any significant heterogeneous effects based on the mother’s marital status at the time of exposure, the child’s caste, or the sibling composition.

3.6 Mechanisms

One question that arises is: what explains our results? Is the observed effect linked to a change in mothers’ attitudes toward traditional sexist social norms due to the timing of their exposure to gender quotas, or could it be attributed to other public policies or interventions?

To address these questions, we primarily examined the educational programs available to the families of the children in our study. Our focus on educational programs is twofold: first, due to our main results showing the elimination of the gender gap in school enrollment and time spent on schooling and studying; and second, due to the availability of relevant data in the YLS. Specifically, we analyzed information from the household questionnaire regarding the type of educational support received, which includes assistance with child education and educational support provided by (non-)governmental organizations.

The results presented in Table 3.10 indicate that very few children benefit from these educational programs. Only 6% of children whose mothers were exposed to gender quotas in adulthood receive such support, and this figure drops to 5% for boys alone. Furthermore, children whose mothers were exposed to gender quotas during adolescence receive relatively more support—by approximately two percentage points compared to their counterparts. However, this difference is largely driven by boys, who show a 4 percentage point advantage in support when their mothers were exposed to a female *sarpanch* during adolescence. This finding suggests that the primary results concerning gender inequalities cannot be attributed to the educational programs available to the children in question.

On the other hand, our findings regarding mothers’ aspirations—particularly the significant increase in educational and employment aspirations for girls whose mothers were exposed to gender quotas during adolescence, effectively eliminating the gender gap in higher education—provide substantial evidence of a potential shift in sexist social norms. Nonetheless, we acknowledge the limitation that we could not account for numerous unobservable factors that might also influence these outcomes.

3.7 Conclusion

In contemporary India, girls continue to face less favorable conditions compared to their male counterparts, a disparity that emerges in childhood and is particularly pronounced in parental, particularly maternal, aspirations and attitudes shaped by deep-seated discriminatory social norms. These gender disparities have far-reaching consequences throughout women's lives.

However, even deeply ingrained social norms can be altered through educational interventions or public policies. For such changes to have lasting effects, policymakers must consider the significance of timing in exposure to these interventions, with adolescence appearing to be a particularly critical period.

This paper examines one specific form of public policy: affirmative action in politics, specifically the implementation of gender quotas for leadership positions in village councils. By promoting women into roles traditionally held by men, such policies have the potential to challenge and reshape gender stereotypes, thereby influencing women's self-perceptions, aspirations, and behaviors. More precisely, we investigate whether the timing of mothers' exposure to the gender quota system influences parental aspirations, children's activities, and their future goals. We hypothesize that exposure to gender quotas during adolescence has more pronounced and enduring effects on gender gaps compared to similar exposure in adulthood.

Our findings indicate that mothers exposed to gender quotas during adolescence significantly increase their aspirations for their daughters, effectively closing the gender gap in educational ambitions. This rise in maternal aspirations correlates with higher school enrollment rates and a reduction in the likelihood of girls engaging exclusively in child labor, keeping them in school. Additionally, these girls tend to devote more daily hours to education and aspire to higher-skilled jobs in the future. We found no significant heterogeneous effects related to the mother's marital status during exposure, the child's caste, or sibling composition. Furthermore, the absence of benefits from school programs for girls whose mothers were exposed to a female *sarpanch* during adolescence supports the hypothesis that changes in social norms surrounding gender are closely tied to the timing of mothers' exposure to gender quotas.

Overall, these results underscore the importance of interventions aimed at shaping social norms during adolescence. While our data do not provide insights into the role of fathers in these changes, achieving greater gender equality in Indian society will likely require the involvement of all family members, as suggested by other studies (Dhar, Jain, and Jayachandran 2019; Chzen et al. 2021; Leer et al. 2022). By influencing aspirations and behaviors during adolescence, individuals may contribute to fostering more egalitarian outcomes for future

generations.

3.8 Tables

Main results

Table 3.1: Mothers’ aspirations for their child.

	(1) Higher education	(2) High-skill job	(3) Respect of legal age at marriage	(4) Normalized average
Panel A: First difference				
Mother exposed during adolescence	-0.02 (0.05)	-0.01 (0.05)	-0.03 (0.03)	-0.11 (0.12)
Constant	0.48 (0.53)	1.18 (0.92)	0.93*** (0.30)	0.35 (1.71)
Obs.	961	961	955	955
Mean for control group	0.71	0.69	0.95	0.00
Panel B: Effect on girls				
Mother exposed during adolescence	-0.11* (0.06)	-0.13* (0.07)	-0.02 (0.03)	-0.29* (0.15)
Girl	-0.23*** (0.04)	-0.06 (0.04)	0.01 (0.02)	-0.29*** (0.09)
Mother exposed during adolescence X Girl	0.21*** (0.07)	0.24*** (0.07)	-0.02 (0.03)	0.39** (0.15)
Constant	0.67 (0.51)	1.25 (0.89)	0.92*** (0.30)	0.61 (1.63)
Controls	Yes	Yes	Yes	Yes
Obs.	961	961	955	955
Mean for control group	0.80	0.71	0.95	0.11
p-value Adolescence=Adolescence X Girl	0.003	0.006	0.993	0.013

Source: YLS and Andhra Pradesh State Election Commission data.

Note: Panels A and B present the estimation results, differentiated by whether the child’s sex is included in the analysis. Panel A shows the results without considering the child’s sex, while Panel B incorporates the child’s sex into the estimations. The columns in the tables detail various outcomes related to mothers’ aspirations: higher education (graduate, post-graduate, and post-secondary technological institute levels), high-skill jobs (as classified by the NCO), adherence to the legal age at marriage (18 years for girls and 21 years for boys), and the normalized average of these three variables. The mean values for the control group are provided for each dependent variable. In Panel A, the control group consists of children whose mothers were exposed to gender quotas during adulthood. In Panel B, the control group is comprised of boys whose mothers were exposed to gender quotas during adulthood. Additionally, we report the p-value for testing the significance of the difference between the coefficients for Adolescence and Adolescence X Girl. Standard errors are clustered at the village level and are presented in parentheses. Statistical significance is indicated as follows: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 3.2: Children's activities.

	(1)	(2)	(3)	(4)	(5)	(6)
	Enrolled in school	Private school	Child labor	Domestic work	Family farm	Paid work
Panel A: First difference						
Mother exposed during adolescence	0.01 (0.02)	0.02 (0.04)	0.03 (0.04)	0.06 (0.04)	-0.05 (0.05)	-0.03 (0.02)
Constant	1.35*** (0.26)	0.04 (0.53)	0.31 (0.43)	0.46 (0.46)	1.13* (0.64)	0.07 (0.39)
Obs.	961	961	961	961	603	961
Mean for control group	0.95	0.29	0.64	0.58	0.24	0.14
Panel B: Effect on girls						
Mother exposed during adolescence	-0.02 (0.02)	0.02 (0.05)	0.08 (0.06)	0.11* (0.06)	-0.03 (0.05)	-0.01 (0.03)
Girl	-0.03* (0.02)	-0.19*** (0.02)	0.12*** (0.04)	0.16*** (0.03)	-0.06 (0.04)	-0.01 (0.03)
Mother exposed during adolescence X Girl	0.05** (0.02)	0.03 (0.06)	-0.10 (0.07)	-0.12 (0.07)	-0.02 (0.07)	-0.04 (0.04)
Constant	1.37*** (0.26)	0.17 (0.55)	0.21 (0.42)	0.33 (0.45)	1.15* (0.63)	0.07 (0.40)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	961	961	961	961	603	961
Mean for control group	0.96	0.37	0.59	0.52	0.29	0.15
p-value Adolescence=Adolescence X Girl	0.064	0.844	0.160	0.075	0.877	0.671

Source: YLS and Andhra Pradesh State Election Commission data.

Note: Panels A and B display the estimation results, with Panel A excluding the child's sex from the analysis and Panel B including it. The columns represent various outcomes related to children's activities: school enrollment, enrollment in a private school, engagement in any child labor, involvement in domestic work (including household chores and childcare or eldercare), work on the family farm (unpaid family labor in agriculture), and paid work (any job for which the child is compensated). The mean values for the control group are provided for each dependent variable. In Panel A, the control group consists of children whose mothers were exposed to gender quotas during adulthood. In Panel B, the control group comprises boys whose mothers were exposed to gender quotas during adulthood. We also report the p-value for testing the significance of the difference between the coefficients for Adolescence and Adolescence X Girl. Standard errors, clustered at the village level, are presented in parentheses. Statistical significance is indicated as follows: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 3.3: Children’s status.

	(1) Studying only	(2) Studying and working	(3) Working only
Panel A: First difference			
Mother exposed during adolescence	-0.03 (0.04)	0.04 (0.04)	-0.00 (0.01)
Constant	0.63 (0.44)	0.72 (0.44)	-0.41* (0.24)
Obs.	961	961	961
Mean for control group	0.35	0.59	0.04
Panel B: Effect on girls			
Mother exposed during adolescence	-0.08 (0.06)	0.06 (0.06)	0.02 (0.02)
Girl	-0.13*** (0.04)	0.10*** (0.04)	0.02 (0.01)
Mother exposed during adolescence X Girl	0.12 (0.07)	-0.06 (0.08)	-0.04* (0.02)
Constant	0.73* (0.44)	0.64 (0.44)	-0.43* (0.24)
Controls	Yes	Yes	Yes
Obs.	961	961	961
Mean for control group	0.40	0.56	0.04
P-value Ado=Ado X Girl	0.128	0.317	0.100

Source: YLS and Andhra Pradesh State Election Commission data.

Note: Panels A and B present the estimation results, with Panel A excluding the child’s sex from the analysis and Panel B including it. The columns outline the various outcomes related to children’s status: studying only (enrolled in school and not engaged in any child labor), studying and working (enrolled in school while also engaged in any child labor), and working only (not enrolled in school but involved in child labor). The mean values for the control group are provided for each dependent variable. In Panel A, the control group consists of children whose mothers were exposed to gender quotas during adulthood. In Panel B, the control group includes boys whose mothers were exposed to gender quotas during adulthood. We also report the p-value for testing the significance of the difference between the coefficients for Adolescence and Adolescence X Girl. Standard errors, clustered at the village level, are shown in parentheses. Statistical significance is indicated as follows: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 3.4: Children's time-use.

Daily hours devoted to...	(1)	(2)	(3)	(4)	(5)
	Schooling	Child labor	Domestic work	Sleep	Leisure
Panel A: First difference					
Mother exposed during adolescence	0.04 (0.21)	-0.17 (0.11)	-0.02 (0.09)	-0.08 (0.09)	0.21* (0.11)
Constant	7.81*** (2.81)	-1.48 (1.77)	0.40 (1.16)	9.70*** (1.34)	6.95*** (1.85)
Obs.	959	959	959	959	959
Mean for control group	9.63	0.39	1.01	8.93	4.04
Panel B: Effect on girls					
Mother exposed during adolescence	-0.26 (0.28)	-0.17 (0.13)	-0.12 (0.11)	-0.04 (0.09)	0.54*** (0.19)
Girl	-0.29* (0.17)	-0.08 (0.12)	0.44*** (0.08)	-0.07 (0.08)	-0.01 (0.13)
Mother exposed during adolescence X Girl	0.63** (0.29)	-0.01 (0.16)	0.15 (0.15)	-0.06 (0.13)	-0.63** (0.27)
Constant	8.08*** (2.75)	-1.43 (1.76)	0.13 (1.15)	9.74*** (1.34)	6.87*** (1.80)
Controls	Yes	Yes	Yes	Yes	Yes
Obs.	959	959	959	959	959
Mean for control group	9.73	0.43	0.81	8.95	4.07
p-value Adolescence=Adolescence X Girl	0.093	0.520	0.217	0.937	0.009

Source: YLS and Andhra Pradesh State Election Commission data.

Note: Panels A and B present the estimation results with and without considering the child's sex in the analysis—Panel A excluding the child's sex and Panel B including it. The columns outline the different outcomes related to children's time use: schooling (which includes both time spent at school and studying), child labor (including tasks at the family farm and paid work), domestic work (encompassing domestic chores and caring for others), sleep, and leisure. All outcomes are measured in daily hours. In Panel A, the control group consists of children whose mothers were exposed to gender quotas during adulthood. In Panel B, the control group comprises boys whose mothers were exposed to gender quotas during adulthood. We also report the p-value to test the significance of the difference between the coefficients for Adolescence and Adolescence X Girl. Standard errors, clustered at the village level, are presented in parentheses. Statistical significance is indicated as follows: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 3.5: Children’s aspirations.

	(1) Higher education	(2) High-skill job	(3) Normalized average
Panel A: First difference			
Mother exposed during adolescence	-0.07 (0.06)	-0.01 (0.05)	-0.11 (0.14)
Constant	0.24 (0.51)	0.27 (0.54)	-1.26 (1.19)
Obs.	958	957	957
Mean for control group	0.75	0.67	-0.00
Panel B: Effect on girls			
Mother exposed during adolescence	-0.07 (0.06)	-0.08 (0.06)	-0.20 (0.15)
Girl	-0.12*** (0.03)	0.19*** (0.04)	0.08 (0.08)
Mother exposed during adolescence X Girl	0.02 (0.04)	0.10* (0.06)	0.17 (0.11)
Constant	0.33 (0.52)	0.14 (0.55)	-1.30 (1.21)
Controls	Yes	Yes	Yes
Obs.	958	957	957
Mean for control group	0.80	0.58	-0.04
p-value Adolescence=Adolescence X Girl	0.296	0.077	0.081

Source: YLS and Andhra Pradesh State Election Commission data.

Note: Panels A and B present the estimation results, with Panel A excluding the child’s sex from the analysis and Panel B including it. The columns outline the different outcomes related to children’s aspirations: higher education (graduate, post-graduate, and post-secondary technological institute), high-skill jobs (NCO classification), and the normalized average of these two variables. In Panel A, the control group consists of children whose mothers were exposed to gender quotas during adulthood. In Panel B, the control group is composed of boys whose mothers were exposed to gender quotas during adulthood. We also report the p-value to test the significance of the difference between the coefficients for Adolescence and Adolescence X Girl. Standard errors, clustered at the village level, are provided in parentheses (* p < 0.10, ** p < 0.05, *** p < 0.01).

Table 3.6: Marital Status Heterogeneity

	Higher education	High-skill job	School enrollment	Working only	Time to studying	Time to leisure	High-skill job
Mother exposed during adolescence	-0.06 (0.06)	-0.06 (0.09)	0.03* (0.02)	-0.03 (0.02)	0.23 (0.26)	0.23 (0.24)	-0.02 (0.07)
Girl	-0.24*** (0.04)	-0.08* (0.04)	-0.03* (0.02)	0.02 (0.02)	-0.32* (0.17)	-0.00 (0.13)	0.19*** (0.04)
Mother was single during reservation	-0.25* (0.13)	-0.24* (0.14)	0.01 (0.03)	-0.01 (0.03)	0.62 (0.45)	-0.30 (0.32)	0.10 (0.13)
Girl X Single	0.17 (0.23)	0.40* (0.21)	0.03 (0.03)	-0.02 (0.02)	0.76 (0.72)	-0.18 (0.56)	-0.01 (0.16)
Mother exposed during adolescence X Girl	0.06 (0.08)	0.10 (0.10)	-0.01 (0.03)	0.02 (0.03)	0.12 (0.31)	-0.18 (0.35)	0.00 (0.08)
Adolescence X Single	0.12 (0.13)	0.11 (0.17)	-0.10*** (0.03)	0.08*** (0.03)	-1.10* (0.56)	0.63* (0.38)	-0.13 (0.14)
Adolescence X Single X Girl	0.08 (0.24)	-0.17 (0.25)	0.06* (0.04)	-0.06* (0.03)	0.05 (0.81)	-0.53 (0.62)	0.17 (0.16)
Constant	0.63 (0.50)	1.18 (0.90)	1.35*** (0.26)	-0.41* (0.24)	7.44*** (2.74)	7.26*** (1.75)	0.03 (0.57)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	960	960	960	960	958	958	956
Mean for control group	0.81	0.71	0.96	0.04	9.71	4.09	0.57
P-value Adolescence x Girl= Adolescence x Girl X Single	0.946	0.382	0.223	0.163	0.944	0.673	0.402

Source: YLS and Andhra Pradesh State Election Commission data.

Note: The columns present the significant outcomes identified in our study, where the timing of a mother's exposure to gender quotas has had notable effects on gender inequalities in childhood. These outcomes include mothers' job (NCO classification) and educational (graduate, post-graduate, and post-secondary technological institute) aspirations, school enrollment, working-only status (i.e., not enrolled in school and engaged in any child labor), daily hours devoted to study (school enrollment and studying) and leisure, and children's job aspirations (NCO classification). The control group consists of boys whose mothers were exposed to gender quotas during adulthood. We also provide the p-value to assess the significant difference between the coefficients for Adolescence X Girl and Adolescence X Girl X Single, as we are particularly interested in the heterogeneous effects related to mothers' marital status (celibacy) during exposure to gender quotas. Standard errors, clustered at the village level, are reported in parentheses (* p < 0.10, ** p < 0.05, *** p < 0.01).

Table 3.7: Caste Heterogeneity

	Higher education	High-skill job	Normalized average	Well-being	School enrollment	Working only	Time to studying
Mother exposed during adolescence	-0.06 (0.06)	-0.12 (0.09)	0.01 (0.02)	-0.01 (0.02)	-0.13 (0.36)	0.35 (0.27)	0.02 (0.07)
Girl	-0.19*** (0.06)	-0.09 (0.06)	-0.03 (0.03)	0.02 (0.03)	-0.47 (0.32)	0.05 (0.21)	0.22*** (0.05)
SC/ST	0.07 (0.05)	0.02 (0.06)	0.02 (0.02)	-0.03 (0.02)	-0.22 (0.29)	0.40** (0.19)	0.09 (0.06)
Girl X SC/ST	-0.10 (0.09)	0.05 (0.08)	0.01 (0.04)	0.00 (0.04)	0.43 (0.48)	-0.17 (0.31)	-0.06 (0.09)
Mother exposed during adolescence X Girl	0.16* (0.10)	0.25** (0.11)	0.06 (0.03)	-0.05 (0.04)	0.61 (0.47)	-0.37 (0.34)	0.05 (0.08)
Adolescence X SC/ST	-0.11 (0.08)	-0.01 (0.11)	-0.05 (0.04)	0.04 (0.04)	-0.27 (0.62)	0.44 (0.42)	-0.22*** (0.08)
Adolescence X Girl X SC/ST	0.12 (0.13)	-0.03 (0.15)	-0.01 (0.06)	0.01 (0.07)	0.03 (0.84)	-0.59 (0.57)	0.12 (0.12)
Constant	0.65 (0.51)	1.25 (0.90)	1.37*** (0.26)	-0.42* (0.24)	8.33*** (2.75)	6.48*** (1.74)	0.12 (0.55)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	961	961	961	961	959	959	957
Mean for control group	0.76	0.67	0.95	0.05	9.67	3.90	0.52
P-value Adolescence x Girl= Adolescence x Girl X SC/ST	0.827	0.241	0.483	0.569	0.648	0.796	0.715

Source: YLS and Andhra Pradesh State Election Commission data.

Note: The columns display the significant outcomes from our study, where the timing of a mother’s exposure to gender quotas has shown notable effects on gender inequalities in childhood. These outcomes include mothers’ job (NCO classification) and educational (graduate, post-graduate, and post-secondary technological institute) aspirations, school enrollment, working-only status (i.e., not enrolled in school and engaged in any child labor), daily hours devoted to study (enrollment and studying) and leisure, and children’s job aspirations (NCO classification). The mean values for the control group—boys whose mothers were exposed to gender quotas during adulthood—serve as benchmarks for each dependent variable. We also report the p-values to test the significant difference between the coefficients for Adolescence X Girl and Adolescence X Girl X SC/ST, focusing on the heterogeneous effects related to caste (Scheduled Castes/Scheduled Tribes). Standard errors, clustered at the village level, are presented in parentheses (* p < 0.10, ** p < 0.05, *** p < 0.01).

Table 3.8: Brother(s) Heterogeneity

	Higher education	High-skill job	School enrollment	Working only	Time to studying	Time to leisure	High-skill job
Mother exposed during adolescence	-0.16** (0.06)	-0.19** (0.08)	-0.05* (0.03)	0.04 (0.03)	-0.70 (0.48)	0.83*** (0.29)	-0.10 (0.08)
Girl	-0.30*** (0.06)	-0.12* (0.06)	-0.03 (0.02)	0.03 (0.02)	-0.33 (0.34)	-0.16 (0.19)	0.17*** (0.06)
At least one brother	-0.07* (0.04)	-0.06 (0.07)	-0.01 (0.02)	0.01 (0.02)	-0.23 (0.32)	-0.19 (0.17)	0.01 (0.06)
Girl X Brother(s)	0.10 (0.08)	0.09 (0.09)	0.01 (0.03)	-0.02 (0.03)	0.06 (0.40)	0.23 (0.23)	0.04 (0.08)
Mother exposed during adolescence X Girl	0.25*** (0.09)	0.33*** (0.09)	0.09** (0.04)	-0.08** (0.04)	0.94* (0.54)	-0.90** (0.38)	0.18** (0.09)
Adolescence X Brother(s)	0.08 (0.07)	0.12 (0.08)	0.06* (0.04)	-0.04 (0.03)	0.78 (0.50)	-0.55* (0.30)	0.04 (0.10)
Adolescence X Girl X Brother(s)	-0.06 (0.11)	-0.15 (0.12)	-0.06 (0.05)	0.06 (0.05)	-0.57 (0.63)	0.53 (0.43)	-0.13 (0.13)
Constant	0.69 (0.50)	1.23 (0.87)	1.35*** (0.26)	-0.41* (0.24)	7.84*** (2.77)	7.38*** (1.89)	0.09 (0.56)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	961	961	961	961	959	959	957
Mean for control group	0.76	0.67	0.95	0.05	9.67	3.90	0.52
P-value Adolescence x Girl= Adolescence x Girl X Brother(s)	0.110	0.012	0.084	0.103	0.183	0.062	0.132

Source: YLS and Andhra Pradesh State Election Commission data.

Note: The columns present the significant outcomes identified in our study, where the timing of a mother's exposure to gender quotas impacts gender inequalities in childhood. These outcomes include mothers' job aspirations (NCO classification) and educational aspirations (graduate, post-graduate, and post-secondary technological institute), school enrollment, working-only status (i.e., not enrolled in school and engaged in any child labor), daily hours devoted to studying (enrollment and studying) and leisure, and children's job aspirations (NCO classification). The mean values for the control group—boys whose mothers were exposed to gender quotas during adulthood—are used as benchmarks for each dependent variable. We also report the p-values to test the significant difference between the coefficients for Adolescence X Girl and Adolescence X Girl X Brother(s), focusing on the heterogeneous effects related to sibling composition, specifically the presence of at least one brother. Standard errors, clustered at the village level, are shown in parentheses (* p < 0.10, ** p < 0.05, *** p < 0.01).

Table 3.9: Older Sister(s) Heterogeneity

	Higher education	High-skill job	School enrollment	Working only	Time to studying	Time to leisure	High-skill job
Mother exposed during adolescence	-0.07 (0.06)	-0.13* (0.07)	-0.02 (0.03)	0.02 (0.02)	-0.18 (0.30)	0.39* (0.21)	-0.07 (0.07)
Girl	-0.21*** (0.05)	-0.07 (0.05)	-0.04* (0.02)	0.03* (0.02)	-0.35* (0.21)	-0.16 (0.14)	0.23*** (0.05)
At least one older sister	0.05 (0.04)	0.00 (0.05)	-0.02 (0.02)	0.02 (0.02)	-0.01 (0.21)	-0.15 (0.19)	-0.04 (0.05)
Girl X Older Sister(s)	-0.04 (0.06)	0.01 (0.07)	0.03 (0.04)	-0.03 (0.04)	0.13 (0.39)	0.37 (0.25)	-0.10 (0.07)
Mother exposed during adolescence X Girl	0.19** (0.07)	0.24*** (0.09)	0.07* (0.04)	-0.06** (0.03)	0.76** (0.32)	-0.46 (0.29)	0.04 (0.07)
Adolescence X Older Sister(s)	-0.10 (0.08)	0.01 (0.09)	-0.01 (0.05)	-0.01 (0.04)	-0.31 (0.50)	0.47 (0.41)	-0.08 (0.10)
Adolescence X Girl X Older Sister(s)	0.06 (0.12)	-0.02 (0.11)	-0.03 (0.07)	0.06 (0.06)	-0.34 (0.66)	-0.49 (0.57)	0.20* (0.12)
Constant	0.63 (0.51)	1.25 (0.89)	1.39*** (0.26)	-0.45* (0.24)	8.16*** (2.75)	6.87*** (1.87)	0.22 (0.55)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	961	961	961	961	959	959	957
Mean for control group	0.76	0.67	0.95	0.05	9.67	3.90	0.52
P-value Adolescence x Girl= Adolescence x Girl X Older Sister(s)	0.438	0.151	0.333	0.180	0.194	0.971	0.353

Source: YLS and Andhra Pradesh State Election Commission data.

Note: The columns present significant outcomes from our study, which examines how the timing of a mother's exposure to gender quotas affects gender inequalities in childhood. These outcomes include: mothers' job aspirations (NCO classification), educational aspirations (graduate, post-graduate, and post-secondary technological institute), school enrollment, working-only status (i.e., not enrolled in school and engaged in any form of child labor), daily hours devoted to studying (including school enrollment and studying) and leisure, and children's job aspirations (NCO classification). The mean values for the control group—boys whose mothers were exposed to gender quotas during adulthood—serve as the benchmark for each dependent variable. We also report the p-values for the significance of differences between the coefficients for Adolescence X Girl and Adolescence X Girl X Older Sister(s), focusing on heterogeneous effects related to sibling composition, specifically the presence of at least one elder sister. Standard errors, clustered at the village level, are shown in parentheses (* p < 0.10, ** p < 0.05, *** p < 0.01).

Table 3.10: Programmes.

	(1) Educational support from (N)GOs
Panel A: First difference	
Mother exposed during adolescence	0.02* (0.01)
Constant	0.53** (0.25)
Obs.	961
Mean for control group	0.06
Panel B: Effect on girls	
Mother exposed during adolescence	0.04* (0.02)
Girl	0.03* (0.01)
Mother exposed during adolescence X Girl	-0.04 (0.03)
Constant	0.51** (0.25)
Controls	Yes
Obs.	961
Mean for control group	0.05
p-value Adolescence=Adolescence X Girl	0.134

Source: YLS and Andhra Pradesh State Election Commission data.
 Note: Panels A and B display the estimation results, considering whether the child's sex is included in the analysis—Panel A without considering the child's sex and Panel B with it. Column (1) focuses on the outcome related to educational support programs provided by (non-)governmental organizations (NGOs). The mean for the control group is derived from the values for each dependent variable. In Panel A, the control group consists of children whose mothers were exposed to gender quotas during adulthood, while in Panel B, the control group is comprised of boys whose mothers were exposed during adulthood. We also report the p-value to test the significant difference between the coefficients for Adolescence and Adolescence X Girl. Standard errors, clustered at the village level, are presented in parentheses (* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$).

3.9 Appendix

Descriptive statistics

Table 3.11: Comparison of GPs with and without electoral data in 2002. Village-level characteristics.

	Without Electoral Data			With Electoral Data			Diff
	n	mean	sd	n	mean	sd	
Total land area in the village	26	2393.49	2400.78	51	1284.17	1088.71	1,109.316**
Total arable land in the village	25	1342.92	1203.44	49	873.14	627.60	469.784*
Total irrigated land in the village	23	379.26	788.48	46	297.51	211.33	81.754
Total population	26	2020.88	1583.11	52	1644.29	1090.42	376.596
Distance to the district/regional capital (in kms)	27	81.22	32.18	52	67.06	36.55	14.165*
Hindi one of the most widely spoken languages	27	0.59	0.50	55	0.51	0.50	0.084
Marathi one of the most widely spoken languages	27	0.33	0.48	55	0.24	0.43	0.097
BC the largest ethnic group	27	0.67	0.48	55	0.53	0.50	0.139
SC/ST the largest ethnic group	27	0.19	0.40	55	0.35	0.48	-0.160
Christians one of the major religious group	27	0.48	0.51	55	0.38	0.49	0.100
Muslims one of the major religious group	27	0.52	0.51	55	0.45	0.50	0.064
Handicrafts one of the main economic activities	27	0.19	0.40	55	0.24	0.43	-0.051
Construction one of the main economic activities	27	0.22	0.42	55	0.40	0.49	-0.178*
Trade one of the main economic activities	27	0.74	0.45	55	0.42	0.50	0.323***
Average number of adult women in the household	27	1.79	0.33	55	1.79	0.34	-0.002
Average number of girls aged 1-7 in the household	27	1.17	0.56	55	1.02	0.57	0.151

Source: YLS and Andhra Pradesh State Election Commission data.

Note: * p < 0.10, ** p < 0.05, *** p < 0.01.

Table 3.12: Comparison of GPs with and without electoral data in 2002. Individual- and household-level characteristics.

	Without Electoral Data			With Electoral Data			Diff
	n	mean	sd	n	mean	sd	
Male child	497	0.53	0.50	1004	0.54	0.50	-0.007
Child’s age (in months)	497	11.92	3.56	1004	11.85	3.47	0.074
Age of biological mother	495	23.34	4.42	996	23.64	4.40	-0.296
Mother’s ethnicity (BC)	497	0.55	0.50	1004	0.44	0.50	0.114
Mother’s ethnicity (SC)	497	0.22	0.41	1004	0.20	0.40	0.013
Mother’s ethnicity (ST)	497	0.10	0.30	1004	0.22	0.41	-0.122**
Household head completed primary	496	0.32	0.47	1002	0.30	0.46	0.020
Highest grade mother completed in school	497	2.40	3.69	1004	1.92	3.50	0.479
Having a sibling aged between 1 and 7 years	497	0.40	0.49	1004	0.37	0.48	0.024

Source: YLS and Andhra Pradesh State Election Commission data.

Note: * p < 0.10, ** p < 0.05, *** p < 0.01.

Table 3.13: Child- and household-level characteristics in 2012 - Mother's exposure during adolescence VS adulthood.

	Adolescence			Adulthood			Diff
	n	mean	sd	n	mean	sd	
Male	341	0.51	0.50	656	0.55	0.50	-0.042
Child's age	341	144.14	3.75	656	143.29	3.95	0.845**
Firstborn	341	0.70	0.46	656	0.46	0.50	0.235***
BC	341	0.40	0.49	656	0.45	0.50	-0.055
SC	341	0.20	0.40	656	0.21	0.41	-0.005
ST	341	0.23	0.42	656	0.21	0.41	0.021
Hindu	341	0.91	0.28	656	0.95	0.22	-0.035
Christian	341	0.07	0.25	656	0.03	0.16	0.040*
Muslim	341	0.01	0.11	656	0.02	0.12	-0.004
Buddhist	341	0.00	0.05	656	0.01	0.09	-0.005
# of household members	331	6.87	3.09	634	7.28	3.20	-0.409
Highest grade mother completed	341	2.50	3.87	656	1.63	3.27	0.873***
Male household head	341	0.91	0.28	656	0.91	0.28	0.003
Household head completed primary	340	0.38	0.49	655	0.27	0.44	0.112***
Household wealth score	331	0.55	0.17	634	0.53	0.16	0.013
Living in a GP reserved in 2006-13	341	0.78	0.41	656	0.10	0.30	0.679***
Living in a GP reserved in 2006-13	341	0.22	0.41	656	0.26	0.44	-0.041
Living in a GP reserved in 2006-13	341	0.00	0.05	656	0.64	0.48	-0.639***

Source: YLS and Andhra Pradesh State Election Commission data.

Note: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

GENDER GAPS IN SCHOOLING: TO WHAT EXTENT DO LOCAL INSTITUTIONS MATTER?^{*}

4.1 Introduction

Gender gaps in schooling have been extensively studied across various contexts in developing countries. Evidence suggests that globally, gender disparities in school enrollment have narrowed, and this is similarly the case in India.

Indeed, according to UNESCO, in India, the difference between girls' and boys' gross primary school enrollment decreased from 7 percentage points in 2000 to 0 in 2021—indicating no difference between girls and boys (102% for each gender). However, this progress in reducing gender inequality in education has been uneven across age cohorts. For instance, in 2021, the gender gap in gross secondary enrollment remained at 4 percentage points.

The question of what factors contributed to this progress is particularly important and has been extensively studied. Following Deaton (1997), a large body of literature has emerged that evaluates gender bias within households,

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often using models of intra-household expenditure on various goods, including education (Subramanian and Deaton 1990; Lancaster, Maitra, and Ray 2003; Kingdon 2005). However, as Kingdon (2005) summarizes, the results from these studies are not comparable due to differences in data sources and methodologies, leading to diverging conclusions regarding the existence of gender bias in education. In this paper, we take a different approach to examining educational gender inequalities, focusing instead on the role of village-level factors.

The hypothesis we aim to test is whether place of residence and its characteristics affect gender inequalities and thus may help explain the recent progress observed in this area. For example, the availability of village infrastructure, such as schools, may allow girls to stay in school longer by addressing concerns about their physical safety, particularly for adolescent girls.

To our knowledge, the vast literature on gender gaps in schooling does not explicitly explore this question. Hence, our study is one of the first to illustrate the role of village-level factors in educational gender disparities across different age cohorts. Using data from the India Human Development Survey (IHDS)—a nationally representative and longitudinal dataset—we examine the effects of community-level variables²⁵ on gender gaps in schooling, both in 2005 and 2012²⁶. Moreover, since factors influencing gender disparities in education are likely age-specific, we conduct separate analyses by age cohort. For example, while most villages may have primary schools, middle or secondary schools may be less prevalent. Consequently, transportation challenges or concerns about harassment may disproportionately affect older girls relative to boys in the same age group, as well as compared to younger girls.

Our focus on village factors is motivated by a subset of the literature on the gender earnings gap. The study by Meng (2004) is a benchmark in this field, using the Oaxaca-Blinder (OB) decomposition to assess the contribution of explained and unexplained factors to the gender pay gap in Australian firms. The novelty of her work lies in extending the OB methodology to incorporate firm fixed effects, finding that firm-specific policies are associated with a significant narrowing of the gender earnings gap. In a similar vein, Meng and Meurs (2004) compare Australia and France, revealing that firm fixed effects play a more substantial role in narrowing gender earnings gaps in Australia than in France. Moreover, Nordman and Wolff (2009) use matched employer-employee data for Morocco to examine the determinants of within-firm gender earnings disparities, while Hilger, Nordman, and Sarr (2022) extend this methodology to study the difference in access to formal employment using matched data for Bangladesh.

25. For the remainder of this paper, the terms community and village are used interchangeably to refer to the place of residence.

26. At the time of writing, the third round of IHDS is being conducted, but our analysis is limited to data up until 2012.

This literature inspires us to utilize “local area fixed effects” as a proxy for community-level factors. Accordingly, we first estimate determinants of years of education separately for boys and girls, accounting for individual and household characteristics, while including village fixed effects. These regressions are run separately by age cohort: 6-19 (overall sample), 6-9, 10-12, 13-15, and 16-19. We then retrieve the fixed effects from the boy and girl estimates and regress the gender difference in fixed effects on a range of community-level characteristics. The second-stage estimates allow us to identify the role of village factors in explaining educational gender inequalities.

Our analysis focuses on rural households for two primary reasons. First, the majority of India’s population resides in rural areas. Second, all the community variables we employ (detailed below)—related to infrastructure, social environment, media exposure, etc.—are derived from questions specifically designed for rural settings.

Our analysis underscores the critical influence of village-level determinants in mitigating gender disparities in educational attainment. Although the relative significance of these determinants varies across different age cohorts and survey years (2005 and 2012), several key indicators emerge as particularly salient. These include improvements in infrastructure, the prevailing social environment, media exposure, and, to a lesser extent, the adoption of LPG for cooking. Given the observable trend of diminishing gender gaps in schooling over time, our findings suggest that factors beyond the private household sphere are essential in promoting gender parity in education. These results highlight the need for policy interventions at the community level to complement household-based efforts in achieving equitable educational outcomes.

The remainder of this paper is organized as follows: Sections 4.2 and 4.3 present the data and methodology used in the study. Section 4.4 provides descriptive statistics, followed by Section 4.5, which presents our findings. Finally, Section 4.6 concludes the paper.

4.2 Data

4.2.1 Sample

In this paper, we use unit-level data from the *India Human Development Survey* (IHDS), a nationally representative longitudinal survey coordinated by researchers from the University of Maryland and the National Council of Applied Economic Research (NCAER) in New Delhi. Currently, there are two publicly available waves of the survey. The first wave (IHDS-I) was conducted between 2004 and 2005, and the second wave (IHDS-II) took place between 2011 and 2012. In IHDS-I, a total of 41,554 households across 1,503 villages and 971 urban neighborhoods in India were surveyed. The IHDS data form a unbalanced panel, as 85% of the households from IHDS-I were re-interviewed in IHDS-II, with new households added, bringing the total to 42,152 households from 1,420 villages and 1,042 urban neighborhoods in the second wave.

Our analysis sample includes rural children aged between 6 and 19 from both survey rounds. We use the two cross-sections of IHDS data separately. Combining data from both rounds (2005 and 2012), we obtain a total of 83,786 rural children aged 6 to 19 years—45,523 observations for 2005 and 38,263 for 2012. By age category, this sample includes 23,734 children aged 6 to 9, 19,633 children aged 10 to 12, 18,553 children aged 13 to 15, and 21,866 children aged 16 to 19.

4.2.2 Variables

Our main variable of interest is *years of education* for all individuals aged 6 to 19—representing the school-going age. This is regressed on a set of individual- and household-level characteristics, commonly employed in the literature. At the individual level, we consider *age*, further broken down by four age cohorts (6-9; 10-12; 13-15; 16-19). At the household level, we include *social group* (i.e., caste/tribe) and *religion* (Hindu, Muslim, or Other). Additionally, we account for household composition-related variables: the *age* and *sex* of household members, along with characteristics of the head of household, including their *sex* and *years of education*. To capture the economic status of the household, we incorporate *annual per capita consumption* and the household's *primary source of income* (agriculture, salaried agricultural, salaried non-agricultural, crafts, petty trade, organized trade, salaried/professional, and others).

Since our focus is primarily on the role of community factors, we categorize village-level characteristics into four groups: infrastructure, social environment, media exposure, and factors related to household domestic tasks.

- **Infrastructure:** Variables include the *distance* (in kilometers) to all (public and private) educational institutions (primary, middle, secondary, and higher secondary schools), *village accessibility by road*, and the *percentage of households with access to electricity* in the village.
- **Social Environment:** On the one hand, we include school-related variables such as *confidence in the quality of educational institutions* and the *school social network*—i.e., knowing at least one person who works at an educational institution. On the other hand, we include household subjective perceptions on *inter-caste conflicts* and *risk of girls' harassment*²⁷.
- **Media Exposure:** We consider the percentage of men and women who are (sometimes or regularly) exposed to three media types: *newspapers*, *radio*, and *television*²⁸.
- **Domestic Tasks:** We incorporate proxies for gender norms at the community level, including the *average daily time spent by girls and boys* (independently) in collecting water. Additionally, we include the *percentage of households employing domestic help* for household chores and the *percentage of households using liquefied petroleum gas (LPG)* for cooking.

4.3 Estimation Strategy

To analyze the role of community variables in educational gender inequalities, we employ a methodology initially developed for studying gender pay gaps within firms (Meng 2004; Meng and Meurs 2004; Nordman and Wolff 2009), which has also been applied more recently to other fields, such as job access in Hilger, Nordman, and Sarr (2022).

This approach involves a two-stage process. In the first stage, we estimate the determinants of *years of education* for boys and girls independently, for each wave (2005 and 2012) separately, using individual- and household-level factors as explanatory variables, while including village-level fixed effects. These village fixed effects serve as a proxy for community effects.

In the second stage, we regress the gender gaps in community effects—defined as the difference between the fixed effects obtained from the "boy" and "girl" regressions in the first stage—on a set of village-level characteristics.

27. All these variables are sourced from the household questionnaire. To transform them into community-level measures, we calculate the average of these variables across households in each village to obtain a village-level percentage.

28. Unfortunately, exposure to the Internet is not available in the IHDS questionnaire. However, internet access in rural areas is very limited—less than 1% of households in 2005 and less than 7% in 2012, according to the Internet and Mobile Association of India.

Hence, we estimate the following equations:

First stage:

$$educ_{ijs}^g = \beta_i^g X_i + \delta_s^g S_s + \theta_j^g + \epsilon_{ijs}^g \quad (4.1)$$

$$educ_{ijs}^b = \beta_i^b X_i + \delta_s^b S_s + \theta_j^b + \epsilon_{ijs}^b \quad (4.2)$$

Where *educ* refers to the number of years of education for each child, with *g* referring to girls and *b* referring to boys, living in household *i*, in village *j*, and in state *s*. Note that we use the normalized value of years of education with respect to the average education in village *j*. In other words, for each child, we consider his/her years of education relative to the village average.

X_i is the vector of individual- and household-level characteristics. As mentioned above, X includes the child's age, caste/tribe, and religion, along with household composition (by age and sex), characteristics of the household head (sex and education level), and household socioeconomic status characteristics (household's primary source of occupation, log of annual per capita expenditure, and its square). We also control for the state of residence, S_s .

θ is the variable capturing community effects for village *j*, and ϵ_{ijs}^g and ϵ_{ijs}^b represents the random error terms for child (*g, b*) in household *i*, residing in village *j*, in state *s*.

Second stage:

As mentioned earlier, we retrieve the community fixed effects from equations (1) and (2) (θ). In this second stage, we regress the difference in fixed effects between boys and girls, by age cohort, on community factors, as shown in the following equation:

$$(\theta_b^j - \theta_g^j) = \gamma_j Z_{ij} + \mu_j \quad (4.3)$$

The Z variables, described in more detail in the previous section (2.2), can be summarized into four categories reflecting village factors: infrastructure, social environment, media exposure, and household domestic tasks.

4.4 Descriptive statistics

4.4.1 Individual and household-level determinants of years of education: X-variables

4.4.1.1 Children and their household composition

All individual- and household-level characteristics descriptive statistics, for both 2005 and 2012, can be found in Tables 4.1, 4.7, 4.8, 4.9, and 4.10²⁹.

Of the 83,786 children aged between 6 and 19 years, 48% are girls across both rounds and all age categories, except for the 16-19 age cohort, where the proportion of girls in 2012 is approximately 51% (Table 4.10). The distribution of each age category is fairly consistent at around 25% across both rounds.

Years of education increased notably between 2005 and 2012, from an average of 4.5 years to 5.3 years. Notably, children between the ages of 13 and 19 benefited from a larger increase in their educational attainment. For children aged 13-15, years of education increased from 5.9 to 6.9 years, while for those aged 16-19, the increase was from 6.9 to 8.4 years.

Regarding household gender composition, there is minimal variation across age categories (0-4, 5-9, 10-14, 15-19, 20-24, 25-60, 61+) and between the sexes. This consistency indicates that household composition remained largely unchanged between 2005 and 2012. Concerning the characteristics of household heads, between 4% and 7% of the children in our sample lived in female-headed households, with this figure increasing to 8% for the 16-19 age cohort in 2012. The average education level of household heads ranged from 4 to 4.4 years during this period.

4.4.1.2 Social Groups

India's caste system consists of thousands of units known as "jatis". Broadly, there are three primary groups: the Scheduled Castes (SCs), or Dalits, a collection of jatis historically subject to the stigmatizing practice of untouchability, traditionally located at the bottom of the social hierarchy. Distinct from the caste system, there are numerous aboriginal tribal groups categorized under Scheduled Tribes (STs), also known as Adivasis, meaning original inhabitants. The third group is composed of intermediate castes and communities known as the Other Backward Classes (OBCs), which are lower in the social hierarchy but do not face the stigma of untouchability. Among Hindus, those who do not belong to any of these groups are referred to as upper-caste Hindus, who are typically the most socioeconomically advantaged.

²⁹. Tables by age cohort are provided in the appendix.

In our dataset, the OBC category is the largest, comprising approximately 40% in 2005 and 41.5% in 2012. SCs make up around 22% to 23% in both years, while STs constitute roughly 11%.

4.4.1.3 Socioeconomic Status Characteristics

Significant changes in socioeconomic status (*i.e.*, household wealth and primary source of income) were observed between 2005 and 2012. Annual per capita consumption, measured in log terms, increased from 8.75 to 12.11 for all households. The proportion of households primarily deriving their income from farming remained stable at 38% between 2005 and 2012. However, the share of households engaged in wage labor in the non-agricultural sector increased from 17% to 24%, while those relying on wage labor in the agricultural sector declined from 18% to 13% over the same period.

4.4.2 Determinants of Community Effects: Z-variables

All descriptive statistics pertaining to community variables for both 2005 and 2012 are presented in Table 4.2. These variables are categorized into four domains: infrastructure, social environment, media exposure, and household domestic tasks.

First, infrastructure variables exhibit improvement between 2005 and 2012. The average distance to primary, middle, and secondary schools decreased from approximately 700 meters to 400 meters, from 1.2 kilometers to 800 meters, and from 3.6 kilometers to 3.3 kilometers, respectively. However, the distance to higher secondary schools remained relatively unchanged. Additionally, village connectivity improved, with the proportion of households residing in road-accessible villages increasing from 94% in 2005 to nearly 99% in 2012. Similarly, the percentage of households with electricity rose from 66% in 2005 to 79% in 2012.

The indicators related to the social environment can be disaggregated into schooling and security variables. Schooling variables include the percentage of households with confidence in schools and the percentage of households who know at least one person working in school institutions. For security variables, the focus is on the percentage of households reporting *jatis* conflicts or concerns about girls' harassment. Confidence in schools improved significantly between 2005 and 2012, rising from 67% to 86%. However, the proportion of households with a social connection to school personnel declined from 40% to 35%. In terms of security, households' perception of social conflict deteriorated, with reports of *jatis* conflict increasing from 32% to 44%, and concerns about girls' harassment rising from 12% to 19% over the same period.

Regarding media exposure, trends differ across the three types of media considered: radio, newspaper, and television. Radio exposure declined significantly between the two IHDS waves, with male listenership falling from 50.3% to 27.2% and female listenership from 39.5% to 19.4%. In contrast, newspaper readership and television viewership increased. Among men, the proportion of newspaper readers rose from 39% to 45%, while television viewership grew from 27% to 37%. For women, these figures rose from 18% to 20% and from 31% to 43%, respectively, between 2005 and 2012.

In terms of household domestic tasks, there was little change in the time girls spent collecting water daily, with averages of 10.4 minutes in 2005 and 10.9 minutes in 2012. Boys' time on this task, however, increased from 5.2 minutes to 7.8 minutes over the same period. Additionally, the proportion of households employing domestic help decreased, while the use of LPG for cooking rose significantly, from 5% in 2005 to 13% in 2012.

4.5 Results

4.5.1 Stage 1: Child- and household level determinants of sex gaps in community effects

In line with the empirical strategy outlined in Section 3, we begin by estimating Equations (1) and (2) to identify the determinants of the *normalized* years of education, regressing it on individual and household characteristics. The dependent variable is defined as the difference between a child's years of schooling and the average years of schooling in their village of residence. For the remainder of this paper, we refer to this variable simply as "years of education". The regression is conducted for all children aged 6–19, as well as separately for the following age cohorts: 6–9, 10–12, 13–15, and 16–19. Estimates for each age category are derived in a consistent manner. This analysis is performed separately for both the 2005 and 2012 waves.

For each wave (2005 and 2012), we generate five tables, each corresponding to a different age category. Each table contains two columns, distinguishing results by the sex of the child. Since the first-stage results are not the primary focus of this paper, they are presented in the Appendix in Tables 4.11 to 4.20, accompanied by a brief discussion³⁰.

30. In summary, our findings align with the existing literature. Factors such as the child's age, household composition—specifically, the presence of women, the sex of the household head (female), the head's education level—and household wealth positively influence the number of years of education. On the other hand, caste, religion, and the presence of young and school-age children, regardless of sex, negatively affect schooling duration, with differentiated impacts by

4.5.2 Stage 2: Village-level determinants of sex gaps in community effects

The second stage of the analysis presents the estimates for the regressions specified in Equation (3). As outlined in the section dedicated to the empirical strategy, this equation regresses the difference between boys and girls in the community fixed effects—denoted as $\theta_b^j - \theta_g^j$, derived from the regressions in Equations (1) and (2)—on a set of predictors (infrastructure, social environment, exposure to media, and household-related domestic tasks). Therefore, while the first stage constitutes an intra-village analysis, the second stage can be interpreted as an inter-village analysis of the gender gap in years of education.

The interpretation of the results hinges on the sign and significance of the community-level variables. Regardless of the direction of the dependent variable, which reflects the difference in community fixed effects between boys and girls, a community-level factor with a negative and statistically significant coefficient is indicative of a reduction in educational gender inequalities. Conversely, a positive and significant coefficient suggests that the factor exacerbates these gender disparities.

4.5.2.1 Results for 2005

Table 4.3 demonstrates that the mean of the dependent variable is negative for the overall sample, as well as for children aged 6-9 and 10-12 years, while it is positive for the two older age cohorts (*i.e.*, teenagers): 13-15 and 16-19 years. For all children, as well as those in the 6-9 and 10-12 year age groups, this implies a relative advantage for girls over boys in terms of community fixed effects on schooling duration, and by extension, on educational gender inequalities. In contrast, for teenagers (aged 13 to 19), the interpretation reverses, suggesting an advantage for boys.

For the full sample, the results of the second-stage estimation—*cf.* Table 4.3—highlight the significant influence of media exposure and the social environment. Specifically, an increase in the proportion of men reading newspapers, as well as the proportion of households reporting harassment of girls, are identified as factors that positively impact the relative advantage of girls in terms of community fixed effects, thereby contributing to the reduction of educational gender inequality to some extent.

This latter result is predominantly driven by the 10-12 age cohort, where we also find a negative and significant effect on the gender gap in community fixed effects. Furthermore, within this cohort, another social environment vari-

gender.

able—namely, the proportion of households expressing confidence in school quality—emerges as significant. This effect of school confidence is also observed among children in the 6-9 age cohort. Additionally, for the 10-12 age cohort, the percentage of households with access to electricity is found to be a significant factor, while road access to villages does not show the same relevance. Thus, both the perceived quality of education and the time saved on domestic tasks—linked to household electricity access—are identified as positive factors in reducing gender inequalities in education. However, improved road access to villages seems to reduce the advantage of girls over boys in terms of the effect of community fixed factors on schooling duration. This finding may be explained by heightened security risks for girls associated with better village connectivity.

As previously noted, for children aged 13-15 and 16-19, we observe a positive sex gap in community fixed effects. In these two age categories, media exposure—particularly through newspaper readership—appears to reduce the sex gap, slightly favoring boys in terms of their schooling duration. Additionally, for the 16-19 age cohort, the presence of parental social networks within educational institutions (e.g., knowing at least one person in the institution) ensures greater security and trust, thereby contributing to a reduction in the educational gender gap.

For the year 2005, the findings underscore the importance of community-level factors such as infrastructure (road accessibility, percentage of households with access to electricity), the social environment (risks of girls' harassment, confidence in teaching quality, and school-related social networks), and media exposure (primarily through newspapers) in shaping educational gender inequalities. However, significant variations are observed across age cohorts. Specifically, for younger cohorts, infrastructure and the social environment exert a more prominent influence on educational gender inequalities, whereas for older cohorts, media exposure appears to play a more decisive role.

4.5.2.2 Results for 2012

In 2012, as indicated in Table 4.4, we first observe that the mean of the dependent variable is negative across all age categories. This suggests that village-level characteristics generally provide a greater advantage for girls than for boys in terms of community fixed effects on education, unlike in 2005, when this relative advantage for girls was observed only for those under the age of 12.

As in 2005, the roles of social environment, media exposure, and infrastructure remained significant in 2012. However, we also observe an influence from a variable related to domestic chores: the use of LPG for cooking.

For the overall sample, as well as for children aged 10-12 and 16-19, the social environment variables exert a negative influence on the gender gap in

community fixed effects, favoring girls. However, the relevance of specific social environment variables differs by age group. For the full sample (aged 6-19), parental confidence in the quality of educational institutions is the crucial factor. For children aged 10-12, the proportion of households reporting conflicts among *jatis* within the village becomes important. Meanwhile, for the 16-19 age group, the proportion of households declaring a risk of girls' harassment is the key factor influencing the gender gap.

In terms of media exposure, villages where women are relatively more likely to read newspapers and watch television programs exhibit a wider gender gap in community fixed effects, enhancing the relative advantage of girls over boys in terms of schooling duration.

Regarding infrastructure, village connectivity (road access) and proximity to middle schools, as in 2005, are particularly important. For the 10-12 age cohort, greater road access to villages reduces the relative advantage of girls in terms of community fixed effects on schooling duration. A similar pattern is observed for the 13-15 age cohort with respect to the distance to secondary schools.

Among the domestic chores-related variables, the proportion of households using LPG for cooking is associated with an increase in the gender gap in community fixed effects, once again favoring girls. Specifically, as the use of LPG for cooking increases, it benefits girls' schooling duration. This finding is analogous to the role electricity played in 2005. The use of LPG for cooking reduces the time women and girls spend on domestic chores, such as fetching firewood, thereby allowing them more time for education.

In summary, the 2012 results reaffirm the importance of infrastructure (road accessibility and distance to schools), the social environment (risks of girls' harassment, conflicts among *jatis*, and confidence in teaching quality), and media exposure (particularly for women through newspapers and television) in shaping educational gender inequalities. Additionally, the use of LPG for cooking emerges as a significant village-level factor in this context. As in 2005, the 2012 results reveal heterogeneity across age cohorts: infrastructure and the social environment are more influential for younger children, whereas media exposure plays a more prominent role for older children in explaining gender disparities in education.

4.5.2.3 Additional exploratory analysis

Our primary results underscore the significance of certain community variables in relation to gender differences in community fixed effects on the length of schooling.

Aligned with our exploratory approach to investigating the influence of community factors on educational gender inequalities, we aimed to examine the

underlying mechanisms driving the overall effects discussed above. Specifically, it is relevant to investigate whether these effects vary by gender. The community variables identified in our main results could potentially affect the community fixed effects in different ways: they may have a similar directional impact for both boys and girls but differ in magnitude, exert a significant effect for one gender while having no effect for the other, or produce significant effects for both sexes but in opposite directions.

To explore these potential gender-specific differences, after estimating the fixed effects by gender and age cohort using Equations (1) and (2), we proceed to estimate the following equations:

$$\theta_{ij}^g = \gamma_j^g Z_j + \mu_j^g \quad (4.4)$$

$$\theta_{ij}^b = \gamma_j^b Z_j + \mu_j^b \quad (4.5)$$

Where θ is the variable capturing community effects for village j for each child i , with g referring to girls and b referring to boys.

And, as previously, Z variables refer to village factors: infrastructure, social environment, media exposure, and household domestic tasks, and μ_j^g and μ_j^b represents the random error terms for child (g, b).

The results presented in Tables 4.5 and 4.6 provide deeper insight into the role of community variables, highlighted in the previous section, in explaining gender differences in community fixed effects and, consequently, educational gender inequalities.

Specifically, in 2005, confidence in school institutions for 6-9-year-olds, as well as the proportion of households reporting a risk of harassment for girls aged 10-12, appear to positively influence the length of schooling, but only for girls (*cf.* Table 4.5). This contributes to the reduction of educational gender inequalities for the age groups concerned. Additionally, the proportion of newspaper readers was found to negatively impact the schooling duration of boys aged 13-19, thereby reducing educational gender inequalities. However, access to villages by road negatively affected the difference in community fixed effects between girls and boys aged 10-12 in terms of schooling duration. Table 4.5 reveals that this outcome is primarily driven by the negative effect of village accessibility on girls in this age group, explaining why this variable contributes to an increase in gender inequalities in education.

In 2012, our main results suggest that media exposure and conflicts between *jatis* had a positive impact on girls' advantage in terms of community fixed effects on schooling duration, while factors such as village accessibility and distance from educational institutions exacerbated gender inequalities. Regarding media exposure, the result is largely due to negative effects on boys' community fixed

effect—both for the overall sample and for the 16-19 age group (*cf.* Table 4.6). In contrast, for conflicts between *jatis*, Table 4.6 shows that this community variable positively influences the community fixed effect, but only for girls aged 10-12, whereas for boys in the same age group, the effect is negative. As for the variables contributing to increased educational gender inequalities, such as village accessibility and distance from secondary institutions, Table 4.6 indicates that village accessibility is a positive factor only for boys aged 10-12 in terms of their community fixed effect. Moreover, the distance to secondary schools negatively affects only girls aged 13-15..

Consequently, the results of this additional exploratory analysis provide a clearer understanding of the underlying mechanisms behind our main findings and suggest directions for future research. For instance, it would be valuable to investigate why a higher proportion of newspaper readers negatively impacts boys' school duration, and why inter-caste conflicts or the perceived risk of harassment for girls act as indirect motivating factors for girls' school duration.

4.6 Conclusion

Over the past two decades, India has made notable strides in reducing gender disparities in education. However, significant heterogeneity persists across various age cohorts. While the extant literature on gender inequality in education predominantly focuses on individual and household-level determinants, this paper represents one of the first systematic efforts to examine the role of community-level factors, particularly in the context of recent progress in this domain.

Using data from two rounds of the nationally representative India Human Development Survey (IHDS) for rural India (2005 and 2012), this paper adopts a novel approach to investigating gender gaps in educational attainment. First, we estimate the determinants of *years of education* for boys and girls separately at the individual and household level. We then extract the fixed effects from these regressions for both boys and girls, computing the differential in these fixed effects to quantify the gender gap attributed to village-level factors. Finally, we examine the determinants of these gender gaps in community fixed effects, focusing on key village-level factors such as infrastructure, social environment, media exposure, and domestic household tasks.

Our findings reveal that infrastructure, social environment, and media exposure exert a significant influence on the gender gap in years of schooling. Additionally, the use of LPG for cooking, though to a lesser extent, also plays a role in narrowing this gap. Notably, the effects of these factors vary across age cohorts: while infrastructure and social environment are particularly important

for younger cohorts, media exposure plays a more prominent role for older cohorts. These results hold important policy implications, underscoring the critical role of community-level improvements in promoting gender equality in education.

The evidence suggests that targeted improvements in community infrastructure and social environments have already contributed to reducing gender gaps in education and hold promise for further progress. Therefore, policy interventions aimed at enhancing village-level conditions represent a compelling strategy for addressing gender disparities in schooling. Such interventions complement household-level efforts and are essential for sustaining the progress made in achieving gender parity in education.

4.7 Tables

Descriptive statistics

Table 4.1: Child- and household-level characteristics in 2005 and 2012.

	Year		Total	Test
	2005	2012		
Observations	45,523 (54.3%)	38,263 (45.7%)	83,786 (100.0%)	
<i>Child-level characteristics</i>				
Female	0.482 (0.500)	0.489 (0.500)	0.485 (0.500)	0.069
6-9 yo	0.288 (0.453)	0.278 (0.448)	0.283 (0.451)	0.003
10-12 yo	0.237 (0.425)	0.231 (0.422)	0.234 (0.424)	0.058
13-15 yo	0.223 (0.416)	0.220 (0.414)	0.221 (0.415)	0.327
16-19 yo	0.253 (0.435)	0.271 (0.444)	0.261 (0.439)	<0.001
No. of years of education	4.461 (3.467)	5.321 (3.585)	4.854 (3.547)	<0.001
<i>Household-level characteristics</i>				
<i>Caste and religion</i>				
Brahmin	0.040 (0.195)	0.038 (0.192)	0.039 (0.194)	0.313
SC	0.227 (0.419)	0.235 (0.424)	0.231 (0.421)	0.009
ST	0.109 (0.311)	0.112 (0.316)	0.110 (0.313)	0.128
OBC	0.403 (0.490)	0.415 (0.493)	0.408 (0.492)	<0.001
Other	0.221 (0.415)	0.200 (0.400)	0.211 (0.408)	<0.001
Hindu	0.798 (0.402)	0.813 (0.390)	0.805 (0.396)	<0.001
Muslim	0.124 (0.330)	0.128 (0.334)	0.126 (0.332)	0.089
Other religion	0.078 (0.269)	0.059 (0.235)	0.069 (0.254)	<0.001
<i>Household composition</i>				
0-4 males ratio	0.035 (0.077)	0.032 (0.077)	0.034 (0.077)	<0.001
5-9 males ratio	0.091 (0.133)	0.084 (0.133)	0.088 (0.133)	<0.001
10-14 males ratio	0.120 (0.150)	0.119 (0.158)	0.119 (0.154)	0.828
15-19 males ratio	0.095 (0.149)	0.092 (0.153)	0.093 (0.151)	0.001
20-24 males ratio	0.034 (0.088)	0.034 (0.090)	0.034 (0.089)	0.327
25-60 males ratio	0.214 (0.110)	0.216 (0.119)	0.215 (0.114)	0.006
61+ males ratio	0.026 (0.068)	0.032 (0.078)	0.029 (0.073)	<0.001
0-4 females ratio	0.033 (0.077)	0.029 (0.075)	0.031 (0.076)	<0.001
5-9 females ratio	0.078 (0.122)	0.074 (0.124)	0.076 (0.123)	<0.001
10-14 females ratio	0.111 (0.141)	0.111 (0.149)	0.111 (0.145)	0.828
15-19 females ratio	0.578 (0.810)	0.516 (0.773)	0.550 (0.794)	<0.001
20-24 females ratio	0.025 (0.068)	0.026 (0.072)	0.026 (0.070)	0.071
25-60 females ratio	0.234 (0.110)	0.251 (0.119)	0.241 (0.115)	<0.001
61+ females ratio	0.029 (0.072)	0.040 (0.087)	0.034 (0.079)	<0.001
<i>Household head</i>				
Female head	0.041 (0.199)	0.075 (0.263)	0.057 (0.231)	<0.001
Education of head	4.088 (4.365)	4.483 (4.506)	4.269 (4.434)	<0.001
<i>Household wealth</i>				
Annual consumption/capita (log)	8.759 (0.631)	12.114 (0.603)	10.291 (1.782)	<0.001
<i>Primary source of income</i>				
Agriculture	0.385 (0.487)	0.381 (0.486)	0.383 (0.486)	0.182
Agriculture wage labour	0.188 (0.391)	0.138 (0.345)	0.166 (0.372)	<0.001
Non-agriculture wage labour	0.174 (0.379)	0.248 (0.432)	0.208 (0.406)	<0.001
Artisan	0.045 (0.207)	0.011 (0.103)	0.029 (0.168)	<0.001
Petty trade	0.031 (0.173)	0.075 (0.263)	0.051 (0.220)	<0.001
Organised trade/business	0.032 (0.176)	0.005 (0.074)	0.020 (0.139)	<0.001
Salaried and professionals	0.114 (0.318)	0.099 (0.298)	0.107 (0.309)	<0.001
Others(pension/rent, others)	0.031 (0.173)	0.043 (0.202)	0.036 (0.187)	<0.001

Source: IHDS data.

Note: "2005", "2012", and "Total" columns present the means, with standard errors in parentheses, for the characteristics at child- and household-level (except for the number of observations). The 'Test' column reports the p-values from the group comparison test.

Table 4.2: Village-level characteristics in 2005 and 2012.

	Year		Total	Test
	2005	2012		
Observations	45,523 (54.3%)	38,263 (45.7%)	83,786 (100.0%)	
Infrastructures				
Distance to primary schools	0.076 (0.838)	0.043 (1.375)	0.061 (1.116)	<0.001
Distance to middle schools	1.221 (2.705)	0.800 (2.176)	1.026 (2.484)	<0.001
Distance to secondary schools	3.645 (4.911)	3.336 (5.164)	3.501 (5.033)	<0.001
Distance to higher secondary schools	7.240 (7.472)	7.278 (22.958)	7.258 (16.664)	0.745
Village is accessible by roads	0.939 (0.240)	0.987 (0.115)	0.960 (0.195)	<0.001
% of HH with electricity	0.659 (0.332)	0.787 (0.269)	0.717 (0.312)	<0.001
Social environment				
% of HH with school confidence	0.679 (0.254)	0.865 (0.165)	0.764 (0.237)	<0.001
% of HH who know school staff	0.400 (0.301)	0.354 (0.236)	0.379 (0.274)	<0.001
% of HH declaring jatis conflicts	0.323 (0.288)	0.448 (0.346)	0.380 (0.322)	<0.001
% of HH declaring girls harassment	0.120 (0.205)	0.187 (0.219)	0.150 (0.215)	<0.001
Media exposure				
% of men listening to radio	0.503 (0.287)	0.272 (0.251)	0.398 (0.294)	<0.001
% of women listening to radio	0.395 (0.276)	0.194 (0.212)	0.303 (0.268)	<0.001
% of men reading newspaper	0.391 (0.254)	0.448 (0.248)	0.417 (0.253)	<0.001
% of women reading newspaper	0.181 (0.214)	0.205 (0.200)	0.192 (0.208)	<0.001
% of men watching TV regularly	0.271 (0.244)	0.370 (0.284)	0.316 (0.268)	<0.001
% of women watching TV regularly	0.315 (0.265)	0.434 (0.297)	0.370 (0.286)	<0.001
Household domestic tasks				
Avg daily time girls take to get water	10.454 (18.224)	10.937 (16.037)	10.674 (17.262)	<0.001
Avg daily time boys take to get water	5.251 (11.538)	7.823 (13.839)	6.426 (12.705)	<0.001
% of HH employing HH help/servants	0.024 (0.057)	0.018 (0.039)	0.021 (0.050)	<0.001
% of HH with LPG	0.052 (0.221)	0.131 (0.337)	0.088 (0.283)	<0.001

Source: IHDS data.

Note: "2005", "2012", and "Total" columns present the means, with standard errors in parentheses, for the characteristics at village-level (except for the number of observations). The 'Test' column reports the p-values from the group comparison test.

Main results

Table 4.3: Importance of village-level variables on sex gaps in community effect in 2005.

	(1)	(2)	(3)	(4)	(5)
	dif_NFE619	dif_NFE69	dif_NFE1012	dif_NFE1315	dif_NFE1619
Distance (in km) to primary schools	-0.060 (0.049)	-0.004 (0.036)	-0.038 (0.062)		
Distance (in km) to middle schools	0.008 (0.013)		0.019 (0.015)	-0.019 (0.024)	
Distance (in km) to secondary schools	0.005 (0.009)			0.014 (0.014)	0.015 (0.020)
Distance (in km) to higher secondary schools	-0.004 (0.005)				0.005 (0.013)
Village is accessible by roads	-0.044 (0.136)	-0.059 (0.102)	0.354** (0.175)	0.255 (0.250)	-0.480 (0.343)
% of HH with electricity	-0.191 (0.164)	0.022 (0.121)	-0.433** (0.208)	-0.064 (0.305)	-0.063 (0.418)
% of HH with school confidence	-0.159 (0.143)	-0.255** (0.109)	-0.348* (0.184)	0.110 (0.268)	-0.246 (0.364)
% of HH declaring conflicts among communities/jatis	0.069 (0.129)	0.027 (0.096)	-0.152 (0.165)	0.143 (0.242)	0.132 (0.330)
% of HH declaring girls harassment	-0.354* (0.209)	-0.065 (0.158)	-0.453* (0.263)	-0.566 (0.387)	-0.126 (0.539)
% of HH in neighborhood who know people working in schools	-0.104 (0.134)	-0.129 (0.104)	0.210 (0.175)	0.169 (0.255)	-0.605* (0.350)
Avg daily time (in min) girls take to get water	0.001 (0.002)	-0.002 (0.002)	0.002 (0.003)	0.001 (0.004)	0.003 (0.006)
Avg daily time (in min) boys take to get water	-0.003 (0.004)	0.004 (0.003)	-0.001 (0.005)	0.003 (0.006)	-0.007 (0.009)
% of HH employing HH help/servants	0.544 (0.527)	0.354 (0.402)	0.292 (0.668)	-0.729 (1.056)	0.212 (1.412)
% of HH with LPG	-0.103 (0.153)	0.009 (0.114)	-0.058 (0.197)	0.165 (0.274)	-0.437 (0.392)
% of men listening to radio	0.357 (0.253)	0.223 (0.186)	0.174 (0.321)	0.418 (0.463)	0.213 (0.650)
% of women listening to radio	-0.346 (0.250)	-0.134 (0.183)	-0.313 (0.318)	-0.468 (0.457)	-0.536 (0.641)
% of men reading newspaper	-0.537** (0.223)	-0.143 (0.170)	0.148 (0.292)	-1.170*** (0.423)	0.835 (0.584)
% of women reading newspaper	0.186 (0.265)	0.113 (0.205)	-0.404 (0.344)	0.245 (0.507)	-1.382** (0.684)
% of men watching TV regularly	0.055 (0.317)	0.253 (0.240)	0.017 (0.425)	0.261 (0.601)	-0.002 (0.826)
% of women watching TV regularly	-0.301 (0.317)	-0.335 (0.237)	-0.240 (0.421)	-0.288 (0.602)	-0.316 (0.822)
Constant	0.995 (1.374)	0.355 (0.996)	-0.476 (1.684)	-1.563 (2.003)	0.214 (2.008)
Observations	1,287	1,228	1,164	1,145	1,144
R-squared	0.130	0.043	0.072	0.097	0.087
Mean of dependent variable	-0.00539	-0.00181	-0.0200	0.0891	0.186

Source: IHDS-I data.

Note: Each column shows the estimated gender gap in community fixed effects by age cohort (6-19, 6-9, 10-12, 13-15, and 16-19). Standard errors are clustered at the community-level in parentheses (* p < 0.10, ** p < 0.05, *** p < 0.01).

Table 4.4: Importance of village-level variables on sex gaps in community effect in 2012.

	(1)	(2)	(3)	(4)	(5)
	dif_NFE619	dif_NFE69	dif_NFE1012	dif_NFE1315	dif_NFE1619
Distance to primary schools	0.018 (0.015)	-0.015 (0.011)	-0.000 (0.018)		
Distance to middle schools	0.001 (0.014)		0.023 (0.018)	0.047* (0.025)	
Distance to secondary schools	-0.000 (0.006)			-0.006 (0.009)	0.011 (0.013)
Distance to higher secondary schools	-0.002* (0.001)				-0.003 (0.003)
Village is accessible by roads	0.163 (0.264)	-0.092 (0.236)	0.734** (0.356)	-0.694 (0.459)	0.256 (0.710)
% of HH with electricity	-0.098 (0.172)	0.032 (0.140)	-0.200 (0.232)	-0.317 (0.300)	0.337 (0.406)
% of HH with school confidence	-0.343* (0.196)	-0.176 (0.167)	0.096 (0.278)	-0.054 (0.351)	-0.686 (0.471)
% of HH declaring conflicts among communities/jatis	-0.015 (0.099)	-0.028 (0.082)	-0.326** (0.134)	0.207 (0.173)	-0.096 (0.232)
% of HH declaring girls harassment	-0.178 (0.147)	-0.056 (0.123)	0.115 (0.200)	-0.111 (0.261)	-0.643* (0.348)
% of HH in neighborhood who know people working in schools	0.211 (0.145)	0.063 (0.124)	-0.296 (0.199)	-0.108 (0.258)	0.385 (0.347)
Avg daily time girls take to get water	0.005 (0.003)	-0.004 (0.003)	-0.002 (0.005)	0.006 (0.006)	0.006 (0.008)
Avg daily time boys take to get water	-0.002 (0.004)	0.003 (0.003)	0.006 (0.005)	-0.001 (0.007)	-0.000 (0.009)
% of HH employing HH help/servants	0.177 (0.748)	0.017 (0.646)	-0.588 (1.084)	2.178 (1.338)	0.021 (1.730)
% of HH with LPG	-0.165* (0.091)	-0.033 (0.079)	-0.178 (0.126)	-0.045 (0.166)	-0.369* (0.213)
% of men listening to radio	-0.192 (0.289)	0.342 (0.247)	-0.310 (0.402)	0.208 (0.534)	-1.067 (0.694)
% of women listening to radio	0.044 (0.318)	-0.403 (0.268)	0.407 (0.447)	0.175 (0.581)	0.550 (0.753)
% of men reading newspaper	0.148 (0.201)	0.006 (0.179)	0.177 (0.289)	0.069 (0.360)	0.757 (0.480)
% of women reading newspaper	-0.442* (0.244)	-0.133 (0.220)	0.324 (0.360)	-0.146 (0.451)	-2.016*** (0.581)
% of men watching TV regularly	0.182 (0.243)	0.316 (0.209)	0.300 (0.347)	0.588 (0.443)	-0.030 (0.582)
% of women watching TV regularly	-0.532** (0.266)	-0.190 (0.226)	-0.421 (0.374)	-0.638 (0.476)	-0.430 (0.629)
Constant	0.370 (1.115)	-0.961 (0.856)	-0.471 (1.380)	-0.291 (1.768)	-0.530 (2.493)
Observations	1,309	1,085	1,058	1,040	1,135
R-squared	0.095	0.045	0.076	0.087	0.091
Mean of dependent variable	-0.0273	-0.0242	-0.00211	-0.0414	-0.0511

Source: IHDS-II data.

Note: Each column shows the estimated gender gap in community fixed effects by age cohort (6-19, 6-9, 10-12, 13-15, and 16-19). Standard errors are clustered at the community-level in parentheses (* p < 0.10, ** p < 0.05, *** p < 0.01).

Table 4.5: Importance of village-level variables in community effect by sex in 2005.

2005	Roads accessibility	Electrification	School confidence	Girls harassment	School social network	Men reading newspaper	Women reading newspaper
<i>Sample 1: 6-19 age cohort</i>							
Girls	0,089 (0,101)	0,207* (0,121)	0,05 (0,106)	0,199 (0,155)	0,183* (0,099)	0,25 (0,164)	0,104 (0,192)
Boys	-0,056 (0,093)	-0,264** (0,112)	-0,017 (0,098)	-0,224 (0,143)	-0,084 (0,092)	-0,124 (0,15)	-0,127 (0,18)
<i>Sample 2: 6-9 age cohort</i>							
Girls	0,012 (0,065)	-0,134* (0,076)	0,112* (0,068)	0,029 (0,099)	-0,027 (0,065)	-0,163 (0,106)	-0,056 (0,127)
Boys	-0,049 (0,063)	-0,052 (0,074)	-0,151** (0,066)	0,041 (0,097)	-0,142** (0,063)	-0,179* (0,103)	-0,015 (0,124)
<i>Sample 3: 10-12 age cohort</i>							
Girls	-0,194** (0,098)	0,054 (0,116)	0,144 (0,103)	0,256* (0,147)	-0,182* (0,097)	-0,595** (0,157)	0,055 (0,187)
Boys	0,181* (0,098)	-0,364*** (0,114)	-0,197* (0,102)	-0,17 (0,147)	-0,036 (0,097)	-0,283* (0,161)	-0,418*** (0,19)
<i>Sample 4: 13-15 age cohort</i>							
Girls	-0,07 (0,144)	-0,241 (0,173)	-0,107 (0,152)	0,317 (0,222)	-0,344** (0,144)	-0,341 (0,239)	-0,345 (0,284)
Boys	0,216 (0,145)	-0,214 (0,171)	-0,078 (0,152)	-0,274 (0,223)	-0,155 (0,143)	-1,569*** (0,235)	-0,049 (0,283)
<i>Sample 5: 16-19 age cohort</i>							
Girls	0,255 (0,22)	-0,314 (0,262)	-0,115 (0,229)	-0,184 (0,337)	0,048 (0,219)	-1,596*** (0,366)	0,559 (0,425)
Boys	-0,218 (0,21)	-0,254 (0,256)	-0,337 (0,223)	-0,377 (0,328)	-0,488** (0,211)	-0,91*** (0,35)	-0,752* (0,414)

Source: IHDS-I data.

Note: Each column presents the estimated effects of village-level variables on community fixed effects, categorized by age cohort and gender (boys and girls). The selection of community variables is based on the primary findings from 2005 and includes factors such as road accessibility, the proportion of households with electricity, the percentage of households reporting risks of harassment towards girls, the percentage of households with connections to individuals in educational institutions, and the proportion of men and women who regularly read newspapers. Standard errors, shown in parentheses, are clustered at the community level. Significance levels are denoted as * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 4.6: Importance of village-level variables in community effect by sex in 2012.

2012	Distance to middle schools	Distance to higher secondary schools	Roads accessibility	School confidence	Jatis conflicts	Girls harassment	LPG	Women reading newspaper	Women watching TV
<i>Sample 1: 6-19 age cohort</i>									
Girls	-0.007 (0.012)	0.001 (0.001)	0.079 (0.237)	0.282 (0.175)	-0.082 (0.089)	0.029 (0.132)	0.132 (0.081)	0.639*** (0.218)	-0.137 (0.218)
Boys	0.009 (0.011)	-0.001 (0.001)	-0.231 (0.217)	-0.221 (0.16)	0.088 (0.081)	-0.223* (0.121)	-0.068 (0.075)	-0.435*** (0.202)	0.273 (0.2)
<i>Sample 2: 10-12 age cohort</i>									
Girls	-0.012 (0.01)		-0.3 (0.199)	0.044 (0.155)	0.171** (0.074)	-0.03 (0.112)	0.014 (0.07)	-0.361* (0.197)	-0.171 (0.203)
Boys	0.011 (0.01)		0.336* (0.197)	-0.053 (0.149)	-0.157** (0.075)	0.109 (0.112)	-0.097 (0.07)	0.164 (0.196)	-0.492** (0.207)
<i>Sample 3: 13-15 age cohort</i>									
Girls	-0.024* (0.013)		0.313 (0.241)	-0.242 (0.186)	-0.123 (0.092)	0.048 (0.138)	0.005 (0.088)	0.034 (0.239)	-0.08 (0.253)
Boys	0.023 (0.014)		-0.526** (0.263)	-0.153 (0.191)	0.016 (0.095)	-0.059 (0.143)	-0.044 (0.088)	-0.408* (0.237)	-0.631** (0.258)
<i>Sample 4: 16-19 age cohort</i>									
Girls		0.002 (0.002)	-0.119 (0.423)	0.185 (0.274)	0.061 (0.139)	0.256 (0.206)	0.096 (0.128)	0.158 (0.341)	-0.267 (0.372)
Boys		-0.001 (0.002)	-0.044 (0.363)	-0.423 (0.282)	-0.073 (0.138)	-0.309 (0.208)	-0.193 (0.127)	-1.346*** (0.347)	-0.720* (0.375)

Source: IHDS-II data.

Note: Each column presents the estimated effects of village-level variables on community fixed effects, disaggregated by age cohort and gender (boys and girls). The community variables are selected based on the primary findings from 2012 and include factors such as proximity to middle and higher secondary schools, road accessibility, the percentage of households expressing confidence in the quality of education, the proportion of households reporting conflicts among *jatis*, the percentage of households citing risks of harassment towards girls, the proportion of households using LPG for cooking, and the proportion of women who regularly read newspapers or watch television. Standard errors, provided in parentheses, are clustered at the community level to account for potential correlations within communities. The significance of the results is indicated by * $p < 0.10$, ** $p < 0.05$, and *** $p < 0.01$.

4.8 Appendix

Descriptive statistics

Table 4.7: Child- and household-level characteristics in 2005 and 2012 - 6-9 age cohort.

	Year			Test
	2005	2012	Total	
Observations	13,088 (55.1%)	10,646 (44.9%)	23,734 (100.0%)	
<i>Child-level characteristics</i>				
Female	0.477 (0.499)	0.481 (0.500)	0.479 (0.500)	0.526
Age	7.326 (1.094)	7.435 (1.093)	7.375 (1.095)	<0.001
No. of years of education	1.441 (1.373)	1.638 (1.371)	1.529 (1.375)	<0.001
<i>Household-level characteristics</i>				
<i>Caste and religion</i>				
Brahmin	0.037 (0.189)	0.035 (0.184)	0.036 (0.187)	0.408
SC	0.229 (0.420)	0.241 (0.428)	0.234 (0.423)	0.031
ST	0.113 (0.316)	0.113 (0.317)	0.113 (0.316)	0.852
OBC	0.403 (0.491)	0.421 (0.494)	0.411 (0.492)	0.004
Other	0.218 (0.413)	0.189 (0.392)	0.205 (0.404)	<0.001
Hindu	0.796 (0.403)	0.808 (0.394)	0.802 (0.399)	0.024
Muslim	0.130 (0.336)	0.136 (0.343)	0.133 (0.340)	0.146
Other religion	0.074 (0.261)	0.055 (0.229)	0.065 (0.247)	<0.001
<i>Household composition</i>				
0-4 males ratio	0.058 (0.097)	0.058 (0.102)	0.058 (0.099)	0.807
5-9 males ratio	0.179 (0.162)	0.178 (0.166)	0.178 (0.164)	0.959
10-14 males ratio	0.074 (0.113)	0.068 (0.113)	0.071 (0.113)	<0.001
15-19 males ratio	0.028 (0.070)	0.022 (0.064)	0.025 (0.068)	<0.001
20-24 males ratio	0.015 (0.049)	0.014 (0.049)	0.015 (0.049)	0.019
25-60 males ratio	0.217 (0.100)	0.217 (0.110)	0.217 (0.104)	0.584
61+ males ratio	0.026 (0.061)	0.032 (0.070)	0.029 (0.065)	<0.001
0-4 females ratio	0.053 (0.097)	0.051 (0.099)	0.052 (0.098)	0.055
5-9 females ratio	0.157 (0.149)	0.160 (0.156)	0.158 (0.152)	0.136
10-14 females ratio	0.081 (0.117)	0.079 (0.120)	0.080 (0.118)	0.161
15-19 females ratio	0.224 (0.532)	0.167 (0.463)	0.199 (0.503)	<0.001
20-24 females ratio	0.022 (0.063)	0.018 (0.057)	0.020 (0.061)	<0.001
25-60 females ratio	0.233 (0.106)	0.253 (0.109)	0.242 (0.108)	<0.001
61+ females ratio	0.028 (0.067)	0.037 (0.079)	0.032 (0.073)	<0.001
<i>Household head</i>				
Female head	0.032 (0.175)	0.065 (0.247)	0.047 (0.211)	<0.001
Education of head	4.082 (4.405)	4.564 (4.541)	4.298 (4.473)	<0.001
<i>Household wealth</i>				
Annual consumption/capita (log)	8.662 (0.616)	12.012 (0.572)	10.165 (1.769)	<0.001
<i>Primary source of income</i>				
Agriculture	0.379 (0.485)	0.364 (0.481)	0.372 (0.483)	0.016
Agriculture wage labour	0.191 (0.393)	0.135 (0.342)	0.166 (0.372)	<0.001
Non-agriculture wage labour	0.190 (0.393)	0.263 (0.440)	0.223 (0.416)	<0.001
Artisan	0.045 (0.208)	0.010 (0.101)	0.030 (0.170)	<0.001
Petty trade	0.032 (0.175)	0.077 (0.266)	0.052 (0.222)	<0.001
Organised trade/business	0.031 (0.174)	0.006 (0.080)	0.020 (0.140)	<0.001
Salaried and professionals	0.103 (0.304)	0.098 (0.297)	0.101 (0.301)	0.183
Others(pension/rent, others)	0.028 (0.164)	0.046 (0.210)	0.036 (0.186)	<0.001

Source: IHDS data.

Note: "2005", "2012", and "Total" columns present the means, with standard errors in parentheses, for the characteristics at individual and household-level (except for the number of observations). The 'Test' column reports the p-values from the group comparison test.

Table 4.8: Child- and household-level characteristics in 2005 and 2012 - 10-12 age cohort.

	Year		Total	Test
	2005	2012		
Observations	10,783 (54.9%)	8,850 (45.1%)	19,633 (100.0%)	
<i>Child-level characteristics</i>				
Female	0.480 (0.500)	0.478 (0.500)	0.479 (0.500)	0.726
Age	11.031 (0.876)	11.054 (0.861)	11.042 (0.869)	0.069
No. of years of education	3.998 (1.999)	4.491 (1.860)	4.220 (1.953)	<0.001
<i>Household-level characteristics</i>				
<i>Caste and religion</i>				
Brahmin	0.038 (0.192)	0.036 (0.187)	0.038 (0.190)	0.447
SC	0.234 (0.423)	0.231 (0.422)	0.233 (0.423)	0.629
ST	0.100 (0.299)	0.115 (0.319)	0.106 (0.308)	<0.001
OBC	0.405 (0.491)	0.417 (0.493)	0.410 (0.492)	0.099
Other	0.223 (0.416)	0.201 (0.401)	0.213 (0.409)	<0.001
Hindu	0.796 (0.403)	0.813 (0.390)	0.803 (0.397)	0.002
Muslim	0.125 (0.331)	0.135 (0.341)	0.129 (0.336)	0.049
Other religion	0.079 (0.270)	0.053 (0.223)	0.067 (0.251)	<0.001
<i>Household composition</i>				
0-4 males ratio	0.032 (0.071)	0.027 (0.068)	0.029 (0.069)	<0.001
5-9 males ratio	0.083 (0.118)	0.078 (0.116)	0.081 (0.117)	<0.001
10-14 males ratio	0.182 (0.168)	0.189 (0.178)	0.185 (0.173)	0.003
15-19 males ratio	0.054 (0.102)	0.045 (0.098)	0.050 (0.101)	<0.001
20-24 males ratio	0.019 (0.056)	0.017 (0.058)	0.018 (0.057)	0.086
25-60 males ratio	0.211 (0.101)	0.212 (0.112)	0.211 (0.106)	0.203
61+ males ratio	0.025 (0.063)	0.030 (0.074)	0.028 (0.069)	<0.001
0-4 females ratio	0.029 (0.070)	0.025 (0.068)	0.027 (0.069)	<0.001
5-9 females ratio	0.071 (0.111)	0.066 (0.111)	0.069 (0.111)	<0.001
10-14 females ratio	0.167 (0.157)	0.175 (0.168)	0.171 (0.162)	<0.001
15-19 females ratio	0.370 (0.659)	0.293 (0.603)	0.336 (0.635)	<0.001
20-24 females ratio	0.015 (0.049)	0.016 (0.054)	0.016 (0.051)	0.566
25-60 females ratio	0.234 (0.101)	0.248 (0.110)	0.240 (0.105)	<0.001
61+ females ratio	0.029 (0.068)	0.040 (0.086)	0.034 (0.077)	<0.001
<i>Household head</i>				
Female head	0.042 (0.200)	0.073 (0.259)	0.056 (0.229)	<0.001
Education of head	4.066 (4.371)	4.501 (4.535)	4.262 (4.451)	<0.001
<i>Household wealth</i>				
Annual consumption/capita (log)	8.732 (0.619)	12.060 (0.577)	10.232 (1.761)	<0.001
<i>Primary source of income</i>				
Agriculture	0.379 (0.485)	0.373 (0.484)	0.376 (0.484)	0.411
Agriculture wage labour	0.192 (0.394)	0.134 (0.340)	0.166 (0.372)	<0.001
Non-agriculture wage labour	0.178 (0.383)	0.259 (0.438)	0.215 (0.411)	<0.001
Artisan	0.047 (0.212)	0.011 (0.104)	0.031 (0.173)	<0.001
Petty trade	0.031 (0.172)	0.076 (0.265)	0.051 (0.220)	<0.001
Organised trade/business	0.032 (0.176)	0.006 (0.074)	0.020 (0.140)	<0.001
Salaried and professionals	0.111 (0.314)	0.095 (0.294)	0.104 (0.305)	<0.001
Others(pension/rent, others)	0.031 (0.172)	0.046 (0.210)	0.038 (0.190)	<0.001

Source: IHDS data.

Note: "2005", "2012", and "Total" columns present the means, with standard errors in parentheses, for the characteristics at individual and household-level (except for the number of observations). The 'Test' column reports the p-values from the group comparison test.

Table 4.9: Child- and household-level characteristics in 2005 and 2012 - 13-15 age cohort.

	Year			Test
	2005	2012	Total	
Observations	10,139 (54.6%)	8,414 (45.4%)	18,553 (100.0%)	
<i>Child-level characteristics</i>				
Female	0.486 (0.500)	0.486 (0.500)	0.486 (0.500)	0.941
Age	14.006 (0.811)	13.952 (0.794)	13.981 (0.804)	<0.001
No. of years of education	5.990 (2.832)	6.955 (2.295)	6.428 (2.646)	<0.001
<i>Household-level characteristics</i>				
<i>Caste and religion</i>				
Brahmin	0.041 (0.198)	0.043 (0.204)	0.042 (0.201)	0.400
SC	0.224 (0.417)	0.227 (0.419)	0.226 (0.418)	0.687
ST	0.108 (0.311)	0.116 (0.320)	0.112 (0.315)	0.102
OBC	0.402 (0.490)	0.416 (0.493)	0.408 (0.492)	0.062
Other	0.224 (0.417)	0.198 (0.399)	0.212 (0.409)	<0.001
Hindu	0.797 (0.402)	0.816 (0.387)	0.806 (0.396)	<0.001
Muslim	0.122 (0.327)	0.125 (0.331)	0.123 (0.329)	0.438
Other religion	0.082 (0.274)	0.059 (0.235)	0.071 (0.257)	<0.001
<i>Household composition</i>				
0-4 males ratio	0.021 (0.057)	0.019 (0.057)	0.020 (0.057)	0.017
5-9 males ratio	0.052 (0.096)	0.046 (0.093)	0.050 (0.094)	<0.001
10-14 males ratio	0.163 (0.166)	0.170 (0.180)	0.166 (0.173)	0.007
15-19 males ratio	0.115 (0.154)	0.104 (0.155)	0.110 (0.155)	<0.001
20-24 males ratio	0.031 (0.077)	0.029 (0.078)	0.030 (0.077)	0.166
25-60 males ratio	0.209 (0.108)	0.213 (0.119)	0.211 (0.113)	0.023
61+ males ratio	0.026 (0.071)	0.031 (0.080)	0.029 (0.075)	<0.001
0-4 females ratio	0.021 (0.059)	0.018 (0.058)	0.020 (0.058)	0.001
5-9 females ratio	0.044 (0.089)	0.039 (0.087)	0.042 (0.088)	<0.001
10-14 females ratio	0.142 (0.155)	0.146 (0.167)	0.144 (0.161)	0.057
15-19 females ratio	0.696 (0.846)	0.591 (0.794)	0.648 (0.825)	<0.001
20-24 females ratio	0.022 (0.062)	0.024 (0.066)	0.023 (0.064)	0.125
25-60 females ratio	0.235 (0.108)	0.252 (0.121)	0.242 (0.115)	<0.001
61+ females ratio	0.030 (0.072)	0.041 (0.089)	0.035 (0.080)	<0.001
<i>Household head</i>				
Female head	0.050 (0.218)	0.078 (0.268)	0.063 (0.242)	<0.001
Education of head	4.162 (4.358)	4.409 (4.472)	4.274 (4.411)	<0.001
<i>Household wealth</i>				
Annual consumption/capita (log)	8.783 (0.624)	12.127 (0.602)	10.300 (1.774)	<0.001
<i>Primary source of income</i>				
Agriculture	0.380 (0.485)	0.397 (0.489)	0.388 (0.487)	0.022
Agriculture wage labour	0.189 (0.392)	0.142 (0.349)	0.168 (0.374)	<0.001
Non-agriculture wage labour	0.168 (0.374)	0.240 (0.427)	0.201 (0.401)	<0.001
Artisan	0.043 (0.204)	0.009 (0.096)	0.028 (0.165)	<0.001
Petty trade	0.032 (0.176)	0.071 (0.256)	0.049 (0.217)	<0.001
Organised trade/business	0.034 (0.181)	0.005 (0.069)	0.021 (0.142)	<0.001
Salaried and professionals	0.121 (0.326)	0.095 (0.293)	0.109 (0.312)	<0.001
Others(pension/rent, others)	0.032 (0.177)	0.041 (0.199)	0.036 (0.188)	<0.001

Source: IHDS data.

Note: "2005", "2012", and "Total" columns present the means, with standard errors in parentheses, for the characteristics at individual and household-level (except for the number of observations). The 'Test' column reports the p-values from the group comparison test.

Table 4.10: Child- and household-level characteristics in 2005 and 2012 - 16-19 age cohort.

	Year		Total	Test
	2005	2012		
Observations	11,513 (52.7%)	10,353 (47.3%)	21,866 (100.0%)	
<i>Child-level characteristics</i>				
Female	0.487 (0.500)	0.507 (0.500)	0.496 (0.500)	0.003
Age	17.414 (1.078)	17.544 (1.139)	17.476 (1.109)	<0.001
No. of years of education	6.985 (3.952)	8.492 (3.400)	7.701 (3.776)	<0.001
<i>Household-level characteristics</i>				
<i>Caste and religion</i>				
Brahmin	0.042 (0.201)	0.039 (0.193)	0.041 (0.197)	0.198
SC	0.222 (0.416)	0.239 (0.427)	0.230 (0.421)	0.003
ST	0.114 (0.317)	0.106 (0.308)	0.110 (0.313)	0.062
OBC	0.401 (0.490)	0.405 (0.491)	0.403 (0.491)	0.550
Other	0.220 (0.415)	0.211 (0.408)	0.216 (0.411)	0.080
Hindu	0.801 (0.399)	0.817 (0.387)	0.809 (0.393)	0.004
Muslim	0.119 (0.324)	0.116 (0.321)	0.118 (0.323)	0.526
Other religion	0.079 (0.270)	0.067 (0.250)	0.073 (0.261)	<0.001
<i>Household composition</i>				
0-4 males ratio	0.025 (0.068)	0.020 (0.061)	0.023 (0.065)	<0.001
5-9 males ratio	0.031 (0.073)	0.023 (0.064)	0.027 (0.069)	<0.001
10-14 males ratio	0.075 (0.118)	0.071 (0.118)	0.073 (0.118)	0.007
15-19 males ratio	0.192 (0.188)	0.193 (0.195)	0.192 (0.191)	0.783
20-24 males ratio	0.074 (0.132)	0.072 (0.132)	0.073 (0.132)	0.306
25-60 males ratio	0.217 (0.130)	0.219 (0.134)	0.218 (0.132)	0.187
61+ males ratio	0.027 (0.077)	0.033 (0.088)	0.030 (0.082)	<0.001
0-4 females ratio	0.024 (0.067)	0.019 (0.060)	0.022 (0.064)	<0.001
5-9 females ratio	0.025 (0.066)	0.020 (0.061)	0.023 (0.064)	<0.001
10-14 females ratio	0.066 (0.111)	0.060 (0.111)	0.063 (0.111)	<0.001
15-19 females ratio	1.072 (0.891)	1.004 (0.868)	1.040 (0.881)	<0.001
20-24 females ratio	0.040 (0.087)	0.045 (0.096)	0.042 (0.092)	<0.001
25-60 females ratio	0.233 (0.125)	0.250 (0.133)	0.241 (0.129)	<0.001
61+ females ratio	0.030 (0.080)	0.041 (0.095)	0.035 (0.088)	<0.001
<i>Household head</i>				
Female head	0.045 (0.206)	0.083 (0.277)	0.063 (0.243)	<0.001
Education of head	4.050 (4.319)	4.446 (4.473)	4.238 (4.397)	<0.001
<i>Household wealth</i>				
Annual consumption/capita (log)	8.871 (0.645)	12.254 (0.627)	10.473 (1.805)	<0.001
<i>Primary source of income</i>				
Agriculture	0.403 (0.491)	0.392 (0.488)	0.398 (0.489)	0.097
Agriculture wage labour	0.182 (0.386)	0.143 (0.350)	0.163 (0.370)	<0.001
Non-agriculture wage labour	0.156 (0.363)	0.230 (0.421)	0.191 (0.393)	<0.001
Artisan	0.043 (0.202)	0.012 (0.108)	0.028 (0.165)	<0.001
Petty trade	0.029 (0.169)	0.074 (0.262)	0.051 (0.219)	<0.001
Organised trade/business	0.031 (0.173)	0.005 (0.071)	0.019 (0.135)	<0.001
Salaried and professionals	0.122 (0.328)	0.106 (0.308)	0.115 (0.319)	<0.001
Others(pension/rent, others)	0.034 (0.180)	0.037 (0.190)	0.035 (0.185)	0.132

Source: IHDS data.

Note: "2005", "2012", and "Total" columns present the means, with standard errors in parentheses, for the characteristics at individual and household-level (except for the number of observations). The "Test" column reports the p-values from the group comparison test.

First-stage results

Results for 2005

For 2005, we observe that the mean number of years of education is positive for boys, whereas it is negative for girls across all age categories considered. In this context, all individual and household-level determinants should be interpreted differently based on the child's sex.

For boys, determinants with a positive effect on the number of years of education should be interpreted as factors that exacerbate the existing gap relative to the community average. Conversely, a determinant with a negative coefficient will indicate a reduction in this gap. For girls, a determinant with a positive coefficient will signify a reduction in the gap relative to the community average. In contrast, a negative coefficient will indicate an increase in the gap. In other words, for both girls and boys, determinants with a positive coefficient drive the length of schooling relative to the community average. For boys, this results in a greater gap between their years of education and the community average, while for girls, it implies a convergence towards the community average. Determinants with a negative coefficient represent obstacles to the number of years of education, regardless of gender. For boys, this would reduce their advantage in terms of schooling length, while for girls, it would exacerbate their existing disadvantage relative to the community average.

The set of variables at the individual and household levels can be categorized into positive and negative determinants of children's length of schooling. Among the positive determinants, at the individual level, only age positively affects the number of years of schooling, irrespective of sex or age (except for girls aged 16 to 19). Thus, older children tend to stay in school longer.

At the household level, determinants such as household composition and wealth also positively impact the number of years of education. Specifically, the characteristics of the head of household (sex and education level) and the ratio of women (by age category: 15-19; 20-24; 25-60 and 61+) contribute to increasing the length of schooling. Hence, better-educated household heads lead to more years of schooling for both girls and boys, regardless of age. This allows boys to deviate positively from the community average and enables girls to catch up with the average level in their village. If the head of household is a woman, this results in an increase in the length of schooling for girls aged 13 to 15 and for boys aged 16 to 19.

In 2005, these age categories (13-15 for girls and 16-19 for boys) were crucial for school dropout—secondary and upper secondary levels, respectively. Literature indicates that women value education highly. As heads of households, they encourage both boys and girls to continue their education beyond these "school

dropout" age categories. The same interpretation applies to the ratio of women in the household. For example, a higher presence of women aged 61 and over increases the length of schooling for girls aged 13 to 15. Similarly, for boys aged 16 to 19, a greater presence of women aged 15-19 and 25-60 increases the gap with the community average.

Regarding household wealth, which includes the (logarithm of) annual per capita consumption and the main occupation (compared to the "salaried and professional" category), wealth generally has a positive influence on the number of years of education for children. Notably, occupation variables like "Agriculture," "Agriculture wage labor", "Non-agriculture wage labor", "Artisan", and "Other" have negative coefficients, implying lower incomes compared to "Salaried and professional" activities. Our findings indicate a gender-specific impact of household wealth on education. Wealth significantly affects all children, but its effect is more pronounced for girls. For boys, the positive effect of household wealth on schooling length is particularly evident for those aged 16 to 19. Thus, these results underscore the importance of wealth in shaping educational outcomes for both sexes.

For negative determinants—obstacles to schooling— we find that household composition, caste, and religion are significant factors. In terms of household composition, the presence of young children (0-4 years), school-aged children (6-19), and adult men (20 years and over) negatively influences educational attainment. All children, regardless of sex, experience reduced schooling when the number of young children is high. The magnitude of the negative effect on the gap in the community depends on the sex of the young child. This can be attributed to the need for care-giving and potential future competition for resources dedicated to education.

For girls, the presence of other girls of the same age leads to competition, reducing their length of schooling. Moreover, the presence of boys of school age also hampers their educational attainment compared to the community average. It is the case for girls aged 10 to 12 in relation to the proportion of males aged 10-14. This result reflects the strong preference for boys in (rural) India. Similarly, the presence of adult men (aged 20-60) particularly affects the education of girls aged 16 to 19, widening the gap with the community average. For boys, competition with peers of the same age also reduces their length of schooling. Notably, the presence of men aged 20 to 24 also adversely affects the educational attainment of boys aged 13 to 19. This result may be explained by a preference for older brothers, leading to reduced educational expenditure for younger boys in the family.

Regarding household caste and religion, coefficients are compared to the "Brahmin" caste or Hindu. For girls aged 13 and over, belonging to any caste other

than "Brahmin" (OBC, SC, ST, Other) is a hindrance to educational attainment, with ST being particularly detrimental. For boys, especially those aged 6 to 15, being SC or ST impedes their length of schooling relative to the community average. On the other hand, all Muslim boys experience reduced schooling relative to their faith. For girls, particularly those aged 13 and over, this religious barrier also affects their length of schooling. This again highlights the pivotal nature of the 13-15 age group for girls' school dropout.

Results for 2012

For 2012, the first notable change is the sign reversal for the average length of schooling for girls aged 6 to 12. In contrast to 2005, the average for the two sub-samples of girls (aged 6-9 and 10-12) now has a positive sign. This indicates that, in 7 years, girls in this age group have a higher average number of years of education compared to their village of residence and, consequently, to boys of the same age.

Regarding positive determinants, especially at the individual level, the same effect of age on the length of schooling is observed as in 2005 (with the exception of girls aged 16-19). For household characteristics positively influencing the education level of children, we again find the wealth, sex, and education of the household head, as well as the ratio of women in the household. However, the results differ somewhat from those obtained in the 2005 wave. In 2012, (logarithm of) annual per capita consumption positively influenced the length of schooling for all boys and girls aged 13 and over. Moreover, the primary source of household income is crucial for all children aged 13 and over, regardless of sex. Hence, wealth is essential for both girls and boys to have access to secondary education.

Regarding the characteristics of the household head, having a female head of household affects the number of years of education for boys only, particularly those aged 16 to 19. In 2005, this was a positive determinant for girls aged 13 to 15. Additionally, the household head's education continues to influence all children, regardless of sex or age, positively.

The proportion of women in the household—aged 15 and over—positively impacts the level of education for boys aged 16 to 19. In comparison to the 2005 data, this effect is not observed for girls aged 10-12.

For negative determinants of the length of schooling, we observe the same categories of variables at the household level: caste, religion, and the ratio of males to females (by age group). As in 2005, girls who belong to a different caste, "Brahmins" (the reference category), experience a disadvantage in their length of schooling. For boys, being SC or ST is detrimental. Additionally, being Muslim negatively impacts the number of years of education for both girls and boys aged

10 to 19.

The results in 2012 regarding the ratio of men in the household are similar to those from 2005. The presence of young male children (0-4 years), school-age boys (6-19 years), and adult men (20 years and over) all negatively influence the number of years of schooling. This may be linked to the care required for young children, competition among school-aged children, preference for the eldest, and conservatism from the eldest.

The effects of the ratio of women in the household in 2012 differ slightly from those in 2005. The proportion of girls aged 0 to 4 in the household negatively affects the duration of schooling for all girls. This may be related to the care required and potential future competition for educational resources. In 2012, only girls were affected by this, whereas in 2005, it was a concern for children of both sexes. Additionally, the proportion of girls aged 10 to 14 also negatively impacts girls of the same age due to competition, potentially linked to limited educational expenditure. Lastly, the proportion of girls aged 15 to 19 adversely affects the number of years of education for slightly younger boys (13-15). Notably, this indicates emerging competition between sexes for higher levels of education in 2012.

In summary, the individual and household determinant children's schooling length is quite similar between the two IHDS waves. The positive determinants—those that enhance the duration of schooling—include children's age, household composition, and wealth. The presence of more women aged 61 and over in the household, as well as a higher education level of the household head, significantly extends schooling duration for children of both sexes. The sex of the household head is also crucial for the oldest children—girls aged 13 to 15 in 2005 and boys aged 16 to 19 in both 2005 and 2012. Household wealth, indicated by the primary occupation, remains a significant positive factor, especially for girls.

Negative determinants—those that hinder schooling length—include household composition, caste, and religion. The ratios of young children (0-4 years) and school-aged children (6-19 years) negatively affect the duration of schooling, likely due to caregiving needs and competition for educational resources. Additionally, the ratio of adult males is a negative determinant for all children, potentially indicating a preference for boys, especially the eldest. Finally, belonging to a different caste compared to "Brahmins" and being Muslim hinder the length of schooling for girls, while for boys, only being from Scheduled Castes/Scheduled Tribes is a blocking factor.

2005

Table 4.11: Effect of child- and household-level variables on length of schooling - 6-19 age cohort - IHDS 2005.

	(1)	(2)
	Boys - Neighborhood FE	Girls - Neighborhood FE
Annual consumption/capita (log)	0.897 (0.601)	0.813 (0.580)
Square of annual consumption/capita	-0.023 (0.033)	-0.020 (0.032)
10-12 yo	2.362*** (0.045)	2.167*** (0.054)
13-15 yo	4.303*** (0.062)	3.668*** (0.074)
16-19 yo	5.485*** (0.082)	3.986*** (0.103)
0-4 males ratio	-1.835*** (0.280)	-3.870*** (0.286)
5-9 males ratio	-1.275*** (0.179)	-2.243*** (0.238)
10-14 males ratio	-1.078*** (0.178)	-1.454*** (0.240)
15-19 males ratio	-0.224 (0.339)	-0.813 (0.561)
20-24 males ratio	-1.193*** (0.310)	-3.089*** (0.308)
25-60 males ratio	-0.166 (0.238)	-1.344*** (0.263)
61+ males ratio	-0.350 (0.321)	-1.107*** (0.365)
0-4 females ratio	-1.533*** (0.271)	-3.139*** (0.280)
5-9 females ratio	-0.552** (0.217)	-2.165*** (0.223)
10-14 females ratio	-0.408** (0.197)	-1.790*** (0.198)
15-19 females ratio	0.027 (0.065)	-0.139 (0.091)
20-24 females ratio	0.388 (0.297)	-0.460 (0.355)
25-60 females ratio	0.444** (0.215)	0.076 (0.257)
61+ females ratio	0.241 (0.295)	-0.455 (0.330)
Female head	0.214* (0.110)	0.297** (0.128)
Education of head	0.084*** (0.005)	0.096*** (0.005)
Agriculture	-0.019 (0.067)	-0.134* (0.071)
Agriculture wage labour	-0.347*** (0.076)	-0.561*** (0.082)
Non-agriculture wage labour	-0.354*** (0.077)	-0.443*** (0.082)
Artisan	-0.179* (0.093)	-0.328*** (0.120)
Petty trade	-0.079 (0.112)	0.093 (0.118)
Organised trade/business	0.047 (0.118)	0.037 (0.123)
Others(pension/rent, others)	-0.174* (0.104)	-0.140 (0.125)
SC	-0.391*** (0.108)	-0.753*** (0.142)
ST	-0.478*** (0.139)	-1.001*** (0.174)
OBC	-0.167 (0.103)	-0.534*** (0.138)
Other	-0.072 (0.109)	-0.359** (0.142)
Muslim	-0.509*** (0.088)	-0.555*** (0.113)
Other religion	0.057 (0.133)	-0.033 (0.139)
Constant	-8.247*** (2.727)	-6.051** (2.614)
Observations	23,484	21,850
R-squared	0.566	0.447
Mean of dependent variable	0.196	-0.211

Source: IHDS-I data.

Note: Each column shows the estimated effects of individual- and household-level characteristics on children's length of schooling - column (1) for all children regardless of gender, column (2) for boys, and column (3) for girls. Standard errors are clustered at the community level in parentheses (* p < 0.10, ** p < 0.05, *** p < 0.01).

Table 4.12: Effect of child- and household-level variables on length of schooling - 6-9 age cohort - IHDS 2005.

	(1) Boys - Neighborhood FE	(2) Girls - Neighborhood FE
Annual consumption/capita (log)	0.599 (0.577)	1.130** (0.537)
Square of annual consumption/capita	-0.026 (0.033)	-0.055* (0.031)
Age	0.651*** (0.015)	0.656*** (0.017)
0-4 males ratio	-0.529** (0.233)	-0.656** (0.273)
5-9 males ratio	-0.055 (0.181)	0.060 (0.242)
10-14 males ratio	-0.271 (0.226)	0.026 (0.276)
15-19 males ratio	0.844 (0.613)	-0.266 (0.791)
20-24 males ratio	0.030 (0.522)	-0.499 (0.466)
25-60 males ratio	-0.206 (0.253)	-0.261 (0.255)
61+ males ratio	0.164 (0.335)	0.083 (0.371)
0-4 females ratio	-0.500** (0.239)	-0.553** (0.255)
5-9 females ratio	0.010 (0.214)	-0.350* (0.198)
10-14 females ratio	-0.359 (0.218)	-0.294 (0.272)
15-19 females ratio	-0.173** (0.083)	0.043 (0.108)
20-24 females ratio	-0.179 (0.346)	-0.562* (0.337)
25-60 females ratio	0.018 (0.227)	-0.052 (0.250)
61+ females ratio	-0.173 (0.292)	0.029 (0.304)
Female head	-0.102 (0.122)	0.009 (0.112)
Education of head	0.014*** (0.004)	0.018*** (0.005)
Agriculture	-0.026 (0.071)	-0.097 (0.074)
Agriculture wage labour	-0.080 (0.078)	-0.143* (0.082)
Non-agriculture wage labour	-0.075 (0.077)	-0.114 (0.084)
Artisan	-0.114 (0.111)	-0.039 (0.117)
Petty trade	-0.097 (0.109)	-0.052 (0.119)
Organised trade/business	-0.006 (0.109)	0.034 (0.137)
Others(pension/rent, others)	-0.078 (0.115)	0.046 (0.132)
SC	-0.219** (0.106)	-0.058 (0.126)
ST	-0.258* (0.140)	-0.056 (0.147)
OBC	-0.158 (0.101)	0.008 (0.125)
Other	-0.135 (0.112)	0.037 (0.133)
Muslim	-0.151* (0.082)	-0.054 (0.081)
Other religion	-0.128 (0.106)	-0.091 (0.110)
Constant	-7.602*** (2.557)	-10.142*** (2.363)
Observations	6,816	6,211
R-squared	0.411	0.433
Mean of dependent variable	0.0192	-0.0207

Source: IHDS-I data.

Note: Each column shows the estimated effects of individual- and household-level characteristics on children's length of schooling - column (1) for all children regardless of gender, column (2) for boys, and column (3) for girls. Standard errors are clustered at the community level in parentheses (* p < 0.10, ** p < 0.05, *** p < 0.01).

Table 4.13: Effect of child- and household-level variables on length of schooling - 10-12 age cohort - IHDS 2005.

	(1)	(2)
	Boys - Neighborhood FE	Girls - Neighborhood FE
Annual consumption/capita (log)	2.114** (0.976)	1.901** (0.966)
Square of annual consumption/capita	-0.099* (0.053)	-0.090* (0.054)
Age	0.677*** (0.030)	0.624*** (0.036)
0-4 males ratio	-1.680*** (0.496)	-1.544*** (0.522)
5-9 males ratio	-0.798** (0.339)	-0.682* (0.381)
10-14 males ratio	-0.948*** (0.305)	-0.671* (0.378)
15-19 males ratio	-1.052 (0.778)	0.848 (0.871)
20-24 males ratio	-0.763 (0.602)	-1.430** (0.692)
25-60 males ratio	-0.348 (0.388)	0.408 (0.461)
61+ males ratio	-0.391 (0.573)	1.031* (0.584)
0-4 females ratio	-1.289** (0.501)	-0.772 (0.539)
5-9 females ratio	-0.053 (0.341)	-0.669* (0.404)
10-14 females ratio	-0.052 (0.331)	-1.329*** (0.356)
15-19 females ratio	0.055 (0.117)	-0.205 (0.142)
20-24 females ratio	-0.550 (0.613)	0.191 (0.800)
25-60 females ratio	0.411 (0.382)	1.060** (0.458)
61+ females ratio	0.071 (0.446)	0.632 (0.554)
Female head	0.182 (0.174)	0.107 (0.203)
Education of head	0.054*** (0.008)	0.063*** (0.008)
Agriculture	-0.017 (0.101)	0.008 (0.128)
Agriculture wage labour	-0.168 (0.115)	-0.126 (0.140)
Non-agriculture wage labour	-0.356*** (0.118)	-0.197 (0.138)
Artisan	-0.252 (0.174)	-0.182 (0.215)
Petty trade	0.114 (0.184)	0.140 (0.202)
Organised trade/business	0.120 (0.189)	-0.028 (0.198)
Others(pension/rent, others)	-0.176 (0.179)	-0.173 (0.198)
SC	-0.438** (0.180)	-0.312 (0.222)
ST	-0.369 (0.225)	-0.253 (0.263)
OBC	-0.199 (0.170)	-0.265 (0.214)
Other	-0.095 (0.178)	-0.085 (0.220)
Muslim	-0.514*** (0.156)	-0.215 (0.161)
Other religion	0.282 (0.178)	0.095 (0.199)
Constant	-17.645*** (4.464)	-16.283*** (4.326)
Observations	5,584	5,174
R-squared	0.324	0.312
Mean of dependent variable	0.0448	-0.0487

Source: IHDS-I data.

Note: Each column shows the estimated effects of individual- and household-level characteristics on children's length of schooling - column (1) for all children regardless of gender, column (2) for boys, and column (3) for girls. Standard errors are clustered at the community level in parentheses (* p < 0.10, ** p < 0.05, *** p < 0.01).

Table 4.14: Effect of child- and household-level variables on length of schooling - 13-15 age cohort - IHDS 2005.

	(1)	(2)
	Boys - Neighborhood FE	Girls - Neighborhood FE
Annual consumption/capita (log)	1.828 (1.763)	6.075*** (1.791)
Square of annual consumption/capita	-0.069 (0.097)	-0.300*** (0.098)
Age	0.592*** (0.056)	0.294*** (0.063)
0-4 males ratio	-2.410** (0.985)	-2.491** (0.974)
5-9 males ratio	-0.768 (0.550)	-1.600*** (0.614)
10-14 males ratio	-0.911** (0.394)	-0.172 (0.496)
15-19 males ratio	-1.532** (0.687)	-1.130 (1.293)
20-24 males ratio	-1.137* (0.664)	-0.829 (0.828)
25-60 males ratio	-0.742 (0.554)	0.478 (0.688)
61+ males ratio	0.055 (0.690)	0.694 (0.904)
0-4 females ratio	-2.609*** (0.803)	0.249 (0.975)
5-9 females ratio	-0.441 (0.588)	-0.740 (0.640)
10-14 females ratio	0.175 (0.417)	-0.729* (0.414)
15-19 females ratio	0.010 (0.127)	0.074 (0.214)
20-24 females ratio	1.692*** (0.626)	0.532 (0.823)
25-60 females ratio	0.811 (0.508)	1.000 (0.686)
61+ females ratio	0.320 (0.641)	1.865** (0.779)
Female head	0.003 (0.263)	0.522* (0.287)
Education of head	0.098*** (0.011)	0.124*** (0.013)
Agriculture	0.160 (0.151)	0.061 (0.153)
Agriculture wage labour	-0.290 (0.189)	-0.358* (0.198)
Non-agriculture wage labour	-0.379** (0.180)	-0.301 (0.194)
Artisan	-0.053 (0.215)	-0.531** (0.259)
Petty trade	-0.011 (0.278)	0.223 (0.292)
Organised trade/business	-0.123 (0.278)	0.406 (0.281)
Others(pension/rent, others)	-0.211 (0.229)	0.182 (0.271)
SC	-0.450* (0.237)	-0.782*** (0.284)
ST	-0.657** (0.314)	-1.101*** (0.401)
OBC	-0.164 (0.223)	-0.512* (0.276)
Other	0.044 (0.241)	-0.115 (0.287)
Muslim	-0.504** (0.236)	-0.797*** (0.249)
Other religion	0.220 (0.245)	0.006 (0.286)
Constant	-18.365** (7.944)	-34.188*** (8.242)
Observations	5,201	4,911
R-squared	0.300	0.307
Mean of dependent variable	0.173	-0.184

Source: IHDS-I data.

Note: Each column shows the estimated effects of individual- and household-level characteristics on children's length of schooling - column (1) for all children regardless of gender, column (2) for boys, and column (3) for girls. Standard errors are clustered at the community level in parentheses (* p < 0.10, ** p < 0.05, *** p < 0.01).

Table 4.15: Effect of child- and household-level variables on length of schooling - 16-19 age cohort - IHDS 2005.

	(1) Boys - Neighborhood FE	(2) Girls - Neighborhood FE
Annual consumption/capita (log)	3.865** (1.635)	4.692*** (1.690)
Square of annual consumption/capita	-0.165* (0.088)	-0.217** (0.092)
Age	0.227*** (0.044)	-0.031 (0.048)
0-4 males ratio	-2.309** (1.034)	-3.872*** (0.970)
5-9 males ratio	-1.372 (0.861)	-1.932* (1.011)
10-14 males ratio	-0.967 (0.588)	-1.607** (0.812)
15-19 males ratio	-2.640*** (0.698)	-2.586* (1.377)
20-24 males ratio	-1.912*** (0.578)	-2.564*** (0.706)
25-60 males ratio	0.573 (0.640)	-1.752** (0.743)
61+ males ratio	0.491 (0.833)	-0.701 (0.987)
0-4 females ratio	-3.398*** (1.177)	-3.406*** (0.970)
5-9 females ratio	-0.305 (0.929)	-0.745 (1.009)
10-14 females ratio	-0.132 (0.592)	-0.670 (0.851)
15-19 females ratio	0.328* (0.170)	0.088 (0.213)
20-24 females ratio	-0.103 (0.636)	0.282 (0.865)
25-60 females ratio	1.345* (0.695)	1.294 (0.788)
61+ females ratio	1.363 (0.840)	0.531 (0.966)
Female head	0.776*** (0.292)	0.250 (0.341)
Education of head	0.184*** (0.014)	0.203*** (0.017)
Agriculture	-0.062 (0.186)	-0.409** (0.189)
Agriculture wage labour	-0.959*** (0.231)	-1.389*** (0.233)
Non-agriculture wage labour	-0.857*** (0.228)	-1.346*** (0.220)
Artisan	-0.669** (0.288)	-0.898*** (0.331)
Petty trade	-0.341 (0.315)	0.014 (0.367)
Organised trade/business	0.148 (0.289)	-0.038 (0.339)
Others(pension/rent, others)	-0.234 (0.286)	-0.493 (0.304)
SC	-0.432 (0.317)	-1.975*** (0.375)
ST	-0.451 (0.402)	-2.280*** (0.435)
OBC	-0.059 (0.290)	-1.309*** (0.352)
Other	0.095 (0.299)	-1.055*** (0.366)
Muslim	-1.130*** (0.284)	-1.342*** (0.330)
Other religion	-0.390 (0.409)	0.090 (0.391)
Constant	-24.581*** (7.711)	-22.103*** (7.848)
Observations	5,883	5,554
R-squared	0.315	0.340
Mean of dependent variable	0.562	-0.596

Source: IHDS-I data.

Note: Each column shows the estimated effects of individual- and household-level characteristics on children's length of schooling - column (1) for all children regardless of gender, column (2) for boys, and column (3) for girls. Standard errors are clustered at the community level in parentheses (* p < 0.10, ** p < 0.05, *** p < 0.01).

2012

Table 4.16: Effect of child- and household-level variables on length of schooling - 6-19 age cohort - IHDS 2012.

	(1)	(2)
	Boys - Neighborhood FE	Girls - Neighborhood FE
Annual consumption/capita (log)	2.656*** (0.821)	0.366 (0.893)
Square of annual consumption/capita	-0.094*** (0.033)	-0.000 (0.036)
10-12 yo	2.796*** (0.049)	2.698*** (0.054)
13-15 yo	5.133*** (0.062)	4.847*** (0.071)
16-19 yo	6.591*** (0.076)	5.931*** (0.102)
0-4 males ratio	-1.456*** (0.270)	-2.725*** (0.298)
5-9 males ratio	-0.959*** (0.178)	-1.667*** (0.231)
10-14 males ratio	-0.947*** (0.161)	-0.887*** (0.229)
15-19 males ratio	-0.169 (0.299)	0.472 (0.565)
20-24 males ratio	-1.311*** (0.306)	-2.590*** (0.312)
25-60 males ratio	-0.241 (0.219)	-1.166*** (0.272)
61+ males ratio	-0.548** (0.270)	-1.220*** (0.302)
0-4 females ratio	-1.245*** (0.271)	-2.520*** (0.284)
5-9 females ratio	-0.972*** (0.214)	-1.313*** (0.210)
10-14 females ratio	-0.385** (0.175)	-1.383*** (0.173)
15-19 females ratio	0.011 (0.064)	-0.255** (0.100)
20-24 females ratio	0.305 (0.284)	-0.409 (0.345)
25-60 females ratio	0.321 (0.198)	-0.058 (0.224)
61+ females ratio	0.194 (0.247)	-0.470 (0.291)
Female head	0.211** (0.095)	0.167 (0.107)
Education of head	0.056*** (0.004)	0.072*** (0.005)
Agriculture	0.089 (0.066)	-0.087 (0.074)
Agriculture wage labour	-0.210** (0.084)	-0.420*** (0.095)
Non-agriculture wage labour	-0.254*** (0.072)	-0.425*** (0.082)
Artisan	0.150 (0.189)	0.149 (0.216)
Petty trade	0.005 (0.080)	0.047 (0.088)
Organised trade/business	0.050 (0.177)	0.041 (0.233)
Others(pension/rent, others)	0.037 (0.104)	-0.264** (0.113)
SC	-0.354*** (0.112)	-0.570*** (0.143)
ST	-0.556*** (0.143)	-0.772*** (0.190)
OBC	-0.184* (0.108)	-0.429*** (0.140)
Other	-0.187 (0.117)	-0.219 (0.144)
Muslim	-0.525*** (0.106)	-0.517*** (0.116)
Other religion	0.132 (0.146)	0.198* (0.120)
Constant	-21.405*** (5.103)	-6.181 (5.494)
Observations	19,522	18,644
R-squared	0.664	0.604
Mean of dependent variable	-0.0156	0.0186

Source: IHDS-II data.

Note: Each column shows the estimated effects of individual- and household-level characteristics on children's length of schooling - column (1) for all children regardless of gender, column (2) for boys, and column (3) for girls. Standard errors are clustered at the community level in parentheses (* p < 0.10, ** p < 0.05, *** p < 0.01).

Table 4.17: Effect of child- and household-level variables on length of schooling - 6-9 age cohort - IHDS 2012.

	(1) Boys - Neighborhood FE	(2) Girls - Neighborhood FE
Annual consumption/capita (log)	2.769*** (0.975)	1.034 (1.077)
Square of annual consumption/capita	-0.111*** (0.040)	-0.037 (0.044)
Age	0.725*** (0.018)	0.742*** (0.018)
0-4 males ratio	-0.110 (0.261)	-0.868*** (0.265)
5-9 males ratio	0.046 (0.196)	-0.480* (0.247)
10-14 males ratio	0.019 (0.256)	-0.580** (0.274)
15-19 males ratio	0.343 (0.818)	-1.680 (1.060)
20-24 males ratio	0.112 (0.486)	-0.635 (0.445)
25-60 males ratio	-0.230 (0.280)	-0.798*** (0.308)
61+ males ratio	-0.446 (0.349)	-1.140*** (0.347)
0-4 females ratio	-0.422 (0.261)	-0.554* (0.286)
5-9 females ratio	0.206 (0.236)	0.129 (0.203)
10-14 females ratio	-0.291 (0.246)	-0.534** (0.270)
15-19 females ratio	-0.033 (0.112)	0.140 (0.157)
20-24 females ratio	-0.401 (0.380)	-0.268 (0.385)
25-60 females ratio	0.202 (0.258)	0.039 (0.285)
61+ females ratio	0.341 (0.281)	-0.018 (0.324)
Female head	-0.041 (0.112)	-0.179* (0.092)
Education of head	0.004 (0.005)	0.007 (0.005)
Agriculture	0.021 (0.073)	-0.012 (0.077)
Agriculture wage labour	0.050 (0.091)	-0.088 (0.091)
Non-agriculture wage labour	0.077 (0.077)	-0.029 (0.078)
Artisan	0.439** (0.186)	0.019 (0.206)
Petty trade	0.014 (0.089)	0.031 (0.095)
Organised trade/business	0.236 (0.213)	-0.008 (0.264)
Others(pension/rent, others)	0.136 (0.123)	-0.043 (0.102)
SC	0.139 (0.118)	0.115 (0.126)
ST	-0.057 (0.139)	-0.095 (0.143)
OBC	0.100 (0.113)	0.069 (0.122)
Other	0.178 (0.120)	0.074 (0.134)
Muslim	-0.088 (0.094)	-0.111 (0.112)
Other religion	-0.037 (0.134)	-0.088 (0.128)
Constant	-22.720*** (5.946)	-12.170* (6.574)
Observations	5,507	5,112
R-squared	0.485	0.499
Mean of dependent variable	-0.0307	0.0327

Source: IHDS-II data.

Note: Each column shows the estimated effects of individual- and household-level characteristics on children's length of schooling - column (1) for all children regardless of gender, column (2) for boys, and column (3) for girls. Standard errors are clustered at the community level in parentheses (* p < 0.10, ** p < 0.05, *** p < 0.01).

Table 4.18: Effect of child- and household-level variables on length of schooling - 10-12 age cohort - IHDS 2012.

	(1)	(2)
	Boys - Neighborhood FE	Girls - Neighborhood FE
Annual consumption/capita (log)	3.218** (1.590)	0.219 (1.716)
Square of annual consumption/capita	-0.123* (0.065)	0.000 (0.070)
Age	0.869*** (0.033)	0.750*** (0.036)
0-4 males ratio	-1.892*** (0.526)	-0.950* (0.568)
5-9 males ratio	-0.139 (0.345)	-0.772** (0.371)
10-14 males ratio	-0.366 (0.289)	-0.389 (0.384)
15-19 males ratio	-0.210 (0.863)	0.682 (0.963)
20-24 males ratio	-1.458** (0.625)	-0.829 (0.716)
25-60 males ratio	-0.246 (0.391)	-0.656 (0.484)
61+ males ratio	-0.436 (0.525)	-0.666 (0.584)
0-4 females ratio	-0.091 (0.526)	-1.788*** (0.622)
5-9 females ratio	-0.092 (0.365)	-0.085 (0.393)
10-14 females ratio	-0.097 (0.335)	-0.921*** (0.349)
15-19 females ratio	-0.104 (0.144)	-0.182 (0.163)
20-24 females ratio	-0.664 (0.628)	-0.893 (0.815)
25-60 females ratio	-0.089 (0.375)	0.395 (0.409)
61+ females ratio	0.062 (0.440)	-0.087 (0.486)
Female head	0.171 (0.158)	0.137 (0.172)
Education of head	0.038*** (0.008)	0.040*** (0.008)
Agriculture	0.051 (0.125)	-0.022 (0.135)
Agriculture wage labour	-0.175 (0.160)	-0.080 (0.160)
Non-agriculture wage labour	-0.112 (0.134)	-0.188 (0.139)
Artisan	0.356 (0.316)	-0.064 (0.307)
Petty trade	0.146 (0.157)	0.188 (0.169)
Organised trade/business	0.028 (0.260)	0.066 (0.276)
Others(pension/rent, others)	0.019 (0.186)	-0.020 (0.202)
SC	-0.108 (0.191)	-0.417* (0.223)
ST	-0.439* (0.237)	-0.507* (0.278)
OBC	-0.057 (0.185)	-0.316 (0.213)
Other	-0.283 (0.190)	-0.364 (0.231)
Muslim	-0.394** (0.184)	-0.358* (0.210)
Other religion	0.277 (0.242)	0.343 (0.266)
Constant	-30.212*** (9.803)	-10.095 (10.591)
Observations	4,612	4,220
R-squared	0.354	0.358
Mean of dependent variable	-0.0125	0.0141

Source: IHDS-II data.

Note: Each column shows the estimated effects of individual- and household-level characteristics on children's length of schooling - column (1) for all children regardless of gender, column (2) for boys, and column (3) for girls. Standard errors are clustered at the community level in parentheses (* p < 0.10, ** p < 0.05, *** p < 0.01).

Table 4.19: Effect of child- and household-level variables on length of schooling - 13-15 age cohort - IHDS 2012.

	(1)	(2)
	Boys - Neighborhood FE	Girls - Neighborhood FE
Annual consumption/capita (log)	4.648*** (1.626)	5.799*** (1.930)
Square of annual consumption/capita	-0.177*** (0.064)	-0.226*** (0.078)
Age	0.765*** (0.059)	0.586*** (0.054)
0-4 males ratio	-1.881** (0.915)	-0.857 (0.881)
5-9 males ratio	-1.446*** (0.550)	-0.434 (0.591)
10-14 males ratio	-1.130*** (0.353)	0.308 (0.471)
15-19 males ratio	-0.139 (0.557)	0.199 (0.863)
20-24 males ratio	-1.738*** (0.628)	0.030 (0.722)
25-60 males ratio	-0.292 (0.483)	0.359 (0.672)
61+ males ratio	-0.384 (0.536)	-0.223 (0.583)
0-4 females ratio	-0.034 (0.875)	-1.218 (0.824)
5-9 females ratio	-1.074** (0.529)	0.315 (0.583)
10-14 females ratio	-0.723* (0.433)	0.079 (0.320)
15-19 females ratio	-0.337*** (0.119)	-0.063 (0.155)
20-24 females ratio	0.111 (0.659)	0.974 (0.847)
25-60 females ratio	0.397 (0.438)	0.185 (0.520)
61+ females ratio	-0.228 (0.516)	0.262 (0.575)
Female head	0.273 (0.222)	0.092 (0.254)
Education of head	0.057*** (0.011)	0.075*** (0.011)
Agriculture	0.317** (0.148)	-0.097 (0.161)
Agriculture wage labour	-0.125 (0.191)	-0.734*** (0.201)
Non-agriculture wage labour	-0.183 (0.164)	-0.592*** (0.166)
Artisan	0.172 (0.473)	0.544 (0.529)
Petty trade	0.193 (0.180)	-0.036 (0.192)
Organised trade/business	0.545* (0.297)	-0.131 (0.459)
Others(pension/rent, others)	0.159 (0.245)	-0.079 (0.242)
SC	-0.532** (0.215)	-0.889*** (0.253)
ST	-0.785*** (0.259)	-1.328*** (0.344)
OBC	-0.325 (0.198)	-0.731*** (0.237)
Other	-0.317 (0.226)	-0.375 (0.261)
Muslim	-0.551** (0.231)	-0.385 (0.283)
Other religion	-0.398 (0.336)	0.063 (0.312)
Constant	-40.051*** (10.239)	-44.552*** (11.995)
Observations	4,312	4,080
R-squared	0.297	0.311
Mean of dependent variable	0.0305	-0.0317

Source: IHDS-II data.

Note: Each column shows the estimated effects of individual- and household-level characteristics on children's length of schooling - column (1) for all children regardless of gender, column (2) for boys, and column (3) for girls. Standard errors are clustered at the community level in parentheses (* p < 0.10, ** p < 0.05, *** p < 0.01).

Table 4.20: Effect of child- and household-level variables on length of schooling - 16-19 age cohort - IHDS 2012.

	(1)	(2)
	Boys - Neighborhood FE	Girls - Neighborhood FE
Annual consumption/capita (log)	9.288*** (2.169)	4.807** (2.345)
Square of annual consumption/capita	-0.346*** (0.085)	-0.167* (0.093)
Age	0.250*** (0.041)	0.044 (0.048)
0-4 males ratio	-1.269 (1.138)	-2.234* (1.148)
5-9 males ratio	0.097 (1.039)	0.774 (1.047)
10-14 males ratio	0.089 (0.587)	0.123 (0.805)
15-19 males ratio	-2.461*** (0.519)	-0.718 (1.379)
20-24 males ratio	-1.262** (0.635)	-1.700** (0.741)
25-60 males ratio	0.614 (0.593)	-0.184 (0.790)
61+ males ratio	0.967 (0.718)	0.581 (0.952)
0-4 females ratio	0.004 (1.248)	-2.564** (1.089)
5-9 females ratio	-2.234** (1.050)	-1.618 (1.189)
10-14 females ratio	0.925* (0.548)	-0.560 (0.825)
15-19 females ratio	0.423*** (0.151)	0.016 (0.220)
20-24 females ratio	1.017* (0.603)	1.379 (0.844)
25-60 females ratio	2.100*** (0.606)	1.390* (0.776)
61+ females ratio	1.837*** (0.644)	1.692* (0.926)
Female head	0.444** (0.225)	0.304 (0.282)
Education of head	0.136*** (0.012)	0.157*** (0.014)
Agriculture	0.115 (0.168)	-0.093 (0.208)
Agriculture wage labour	-0.520** (0.220)	-0.761*** (0.267)
Non-agriculture wage labour	-0.783*** (0.199)	-0.983*** (0.233)
Artisan	-0.202 (0.545)	-0.212 (0.530)
Petty trade	0.064 (0.221)	0.088 (0.250)
Organised trade/business	-0.639 (0.532)	0.320 (0.582)
Others(pension/rent, others)	-0.219 (0.240)	-0.116 (0.360)
SC	-1.030*** (0.339)	-0.851** (0.423)
ST	-1.014** (0.438)	-1.124** (0.539)
OBC	-0.522 (0.330)	-0.300 (0.415)
Other	-0.510 (0.346)	-0.034 (0.414)
Muslim	-1.137*** (0.300)	-1.386*** (0.332)
Other religion	0.049 (0.398)	0.702* (0.393)
Constant	-66.280*** (13.848)	-34.645** (14.814)
Observations	5,091	5,232
R-squared	0.320	0.276
Mean of dependent variable	0.184	-0.176

Source: IHDS-II data.

Note: Each column shows the estimated effects of individual- and household-level characteristics on children's length of schooling - column (1) for all children regardless of gender, column (2) for boys, and column (3) for girls. Standard errors are clustered at the community level in parentheses (* p < 0.10, ** p < 0.05, *** p < 0.01).

GENERAL CONCLUSION

Achieving gender equality and empowering all women and girls is one of the 17 Sustainable Development Goals highlighted by the United Nations to be achieved by 2030. Despite significant progress toward this goal, women and girls continue to face substantial gender inequalities, particularly in regions dominated by traditional and sexist social norms. However, promoting gender equality is not only a matter of fairness but also crucial for fostering more resilient and prosperous societies. Indeed, countries with higher levels of gender equality benefit from enhanced economic growth, reduced poverty, and more inclusive social development (The World Bank 2022).

This dissertation specifically focuses on India, a country located in South Asia, one of the most unequal regions in the world alongside the Middle East and North Africa—where approximately 63% of the gender gap has been closed to date, compared to 75% or more in Latin America, the Caribbean, and Europe, according to the Global Gender Gap Index (2023). India is particularly marked by gender inequalities, ranking 127th out of 146 countries according to the same index. Rural areas, where nearly 65% of the population resides, offer an especially relevant case for analyzing gender disparities. These regions are more likely to be governed by traditional social structures that reinforce patriarchal norms and gender roles, compared to urban areas.

The aim of this dissertation was to examine gender inequalities in rural India, focusing on two key aspects: "new" determinants of gender inequality—new, on the one hand, because of the contemporary relevance and, on the other hand, due to the limited empirical evidence available—and factors that can sustainably address and reduce these disparities.

The first two chapters examine factors contributing to gender inequalities affecting women in adulthood. Chapter 1 focuses on a contemporary driver, climate change, while Chapter 2 investigates a lesser-studied factor: financial decision-making power. Both chapters highlight how these drivers impact differently women and men, particularly in the labor market (Chapters 1 and 2) and the credit market (Chapter 2). The latter two chapters investigate factors that, beginning in childhood, can help reduce gender disparities and promote a more equitable society in India. Chapter 3 examines the role of adolescence in shaping traditional social norms and the intergenerational transmission of more egalitarian values. Chapter 4 focuses on the role of community variables in explaining recent progress in reducing gender inequality in education.

Main findings

The results of Chapter 1 highlight a contemporary factor contributing to gender inequality: climate change. In the rural Indian context, this was measured through the occurrence of drought shocks during the monsoon season. The analysis reveals that these climate shocks have gender-specific effects on agricultural employment. Notably, only women—particularly those residing in districts where rice is the primary crop—experience a reduction in the number of days worked in the agricultural sector. Moreover, irrigation does not mitigate this effect; rather, it exacerbates the negative consequences of drought shocks on women’s agricultural employment. This finding contrasts with the outcome for men, for whom irrigation alleviates the negative effects of drought shocks on the number of days worked in agriculture. Consequently, a small number of women—though a minority, given the limited opportunities available—shift their labor supply to the non-agricultural sector. These results call on policymakers to address the negative effects of drought shocks, which are likely to become more frequent due to climate change, on women’s employment outcomes. This chapter contributes to the literature on climate shocks, particularly rainfall variation and drought, by examining their impacts on rural households with a specific focus on gender-differentiated effects.

The findings of Chapter 2, based on an exploratory analysis using descriptive statistics, indicate that decision-making power does not consistently lead to women’s empowerment by enhancing their status within households. In rural Tamil Nadu, financial decision-making power tends to worsen gender inequalities in employment and indebtedness. Specifically, it increases the precariousness of women, who are over-represented in casual agricultural jobs, public-sector positions, and debt. In contrast, for men, decision-making power

is associated with higher involvement in self-employment, particularly in the non-agricultural sector. Additionally, heterogeneity analyses show that the effects of decision-making power on gender inequalities in labor and credit markets depend on household economic conditions, such as land ownership, wealth, indebtedness, or assets value. Notably, the rise in employment precarity is observed only among women in landowning and wealthiest households, while the link between decision-making power and self-employment in the non-agricultural sector is seen only for men in households with the lowest assets values. This chapter adds to the existing literature on gender inequalities by illustrating how financial decision-making power within households influences gendered labor market outcomes and indebtedness in rural India. It highlights the importance of reassessing, particularly for policymakers, the assumption that decision-making power universally empowers women, especially in contexts with deeply entrenched gender inequalities.

Following the examination of "new" determinants of gender inequality, the final two chapters focus on how to achieve long-term reductions in gender inequality. The findings from these chapters demonstrate, on one hand, the importance of adolescence in challenging entrenched sexist social norms and in fostering the intergenerational transmission of more egalitarian norms (Chapter 3), and on the other, the role of community factors in recent progress toward reducing educational gender inequalities in rural India (Chapter 4).

Specifically, Chapter 3 demonstrates that mothers who were exposed to a female village council president during their adolescence, compared to adulthood, have higher aspirations for their daughters and raise their children in a more egalitarian manner. Their daughters are more likely to stay in school longer and less likely to engage exclusively in child labor. Moreover, these girls have improved career aspirations, thus narrowing the gender gap in employment expectations—a clear sign of changing traditional social norms and the intergenerational transmission of more egalitarian values. Overall, these results underscore the importance of interventions aimed at shaping social norms during adolescence. In doing so, this chapter builds on the literature that identifies adolescence as a critical period for challenging traditional and sexist social norms, as well as their intergenerational transmission. It also contributes to the body of research on the indirect effects of gender quotas in rural India, providing evidence of long-term indirect effects on reducing gender inequalities in childhood.

Chapter 4, in turn, highlights the importance of village infrastructure, social

environment, and media exposure in reducing educational gender inequalities. However, the impact of these factors varies by the age cohort of the children. For younger children, the reduction in gender disparities is primarily driven by infrastructure and social environment, whereas for older children, media exposure appears to be the most influential factor. This chapter aligns closely with the existing literature on gender inequalities in rural India, particularly with regard to interventions aimed at reducing these disparities. Its contribution lies in the consideration of community-level factors, employing a method commonly used in analyses of the gender earnings gap, which helps explain the progress made over recent decades. In doing so, it provides evidence that policy interventions targeting the improvement of village-level conditions represent a compelling strategy for addressing gender disparities in schooling.

Discussion and ideas for future research

Like any research study, this dissertation has limitations that can be addressed in future works.

First, regarding the first chapter, together with my co-author Véronique Gille, we aim to deepen our understanding of the mechanisms related to the gender-differentiated negative impact of drought shocks on agricultural employment. On the one hand, we will further analyze the role of irrigation. Our results highlight its exacerbating effect for women and its mitigating effect for men concerning the impacts of drought shocks on agricultural employment. To this end, we plan to utilize the comprehensive irrigation data from the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), focusing particularly on the source of irrigation (e.g., canals, reservoirs, wells, etc.).

Additionally, since our main findings primarily concern women residing in rice-growing districts, it seems relevant to examine the role of mechanization. Rice is a relatively less mechanized crop, so labor demand adjustments could be more significant during agricultural shocks, such as droughts.

Finally, as a robustness check, we will revise our definition of drought shocks by considering the entire year instead of just the monsoon period. The goal is to either confirm our main results or identify potential changes related to the chosen definition of drought shocks.

For the second chapter, the primary objective of future research will be to deepen the exploratory analysis of the role of financial decision-making power in relation to gender inequalities in labor and credit markets. Within the household and individual questionnaires of the Networks, Employment, Debt, Mobility,

and Skills in India (NEEMSI) survey, detailed information on indebtedness (such as loan sources and actual loan utilization) and working conditions (type of activity, work-related issues, risks, discrimination, etc.) can be utilized to further support the finding that financial decision-making power has a precarious effect on women's employment and indebtedness. Additionally, significant effort will be devoted to developing an empirical strategy to explore the causal mechanisms between financial decision-making power and gender inequalities, with the aim of better informing effective policy solutions.

Regarding the third chapter, my co-author, Olivia Bertelli, and I aim to substantiate the mechanism presented, namely: the effect of exposure to gender quotas in politics during adolescence on changes in social norms, and consequently, on the intergenerational transmission of more egalitarian social norms. Within the Young Lives Survey (YLS) data, there are no other variables related to parental perceptions and attitudes, particularly those of mothers, toward social norms. In this context, and considering the size of our analytical sample and the criterion of external validity, it would be valuable to seek other data sources, focusing on other Indian states or India as a whole, in order to replicate our analyses. Such data should include information on parental aspirations and attitudes, as well as on social norms. For example, data from the Demographic and Health Surveys at least provide information related to fertility preferences, particularly regarding the desired number of children by sex.

Finally, as for the fourth and final chapter, future work will focus, on the one hand, on further exploring the role of certain community variables highlighted in relation to educational gender inequalities, particularly exposure to media and the social environment. Indeed, our main results emphasize the importance of the number of newspaper readers, television viewers, as well as the perception of conflicts between communities or the risk of assaults on girls, in relation to their length of schooling. It therefore seems important to understand the mechanisms underlying these findings. On the other hand, since we are using the two waves of the India Human Development Survey (IHDS) – 2005 and 2012 – we will be able to conduct an analysis of the variation in the importance of community variables in relation to educational gender inequalities between these two dates. In other words, this type of analysis will allow us to capture the changing strength of the influence of the community variables highlighted with respect to educational gender inequalities over time. ■

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RÉSUMÉ

L'Inde reste particulièrement marquée par les inégalités de genre et ce, malgré des progrès significatifs pour les filles et les femmes au cours des dernières décennies. Cette thèse est entièrement dédiée à cette thématique. En ce sens, elle poursuit deux objectifs principaux : d'une part, analyser le rôle de déterminants contribuant à la persistance des inégalités de genre et, d'autre part, identifier les leviers permettant à la société indienne de progresser vers une plus grande égalité entre les sexes. Ainsi, les deux premiers chapitres de la thèse étudient l'impact du changement climatique et du pouvoir décisionnel financier au regard des inégalités de genre, notamment sur le marché du travail et en matière d'endettement. Les chapitres suivants reposent sur la question de comment réduire les disparités entre les sexes de façon durable. A cet effet, le troisième chapitre souligne l'importance de l'adolescence en tant que période clé pour remettre en cause les normes sociales sexistes profondément enracinées et promouvoir la transmission intergénérationnelle de valeurs plus égalitaires. Enfin, le quatrième chapitre examine le rôle des facteurs communautaires dans les récents progrès accomplis en matière de réduction des inégalités de genre dans le domaine de l'éducation. Dans l'ensemble, les résultats de cette étude offrent des perspectives précieuses sur les déterminants contemporains des inégalités de genre, ainsi que sur les interventions, à la fois individuelles et communautaires, nécessaires à la société indienne pour se rapprocher d'une égalité entre les sexes.

MOTS CLÉS

Genre, inégalités, économie de l'éducation, économie du travail, microéconomie, Inde.

ABSTRACT

This dissertation examines gender inequalities in rural India, where, despite significant progress in recent decades, these disparities remain widespread. The study has two main objectives: first, to analyze the role of determinants that contribute to the persistence of gender inequalities, and second, to identify the factors that could support Indian society in moving toward greater gender equality. To meet these objectives, the first two chapters explore the impact of climate change and financial decision-making power on gender disparities in the labor market and indebtedness. The following chapters focus on sustainable approaches to reducing gender inequality. Chapter three emphasizes adolescence as a pivotal period for challenging deeply rooted sexist social norms, thereby fostering the intergenerational transmission of more egalitarian values. The fourth and final chapter investigates the role of community factors in the recent advancements toward reducing gender disparities in education. Overall, this research provides valuable insights into the contemporary drivers of gender inequality and the individual and community-level interventions required for Indian society to progress toward gender equality.

KEYWORDS

Gender, inequalities, education economics, labor economics, microeconomics, India.