Beyond a Free Lunch: Unintended Consequences of an Out-of-School Nutrition Program on Adolescent Girls' School Enrollment

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Abstract

We study the impact of a large-scale nutritional program designed to enhance the self-development and empowerment of adolescent girls in India. Using difference-in-differences to identify the causal effect of the policy, we find that the program achieved some of its intended objectives of improving health outcomes of adolescent girls, with the prevalence of anemia falling by 3%. However, the program inadvertently led to adverse effects, including an increased school dropout rate among girls and a widening of the gender disparity in school enrollment by 18%, coupled with a reduction in the average age of marriage. These adverse outcomes are primarily attributed to a program component that ties additional nutritional supplements to being out of school. We find no effect on the girls' reading and math learning outcomes.

Keywords: Girls' School Enrollment, Women Empowerment Programs, Take Home Rations

JEL codes: : J13, J16, J18

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1 Introduction

A central objective of the United Nations Sustainable Development Goals (SDGs) encompasses eradicating poverty, eliminating hunger, and ceasing discrimination against women and girls. The United Nations Children's Fund (UNICEF) reports that adolescent girls, defined as individuals aged between 10 and 19 years, constitute approximately 8% of the global population. Notably, India is home to over 18% of the world's adolescent girls, amounting to more than 100 million. Consequently, enhancing the welfare of adolescent girls in India is imperative for the successful attainment of the SDG targets.

An important policy to improve children's schooling and health outcomes is a school-feeding program, which provides meals to school-going kids *in-school*. Parents' of adolescent school-going girls are also less likely to marry them at early ages (Andrew and Adams, 2022). In the context of India, the flagship Midday Meal Scheme has been shown to improve children's learning outcomes (Chakraborty and Jayaraman, 2019). School feeding initiatives can be considered redistributive efforts that offer a social security framework and aid in fostering investments in human capital (Alderman and Bundy, 2012). A cost-effective way of expanding the in-school nutrition program to include out-of-school children is replacing it with take-home ration programs, where families are provided set quantities of food supply *at home*. However, the effects of replacing in-school nutrition programs with take-home ration programs on children's human capital outcomes remain ambiguous.

In this paper, we study the effect of a flagship government of India scheme, the Rajiv Gandhi Scheme for Empowerment of Adolescent Girls (henceforth, SABLA), launched in 2011, aimed at improving the welfare of adolescent girls. SABLA was launched in 205 districts across India. The districts were selected based on a weighted composite index calculated using district-level school dropout rate (50% weight), female literacy rate (20%), child marriage rate (20%), and female labor force participation rate (10%). The scheme aims to provide nutritional support and vocational training to adolescent girls aged 11-18. SABLA's multifaceted approach caters to two distinct groups: out-of-school girls aged 11-14 and girls aged 15-18, regardless of their school enrollment status. SABLA offers informational and educational components designed to empower and elevate the aspirations of girl children. Girls aged 11-14 and out of school are provided hot cooked meals and take-home ration. The vocational training aspect of SABLA is aimed at providing

informal education to out-of-school girls (Millenky, 2016).

We leverage exogenous exposure to the program by year of birth, district, and gender in a difference-in-differences framework to identify the intent to treat (ITT) of SABLA on schooling, health, and marriage outcomes. We provide evidence to potentially rule out parallel-trends violation using an event study framework and placebo tests. We use the 2008-2016 wave Annual Status of Education Report (henceforth, ASER), which collects data on schooling outcomes of children aged 5-16 in rural India. We use the 2020-2021 wave of the National Family Health Survey (henceforth, NFHS-5) for health and marriage outcomes.

Our study reveals varied impacts of the policy on the well-being of adolescent girls. We observed improvements in health indicators: there was a 3% reduction in anemia and a 2.4% decrease in the incidence of low BMI, defined as below the median BMI for the sample, in line with Chatterjee and Poddar (2024). Conversely, we identified an unintended adverse effect related to the scheme's provision of hot-cooked meals and take-home rations for out-of-school girls. This aspect inadvertently incentivized increased school dropouts, exacerbating the gender disparity in dropout rates. Specifically, the dropout rate among girls in the treated cohort rose by 18%, compared to a control mean dropout rate of 5%. The policy showed no significant impact on mathematics and language learning outcomes. Additionally, there was a marginal decrease in the age of marriage for girls, with a reduction of 0.08 years.

We use data from the 2011 Census to examine variations across various district-level indicators. These indicators were formulated based on the criteria used for selecting districts for the program's implementation. Our findings reveal that the unintended increase in school dropouts was more pronounced in districts characterized by higher existing rates of female dropout, lower female literacy, and diminished female labor force participation. Furthermore, at the household level, the impact on girls' school dropout rates was more significant in families where mothers had no formal education and in economically disadvantaged households. Interestingly, we observed no variation in dropout rates concerning fathers' educational level. Lastly, at the village level, our analysis indicates that girls residing in villages without secondary schools were at a higher risk of dropping out.

Substantial literature shows the positive effects of in-school feeding programs on children's human capital (Chakraborty and Jayaraman, 2019; Vermeersch and Kremer, 2005; Gelli et al.,

2019). Alderman and Bundy (2012), employing a randomized controlled trial in Northern Uganda, observed that school attendance among primary school-aged children not previously enrolled in school increased due to an in-school feeding program. Interestingly, the take-home-ration component of the study demonstrated similar effects. This paper contributes to the existing body of research by being among the first to examine THR's impact on adolescents' educational outcomes, specifically noting an unintended negative effect of THR on girls' school enrollment. The heterogeneous results across health and educational outcomes show the multidimensional impact of the program and that otherwise well-intentioned policies can potentially have unintended consequences (Bharadwaj et al., 2020; Calvi and Keskar, 2021).

The remainder of this paper is organized as follows. Section 2 provides a review of the existing literature. Section 3 provides an overview of the institutional background and describes the data employed in the study. Section 4 presents the empirical strategy. Section 5 and Section 6 present the results and robustness checks. Section 7 concludes.

2 Literature Review

Our findings contribute to two distinct strands of literature. Firstly, they add to the literature on the determinants of girls' school enrollment (Muralidharan and Prakash, 2017; Adukia, 2017). Secondly, our research extends the literature exploring the consequences of gender-focused public programs (Dhar et al., 2022) and Chatterjee and Poddar (2020).

Female education significantly impacts labor, marriage, autonomy, child well-being, and the economy. Studies reveal it boosts labor outcomes (Mammen and Paxson, 2000; Luke and Munshi, 2011), shapes marriage timing and husband's education (Breierova and Duflo, 2004; Hahn, Nuzhat, and Yang, 2018), and empowers women in intra-household decisions (Ahmed, Creanga, Gillespie, and Tsui, 2010; Le and Nguyen, 2020). It also lowers fertility rates (Breierova and Duflo, 2004; Kim, 2023) and improves child health and education (Chen and Li, 2009; Lavy and Zablotsky, 2015; Keats, 2018), with broader economic benefits (Behrman, Foster, Rosenweig, and Vashishtha, 1999).

However, girls encounter numerous barriers in accessing education, such as menstrual challenges (Sommer, 2010; Mason, Nyothach, Alexander, Odhiambo, Eleveld, Vulule, Rheingans, Laserson, Mohammed, and Phillips-Howard, 2013; Hennegan, Shannon, Rubli, Schwab, and Melendez-

Torres, 2019), inadequate security, transportation, sanitation (Muralidharan and Prakash, 2017; Adukia, 2017), and household chores (World Bank, 2018).

Governments at both the central and state levels have introduced various initiatives to address these challenges. Notable among them are conditional cash transfers, which provide financial incentives to families when their daughters remain continuously enrolled in formal education and unmarried (Das and Biswas, 2021; Das and Sarkhel, 2023). Another cluster of interventions focuses on enhancing access to education by providing resources such as bicycles (Muralidharan and Prakash, 2017), free school uniforms (Evans, Kremer, and Ngatia, 2008), complimentary school meals (Afridi, 2011), and the construction of sanitation facilities (Adukia, 2017) and libraries (Borkum, He, and Linden, 2012). Additionally, some policies aim to improve children's school enrollment by addressing teachers' absenteeism (Duflo, Hanna, and Ryan, 2012) and parents' education (Banerji, Berry, and Shotland, 2017). Lastly, interventions tackling child morbidity have been implemented to boost school attendance (Bobonis, Miguel, and Puri-Sharma, 2006).

3 Background and Data

3.1 Girls' School Enrollment

In 2009, India took a significant step towards education reform with the enactment of the Right to Education Act. This landmark legislation underscored the significance of education by mandating free schooling for all children aged between six and 14 years. Despite this progressive move, India continues to grapple with alarmingly high dropout rates among girls, with a staggering 4.1 million girls remaining out of school (United Nations Girls' Education Initiative, 2022). This challenge persists in a nation that is home to the world's largest population of illiterate women, surpassing 180 million, and where it ranks 132nd out of 191 countries on the United Nations Development Programme's Human Development Index (Chandra, 2019; Programme, 2022).

A wealth of research underscores the compelling reasons to prioritize the enhancement of girls' access to education. Female education is a linchpin for improved labor outcomes (Mammen and Paxson, 2000; Luke and Munshi, 2011). It also plays a pivotal role in shaping marital outcomes such as the marriage timing and husband's education (Breierova and Duflo, 2004; Hahn, Nuzhat, and Yang, 2018). Additionally, studies by Ahmed, Creanga, Gillespie, and Tsui (2010) and Le and

Nguyen (2020) highlight that educated women have higher intra-household bargaining power. The impact of female education reverberates into lower fertility rates (Breierova and Duflo, 2004; Kim, 2023) and improved child health and education outcomes (Chen and Li, 2009; Lavy and Zablotsky, 2015; Keats, 2018). In culmination, the collective advantages of female education radiate across the broader economic landscape, as emphasized by Behrman, Foster, Rosenweig, and Vashishtha (1999).

Numerous obstacles hinder education access, including economic hardships, cultural norms, and safety concerns (UNESCO, 2015; World Bank, 2018). Girls' vulnerability to dropout is heightened due to menstrual challenges (Sommer, 2010; Mason, Nyothach, Alexander, Odhiambo, Eleveld, Vulule, Rheingans, Laserson, Mohammed, and Phillips-Howard, 2013; Hennegan, Shannon, Rubli, Schwab, and Melendez-Torres, 2019), worsened by inadequate school security, transportation, and sanitation (Muralidharan and Prakash, 2017; Adukia, 2017). Additionally, expectations from girls to help with household chores amplify dropout risks (World Bank, 2018).

In this regard, numerous policies aiming to enhance enrollment and participation in education have been thoroughly examined. A gender-focused analysis of educational initiatives consistently reveals that programs designed to enhance overall school participation are not only effective but, in many cases, even more so for girls. For instance, in India, a strategic initiative was implemented to reduce travel time for girls attending secondary school by providing them with bicycles. This simple intervention resulted in a remarkable 32% surge in girls' enrollment (Muralidharan and Prakash, 2017).

Conditional cash transfers (CCTs) have stood as a prominent policy intervention employed by numerous governments in various developing nations to improve human capital outcomes. Extensive research on CCTs consistently highlights their positive impact on enhancing girls' school enrollment (Fiszbein and Schady, 2009). In India, several states have implemented analogous programs, such as Haryana's "Apni Beti Apna Dhan" initiative and West Bengal's "Kanyashree Prakalpa" program. These initiatives provide cash transfers to families contingent upon their daughters' continuous enrollment in formal education and remaining unmarried. Notably, research conducted by Das and Biswas (2021) and Das and Sarkhel (2023) documents the favorable outcomes of these programs in augmenting female school enrollment. Another effective cost-reduction strategy involves offering subsidies and in-kind transfers, such as free school uniforms and midday meals,

which have remarkably increased both enrollment and attendance rates without requiring strict monitoring (Evans, Kremer, and Ngatia, 2008; Afridi, 2011).

Further, educating parents can significantly impact their understanding of the benefits of schooling and their involvement in their children's education. In a study conducted in India, mothers received literacy training and materials, resulting in a 2% increase in their children's school attendance (Banerji, Berry, and Shotland, 2017).

Addressing teacher absenteeism is another key factor. In India, a reduction in teacher absenteeism through monitoring led to schools being open more frequently, resulting in a 30% increase in the number of instructional days per month, even though student attendance on a daily basis did not change significantly (Duflo, Hanna, and Ryan, 2012). Moreover, policy-makers have explored increasing spending on educational resources to improve enrollment. Adukia (2017) shows that latrine construction in schools increases enrollment in pubescent-age girls. In contrast, an initiative in India that provided infrastructure inputs like libraries did not further increase student attendance (Borkum, He, and Linden, 2012).

Reducing the burden of schooling by addressing child morbidity has also shown promising results. For instance, in India, the Pratham organization provided preschoolers with iron and vitamin A supplementation and deworming medication. This intervention led to a notable increase in weight among participating children and a substantial 8% increase in preschool participation rates, considering a baseline attendance rate of 71% (Bobonis, Miguel, and Puri-Sharma, 2006).

3.2 The SABLA Program

Rajiv Gandhi Scheme for Empowerment of Adolescent Girls (also known as SABLA) is a female adolescent empowerment program which was rolled out in India in selected 205 ditricts in 2011. It was rolled out on April 1, 2011 under the Ministry of Women and Child Development of India. It is a comprehensive intervention for adolescent girls in the age group of 11-18 years, with a focus on out-of school girls. It was supported with the infrastructure of Integrated Child Development Services (ICDS). It is a centrally-sponsored scheme implemented by state governments and union territories. There was equal cost sharing for the nutrition scheme between the state and central government in all the states apart from the northeastern states where the centre provided 90% of the funding.

The districts were chosen from all States/UTs on the basis of a composite weighted index based on indicators relevant to the condition of adolescent girls across the country. These indicators include female school dropout rate, female literacy rate, female child marriage rate, and female work participation. The districts chosen are a combination of good performing, moderate and poor performing districts in all States/UTs across the country, based on this index.

The basic objectives of the scheme are to enable self-development and empowerment of adolescent girls, improvement in their health and nutrition status, spread awareness about health, hygiene, nutrition, adolescent reproductive and sexual health, family and child care. The program also aims at upgrading their home-based skills, life skills and vocational skills. The project also includes bringing back out-of-school adolescent girls under the ambit of formal and non-formal education. The adolescent girls are guided about the existing public services, such as primary health centers, post offices, banks, police stations, etc.

SABLA was implemented through the Anganwadi centres using the ICDS infrastructure. In the absence of proper infrastructure, other buildings such as school/panchayat etc. will be used. The Anganwadi worker surveyed and registered all adolescent girls and advised them to come to the Anganwadi center.

SABLA has two major components: one, a nutrition component for 'out-of-school girls' in the age group of 11 to 14 years and for 'all the girls' in the age group of 14 to 18 years, and second, non-nutrition component for 'out-of-school' adolescent girls in the age group of 11 to 18 years and a vocational training under National Skill Development Program for girls in the age group of 16 to 18 years. As part of the nutrition component, SABLA provides 600 calories and 18 to 20 gm protein in the form of a hot cooked meal or take-home ration from the Anganwadi centers. Apart from that the scheme also provided Iron and Folic Acid supplementation[1], Nutrition and Health Education, and Life Skill Education.

In 2013, the Ministry of Women and Child Development of the Government of India conducted an evaluation of the SABLA (Rajiv Gandhi Scheme for Empowerment of Adolescent Girls) scheme. Two years into its implementation, the scheme demonstrated signs of stabilization and extensive outreach to beneficiaries. In the surveyed states, nutrition was predominantly provided in the form of Take Home Ration (THR). The coverage of beneficiaries under the scheme steadily increased over this two-year period, with secondary analysis indicating that, by the end of December 2012,

[1]Although National Nutritional Anaemia Prophylaxis Programme (NNAPP) also provided supplements to address anaemia

more than 86 lakh Adolescent Girls (AGs) had benefited from the nutrition component. In terms of its distribution across states, we can observe higher figures in larger states that have more pilot districts and a greater population to serve. These states include Uttar Pradesh, Bihar, Madhya Pradesh, Maharashtra, Odisha, Andhra Pradesh, and Rajasthan, as depicted in Figure **??** (Ministry of Women and Child Development, 2013).

Nevertheless, there remains room for improvement in expanding vocational training programs. Furthermore, reintegrating out-of-school girls into the educational system, one of the program's objectives, encountered challenges and progressed slowly. During the 2011-12 academic year, 68,425 girls (only 4% of total beneficiaries) were successfully re-enrolled in school, with an additional 18,227 girls mainstreamed in the subsequent year by December 2012 (Ministry of Women and Child Development, 2013).

Regarding the provision of food supplements to out-of-school girls (OOSGs), a significant majority (over 80%) received Take Home Ration (THR), while approximately 14.9% received a hot cooked meal at Anganwadi Centers (AWCs) or their schools. Several states offered THR, with additional supplements provided by Maharashtra, Andhra Pradesh, and Tripura at AWCs. In Andhra Pradesh, for instance, eggs were distributed weekly at AWCs. Over time, there was a transition to exclusively providing THR, which was perceived to be more socially acceptable than hot cooked meals.

Among the OOSGs receiving THR, as seen in Figure A2, more than 50% reported sharing the Take Home Ration with the Family (57.3%), while more than 40% reported that it was consumed by them (42.4%). During Focus Group Discussions (FGD) and Key Informant Interviews (KII), many parents and officials emphasized that THR served as a key incentive for parents to send their daughters to the AWCs and encourage their participation in program activities (Ministry of Women and Child Development, 2013). Simultaneously, it is essential to underscore that the primary objective of the nutrition component is for adolescent girls to personally consume the nutritional package, thereby enhancing their nutritional status.

3.3 Annual Status of Education Report (ASER)

The ASER primary survey is a nationally representative examination designed to evaluate the fundamental literacy and numeracy skills of rural Indian children. The inaugural ASER took place

in 2005 and was conducted annually for a decade. However, in 2016, ASER adopted an alternate-year schedule, wherein the comprehensive national ASER assessment was conducted in one year, followed by a smaller survey focusing on different age groups and aspects of learning (limited to 1-2 districts per state) in the next. The ASER primary survey employs a two-stage sampling method to select a representative sample of rural households. In the initial stage, 30 villages per rural district across the country are selected using a probability proportional to size method, excluding urban districts. The ASER primary survey employs a rotating panel of villages, with 10 villages replaced annually.

Within each selected village, 20 households are chosen using the “right-hand rule," a pseudo-random technique that avoids the need for a complete household listing. ASER surveyors administer reading and math assessments to all children aged 5 to 16, irrespective of their enrollment status, age, or grade level. Information regarding schooling status is collected for all children between the ages of 3 and 16 residing in the sampled households.

The entire ASER survey is carried out through a network of partner organizations and volunteers. The local District Institute of Educational Training (DIET) serves as the ASER partner organization in many districts. NAS surveyors are selected from candidates undergoing teacher training at DIETs.

The primary focus of our analysis centers on the school dropout rate, with a specific emphasis on the targeted age group for the SABLA program. Figure A3 illustrates the mean dropout rate of children aged 11 to 14, categorized by birth year and gender. Notably, there is a substantial decrease in the dropout rate over time for both boys and girls. Children born between 1992 and 2004 exhibit a higher dropout rate for girls than boys. Beyond this period, the gap in dropout rates between genders gradually narrows. Further, children born between 1992 and 2004 experienced a higher dropout rate for girls than boys, after which the difference starts to converge.

Our subsequent efforts delve into examining the impact of the scheme on children’s learning outcomes, contrasting the SABLA districts with non-SABLA ones. ASER has gauged fundamental skills in both reading and arithmetic. According to the ASER tool, the highest task in reading involves reading a text at a Grade II difficulty level. In mathematics, children are tasked with recognizing numbers (1-9, 11-99), solving a basic two-digit subtraction problem that involves borrowing, and executing a three-digit by one-digit numerical division problem. Each child in the

household is assessed individually and marked at the highest level they can confidently achieve. The identical tasks are administered to all children aged between 5 and 16.

We categorize Math Scores and Reading Scores as binary in our sample, assigning a 1 if the student can successfully perform the division problem in the math test and a 0 if not. Similarly, for the reading score, a 1 is assigned if the child can read a level-II reading text and a 0 if they cannot.

Table A3 presents descriptive statistics of the ASER Sample data from 2008-2018. Among the key variables analyzed, Child Dropped Out between Ages 11-14 reveals that approximately 3% of the children in the dataset discontinued their education during this age range. Further, 32% of the sample belongs to SABLA districts. The Age of the Child, on average, stands at approximately 13.3 years. For those who did drop out (94,417 observations), the Age when Dropped Out records an average age of 13.12 years, with a standard deviation of 1.45. Additionally, 48% of the sample is female. The mother's and father's average age is 36.5 and 41.7 years respectively. Similarly, education levels among parents are captured by Mother Education and Father Education, with 52% of mothers and 73% of fathers having attained a certain level of education.

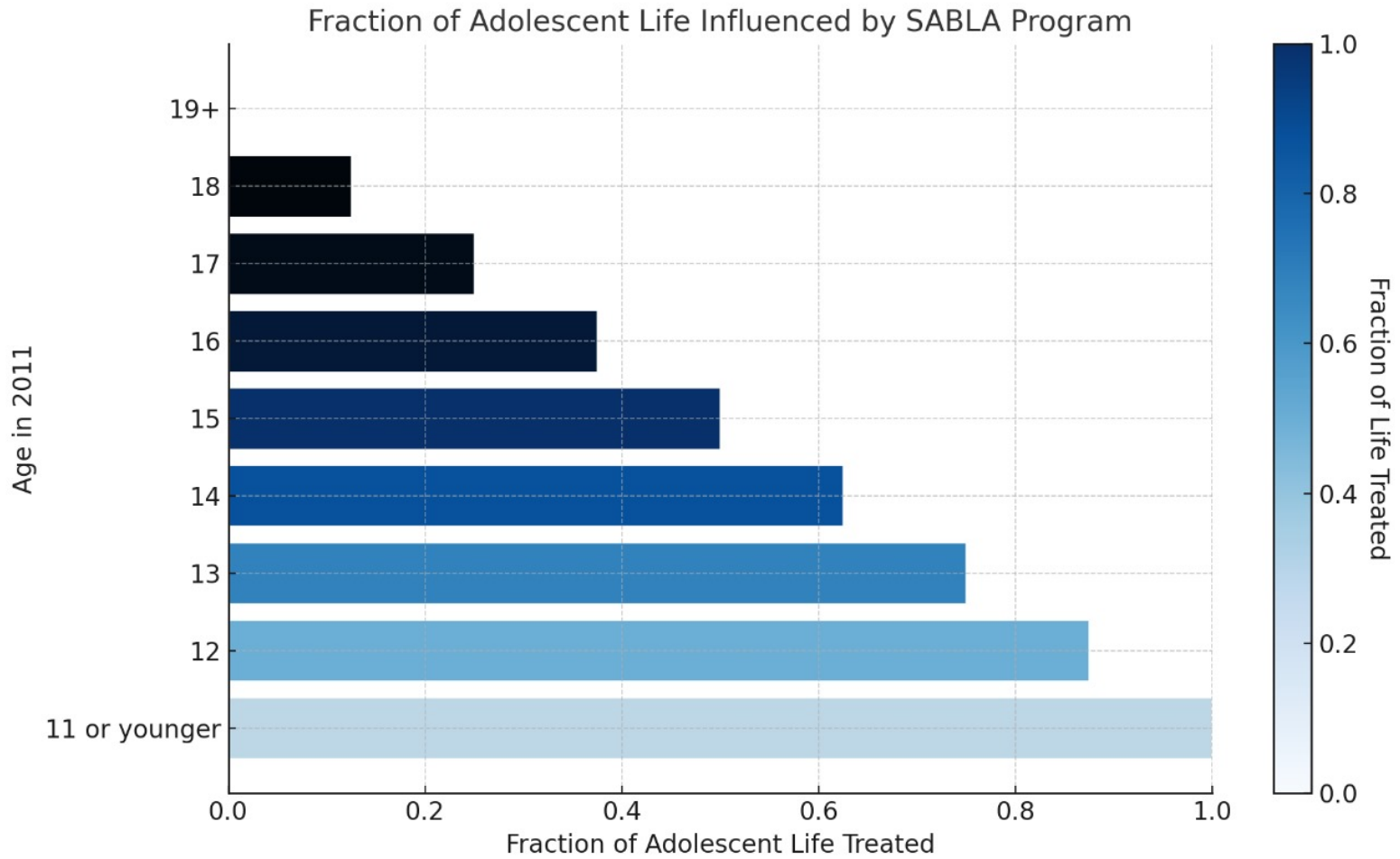
4 Empirical Strategy

The key dependent variable of interest is whether a child dropped out of school between the ages of 11 and 14. Our study design includes both treatment and control groups; however, the treatment intensity varies as a function of each child's age at the time of the intervention in 2011. Consequently, as depicted in Figure 1, we conceptualize the treatment effect as a continuous variable, reflecting the gradation in exposure to the intervention across the sample.

Triple Difference: Our analysis focuses on assessing the impact of the SABLA program on the school enrollment of female children. The first difference arises from comparing outcomes between students in districts that implemented the SABLA program (205 districts) and those in districts that did not. This allows us to distinguish the general impact of the program across different geographic areas.

The second difference hinges on the timing and intensity of the intervention. We employ a continuous treatment variable to measure the varying degrees of impact within the treated districts, depending on the age of the students. This approach enables us to assess how the program's

Figure 1: Treatment Intensity based on exposure to the Program by Age



influence might differ for children at various stages of their schooling.

The third and crucial difference is gender-specific. Recognizing that SABLA was targeted towards improving outcomes for girls, we contrast the effects on female students (treated group) with their male counterparts (control group). This comparison is vital to understanding the program's effectiveness in addressing gender disparities in education. We adopt this triple difference setup using the following equation:

$$\begin{aligned} Y_{idt} = \beta_0 &+ \beta_1(S_d \times P_{it} \times G_i) + \beta_2(S_d \times P_{it}) + \beta_3(P_{it} \times G_i) \\ &+ \beta_4(S_d \times G_i) + \beta_5 S_d + \beta_6 P_{it} + \beta_7 G_i \\ &+ \gamma_s + \gamma_t + \delta \mathbf{Z}_{idt} + \epsilon_{idt}. \end{aligned} \tag{1}$$

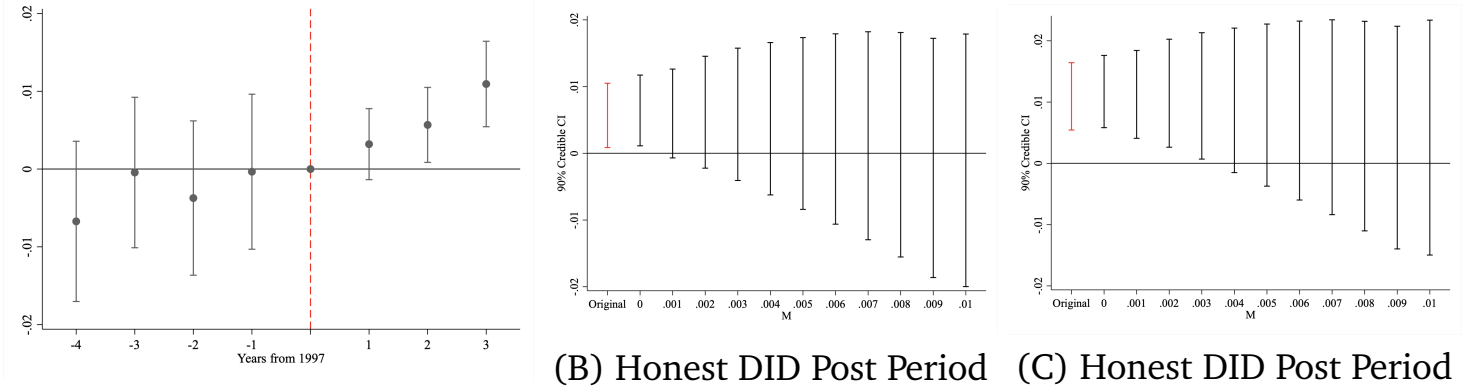
Here, Y_{idt} represents the outcome for individual i in district d born in year t, with γ_d denoting district fixed effects and γ_t representing birth year fixed effects. The vector $\mathbf{Z}idt$ encompasses a set of covariates. S_d indicates whether district d is part of the SABLA program, Pit denotes a continuous treatment based on the fraction of adoloscent life exposure to SABLA, and G_i is a binary variable indicating if individual i is a girl. The parameter of interest, β_1, captures the differential impact of the SABLA program on female children who turned 14 post-implementation, and ϵ_{idt}

accounts for residual errors.

Our control group includes children who do not reside in a SABLA district or those who turned 14 before SABLA implementation (i.e., before 2011). The treatment group, in this extended model, is more specific: it comprises girls who reside in SABLA districts and turned 14 after SABLA was implemented. The key dependent variable of interest is whether a child dropped out of school between the ages of 11 and 14.

In Figure 2, we present an event study plot that compares the proportions of female children dropping out of school between the ages of 11 and 14. This analysis is restricted to children who were enrolled in school at least until the age of 11. The x-axis represents the difference between the year a child turned 14 and the year of SABLA implementation (i.e., 2011). We separately plot data for SABLA and non-SABLA districts, with 95% confidence intervals included. The results indicate no statistically significant difference in the proportion of female children dropping out of school between the ages of 11 and 14 between SABLA and non-SABLA districts, mitigating concerns regarding pre-existing trends.

Figure 2: Event Study Results



(A) Event Study

(B) Honest DID Post Period 2

(C) Honest DID Post Period 3

(D) Honest DID Post Average

NOTES:

Table 1: Impact of SABLA Program Implementation on School Dropout Rates for Girls Aged 11-14

	(1)	(2)	(3)
SABLA × Post × Girl	0.009***	0.009***	0.011***
	(0.004)	(0.002)	(0.002)
Household Controls	No	Yes	Yes
Village level Controls	No	No	Yes
District FE	Yes	Yes	Yes
Year of Birth FE	Yes	Yes	Yes
Mean	0.05	0.05	0.05
Observations	1,705,602	1,519,187	1,387,789

Note: The outcome variable is whether the individual dropped out of school between the ages 11 and 14. SABLA indicates whether the individual resides in a SABLA district. POST denotes a continuous treatment based on the fraction of adolescent life exposure to SABLA. Individual's birth year and district fixed effects are included. Standard errors are clustered at the village level. P-Values in Parenthesis. Significance level: $^{*}p$ <0.1; $^{**}p$ <0.05; $^{***}p$ <0.01.

5 Results

5.1 School Dropout Rates for Girls

To evaluate the impact of the SABLA program on school dropout rates among girls, we employ the analysis framework outlined in Equation (1). Our sample comprises girl children who were surveyed in all ASER surveys spanning from 2008 to 2022, allowing us to pool the data. We include those who were enrolled in school until at least the age of 11 and were at least 14 years old at the time of the survey.

The primary outcome variable of interest is whether these girls dropped out of school between the ages of 11 and 14. We designate the control and treatment groups as follows: the control group consists of children residing in non-SABLA districts or those who turned 14 before SABLA's implementation, while the treatment group comprises those who live in a SABLA district and reached the age of 14 after SABLA was implemented. Our analysis incorporates year and district fixed effects, and standard errors are clustered at the district level.

The average dropout rate among girls in our sample is 5%. In Table 1, we present our findings. We observe that girl children residing in a SABLA district and transitioning to age 14 after SABLA's implementation are 18% more likely to drop out of school between the ages of 11 and 14 compared to their counterparts who do not reside in a SABLA district or those who reside in a SABLA district but transition to age 14 before SABLA's implementation. We have incorporated several household and village-level control variables, encompassing parental age and education, as well as household

amenities such as housing type, access to electricity, and toilet facilities.

Table 2: Age-Specific Impact of SABLA Program on School Dropout Rates

	Age 11	Age 12	Age 13	Age 14
SABLA × Post × Girl	0.003**	0.004	0.008**	0.014***
	(0.017)	(0.128)	(0.04)	(0.009)
Controls	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes
Year of Birth FE	Yes	Yes	Yes	Yes
Mean	0.01	0.02	0.04	0.07
Observations	1,387,789	1,172,469	871,719	635,317

Note: SABLA indicates whether the individual resides in a SABLA district. POST denotes a continuous treatment based on the fraction of adolescent life exposure to SABLA. Individual's birth year and district fixed effects are included. Standard errors are clustered at the village level. P-Values in Parenthesis.
Significance level: $^{*}p$ <0.1; $^{**}p$ <0.05; $^{***}p$ <0.01.

5.2 Learning Outcomes for Girls

Amidst the escalating dropout rates of girls in the SABLA Districts, we further explore whether the scheme has had any impact on the learning outcomes of the girls in the SABLA districts compared to the non-SABLA Districts over time.

In Table 7, we explore the potential impact of the SABLA program on the learning outcomes of girl children, particularly focusing on their Math and Reading scores. The interaction term represents the differential effect of being in a SABLA district after the program's implementation. The coefficients for Math and Reading scores suggest a slight decrease in scores associated with the program, although these effects are not statistically significant.

Considering the test encompasses standard-II text and numeracy levels, girls who drop out after age 11 likely already possess this knowledge. As the sample specifically includes girls aged 11-14 and considers dropouts only after age 11, detecting a learning loss might be improbable.

Table 3: Learning Outcomes in SABLA and Non-SABLA Districts

	Math Score	**Reading Score**
SABLA × Post × Girl	−0.002	−0.003
	(0.813)	(0.680)
Controls	Yes	Yes
Mean	0.64	0.81
Observations	236,558	237,227

Note: The outcome variable is whether the individual dropped out of school between the ages 11 and 14. SABLA indicates whether the individual resides in a SABLA district. POST indicates whether they turned 14 after the implementation of SABLA (i.e., 2011). Individual's birth year and district fixed effects are included. Standard errors are clustered at the village level.
Significance level: $^{*}p$ <0.1; $^{**}p$ <0.05; $^{***}p$ <0.01.

5.3 Anemia, Body Mass Index and Age at Marriage

Building upon our previous analyses, we utilized data from the National and Family Health Survey (NFHS-5), conducted between 2019 and 2021, to evaluate the long-term effects of a specific program on nutritional outcomes and marital age.

Employing age cohorts similar to those used in our prior analysis, we observed a decrease in the incidence of low Body Mass Index (BMI) by 2% and a reduction in anemia cases by 3%. These findings align with the program's primary health objectives.

However, our above analysis reveals a decline in female school dropouts, which corresponds with a decrease in the age of marriage as seen in Table 4. This pattern is consistent with existing research suggesting that girls with lower educational attainment tend to marry at a younger age (Maertens, 2013).

Furthermore, when examining the impact on Years of Education for girls, we noted that the direction of our findings is consistent with those from our ASER analysis, though they lack statistical significance. This outcome may be primarily due to the NFHS dataset not being powered enough to detect significant results, given the relatively small proportion of dropouts in the sample under consideration.

Table 4: Age-Specific Impact of SABLA Program on School Dropout Rates

	Low BMI	**Anemic**	**Years of Education**	**Age at Marriage**
SABLA × Post	-0.01^{*}	-0.016^{***}	-0.034	-0.08^{**}
	(0.084)	(0.008)	(0.411)	(0.046)
Controls	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes
Year of Birth FE	Yes	Yes	Yes	Yes
Mean	0.42	0.54	9.03	19.05
Observations	224,584	232,898	232,898	143,172

Note: SABLA indicates whether the individual resides in a SABLA district. POST denotes a continuous treatment based on the fraction of adolescent life exposure to SABLA. Individual's birth year and district fixed effects are included. Standard errors are clustered at the DHS Cluster level. P-Values in Parenthesis. Significance level: $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$.

5.4 Heterogeneity Analysis

To elucidate the factors contributing to the observed rise in dropout rates among girls, we conducted a heterogeneity analysis, considering a range of demographic attributes and district-level variables.

Our analysis reveals a pronounced effect of maternal education levels on dropout rates: girls whose mothers have lower educational attainment are disproportionately driving up the dropout rates. This finding aligns with existing literature that robustly documents the positive impact of maternal education on children's educational outcomes. In contrast, paternal education appears to exert minimal influence on girls' likelihood to dropout, a phenomenon consistent with prior research indicating a relatively minor role for fathers' educational backgrounds in the Indian context.

Moreover, the absence of a secondary school within the village emerges as a significant deterrent to continued education, compelling girls to forgo schooling in favor of accessing nutritional support from local anganwadi centers. In our sample, 93% of the villages have an anganwadi within the village. Additionally, as anticipated, our data indicate that the dropout rate is predominantly influenced by socioeconomic status, with a higher incidence observed among girls from lower wealth quintiles.

Table 5: Impact of SABLA Program on School Dropout Rates through Demographic Characteristics

	(1)	(2)	(3)	(4)
SABLA × Post × Girl	0.019***	0.015**	0.015***	0.008
	(0.000)	(0.011)	(0.003)	(0.12)
SABLA × Post × Girl × Mother Education	-0.167***			
	(0.000)			
SABLA × Post × Girl × Father Education		-0.002		
		(0.608)		
SABLA × Post × Girl × Secondary School In Village			-0.184***	
			(0.000)	
SABLA × Post × Girl × Wealth Index				-0.088***
				(0.000)
Controls	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes
Year of Birth FE	Yes	Yes	Yes	Yes
Observations	705,027	722,119	731,406	776,827

Note: SABLA indicates whether the individual resides in a SABLA district. POST denotes a continuous treatment based on the fraction of adolescent life exposure to SABLA. Individual's birth year and district fixed effects are included. Standard errors are clustered at the village level. P-Values in parentheses.
Significance level: $^{*}p$ <0.1; $^{**}p$ <0.05; $^{***}p$ <0.01.

Leveraging 2011 Census Data, we categorized districts by their baseline female dropout rates, literacy, and labor force participation. Our analysis indicates that districts with initially higher dropout rates experienced a further exacerbation in dropout incidents. Conversely, districts with elevated levels of female literacy and workforce engagement reported comparatively lower dropout occurrences. This suggests that pre-existing educational and economic conditions significantly influence the dropout trajectory.

Table 6: Impact of SABLA Program on School Dropout Rates based on District level characteristics

	(1)	**(2)**	**(3)**
SABLA × Post × Girl	0.011**	0.011**	0.012**
	(0.029)	(0.031)	(0.016)
SABLA × Post × Girl × Female Dropouts	0.015***		
	(0.000)		
SABLA × Post × Girl × Female Literacy		−0.013***	
		(0.000)	
SABLA × Post × Girl × Female Labour Force Participation			−0.005***
			(0.000)
Controls	Yes	Yes	Yes
District FE	Yes	Yes	Yes
Year of Birth FE	Yes	Yes	Yes
Observations	757,496	772,819	772,819

Note: SABLA indicates whether the individual resides in a SABLA district. POST denotes a continuous treatment based on the fraction of adolescent life exposure to SABLA. Individual's birth year and district fixed effects are included. Standard errors are clustered at the village level. P-Values in Parenthesis.
Significance level: $^{*}p$ <0.1; $^{**}p$ <0.05; $^{***}p$ <0.01.

Table 7: Impact of SABLA Program on School Dropout Rates based on District Quality

	Weak	**Medium**	**Good**
SABLA × Post × Girl	0.02**	0.024***	0.000
	(0.041)	(0.007)	(0.977)
Controls	Yes	Yes	Yes
Mean	0.08	0.06	0.04
Observations	241,813	228,303	220,835

Note: The outcome variable is whether the individual dropped out of school between the ages 11 and 14. SABLA indicates whether the individual resides in a SABLA district. POST indicates whether they turned 14 after the implementation of SABLA (i.e., 2011). Individual's birth year and district fixed effects are included. Standard errors are clustered at the village level. Significance level: $^{*}p$ <0.1; $^{**}p$ <0.05; $^{***}p$ <0.01.

6 Robustness Check

To validate the robustness of our results, we implemented a placebo test, replicating our analysis for periods prior to the intervention (pre-treatment) and focusing on students of primary school age.

We adopted the same analytical approach as detailed in Equation (1), but this time we focused on age cohorts from the pre-treatment period to investigate potential significant effects. As anticipated, this robustness test, detailed in Table 8, did not reveal any significant effects.

Table 8: Placebo Test: Impact of SABLA Program on School Dropout Rates for Girls Aged 11-14 (Time frame before implementation)

	(1)	(2)	(3)
SABLA × Post × Girl	0.001	0.002	0.003
	(0.889)	(0.684)	(0.488)
Household Controls	No	Yes	Yes
Village level Controls	No	No	Yes
District FE	Yes	Yes	Yes
Year of Birth FE	Yes	Yes	Yes
Mean	0.05	0.05	0.05
Observations	338,942	300,350	268,868

Note: The outcome variable is whether the individual dropped out of school between the ages 11 and 14. SABLA indicates whether the individual resides in a SABLA district. POST denotes a continuous treatment based on the fraction of adolescent life exposure before SABLA was implemented. Individual's birth year and district fixed effects are included. Standard errors are clustered at the village level. P-Values in Parenthesis.
Significance level: $^{*}p$ <0.1; $^{**}p$ <0.05; $^{***}p$ <0.01.

Furthermore, we performed an additional robustness check on primary-age students who were not subject to the program. This step was crucial to ensure that the program had no unintended impacts on younger cohorts. Consistent with our expectations, we observed no significant effects, as illustrated in Table 9.

Table 9: Age-Specific Impact of SABLA Program on School Dropout Rates

	Age 7	Age 8	Age 9	Age 10
SABLA × Post × Girl	0.000	0.000	0.000	0.000
	(0.451)	(0.221)	(0.555)	(0.889)
Controls	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes
Year of Birth FE	Yes	Yes	Yes	Yes
Observations	1,673,318	2,526,879	3,013,101	2,780,655

Note: SABLA indicates whether the individual resides in a SABLA district. POST denotes age-wise cohort of primary school students. Individual's birth year and district fixed effects are included. Standard errors are clustered at the village level. P-Values in Parenthesis.
Significance level: $^{*}p$ <0.1; $^{**}p$ <0.05; $^{***}p$ <0.01.

7 Conclusion

In conclusion, this paper presents a comprehensive evaluation of the Rajiv Gandhi Scheme for Empowerment of Adolescent Girls (SABLA) and its multifaceted impact on the well-being of adolescent girls in India. Our study underscores the complexity and dual nature of policy outcomes, demonstrating that well-intentioned interventions can yield unintended consequences.

On the positive side, we found significant improvements in health outcomes, including a 3% reduction in anemia and a 2.4% decrease in low BMI rates among adolescent girls. These findings align with and contribute to the growing body of research emphasizing the benefits of nutritional support in enhancing the physical well-being of young girls.

However, our analysis also unearthed unintended adverse effects of the program. Notably, the provision of hot-cooked meals and take-home rations for out-of-school girls inadvertently encouraged school dropouts, thereby exacerbating gender disparities in education. This unintended consequence, an 18% increase in dropout rates among the treated cohort, highlights the delicate balance required in policy design.

Additionally, our study revealed a marginal decrease in the age of marriage for girls, signaling a need for careful consideration of the broader social implications of such welfare schemes. The nuanced findings from district-level variations and household-level impacts further underline the importance of context in policy implementation and effectiveness.

Our research contributes to the existing literature by being one of the first to explore the impact of take-home rations on adolescent girls' educational outcomes, highlighting an unintended negative effect on school enrollment. This paper thus serves as a critical reminder of the multidimensional nature of policy impacts, illustrating that policies intended to empower and educate can, in some contexts, inadvertently lead to opposite outcomes.

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A Additional Tables and Figures

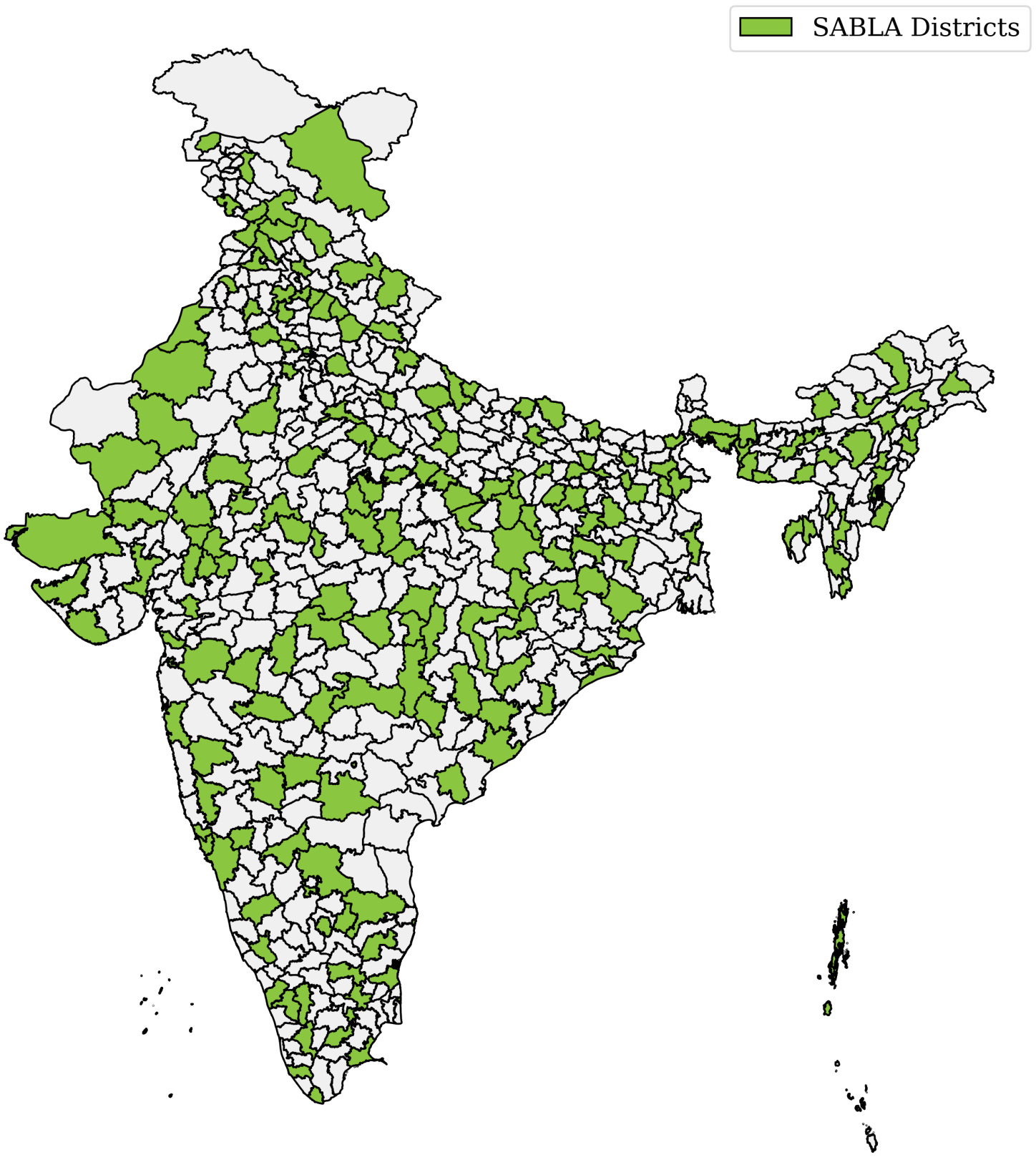
Table A2: Program Components by Age Group and School Enrollment Status

Age Group	**11-14**		**15-18**	
	Out of school girls	**In-school girls**	**Out of school girls**	**In-school girls**
Take home ration or hot cooked meal (at least 600 calories and 18 gms protein)	✓		✓	✓
Iron Folic Acid Supplements	✓		✓	
Vocational Training			✓	
Nutrition and Health Education	✓	✓	✓	✓
Health Check-up	✓		✓	
Counseling on family welfare, reproductive and sexual health, and child care practices	✓	✓	✓	✓
Life Skill Education	✓	✓	✓	✓

Table A1: Descriptive Statistics for Non-SABLA Districts and SABLA Districts

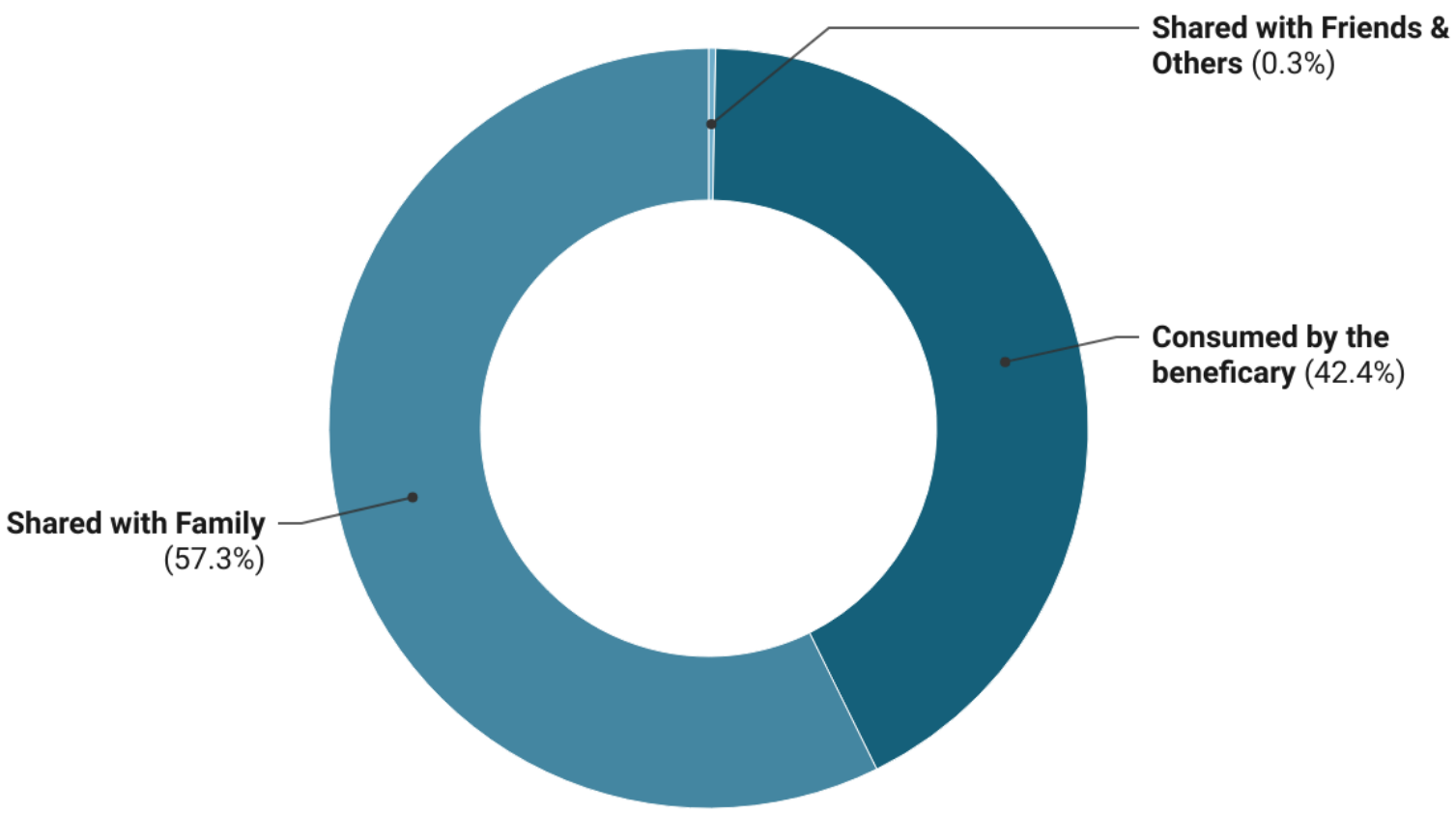
Variable Name	N	Mean	SD	Min	Max
Non-SABLA Districts					
Child Dropped Out between Ages 11-14	1,521,985	0.03	0.18	0	1
Age of the Child	1,521,985	13.32	1.63	11	16
Age when Dropped Out	63,316	13.13	1.45	11	16
Child dropped out of school	1,521,985	0.05	0.21	0	1
Reading Level	1,319,902	0.85	0.36	0	1
Math Level	1,316,931	0.73	0.45	0	1
Girl	1,511,101	0.48	0.5	0	1
Father Age	1,411,825	41.71	7.35	17	99
Mother Age	1,470,937	36.55	7.29	17	99
Mother Education	1,477,475	0.52	0.50	0	1
Father Education	1,408,478	0.74	0.44	0	1
Wealth Index	1,521,985	0.64	0.30	0	1
Electricity in the Village	1,509,355	0.96	0.20	0	1
Road Access in the Village	1,503,773	0.81	0.39	0	1
Government Secondary School in Village	1,449,920	0.23	0.42	0	1
Government Middle School in Village	1,453,353	0.61	0.49	0	1
SABLA Districts					
Child Dropped Out between Ages 11-14	712,818	0.04	0.18	0	1
Age of the Child	712,818	13.32	1.64	11	16
Age when Dropped Out	31,101	13.11	1.44	11	16
Child dropped out of school	712,818	0.05	0.21	0	1
Reading Level	619,323	0.84	0.37	0	1
Math Level	617,882	0.71	0.45	0	1
Girl	707,519	0.48	0.5	0	1
Father Age	664,143	41.72	7.45	17	99
Mother Age	689,432	36.55	7.38	17	99
Mother Education	692,563	0.51	0.50	0	1
Father Education	662,494	0.73	0.45	0	1
Wealth Index	712,818	0.63	0.31	0	1
Electricity in the Village	705,737	0.95	0.21	0	1
Road Access in the Village	703,797	0.80	0.40	0	1
Government Secondary School in Village	676,545	0.23	0.42	0	1
Government Middle School in Village	677,907	0.62	0.49	0	1

Figure A1: Location of SABLA Districts



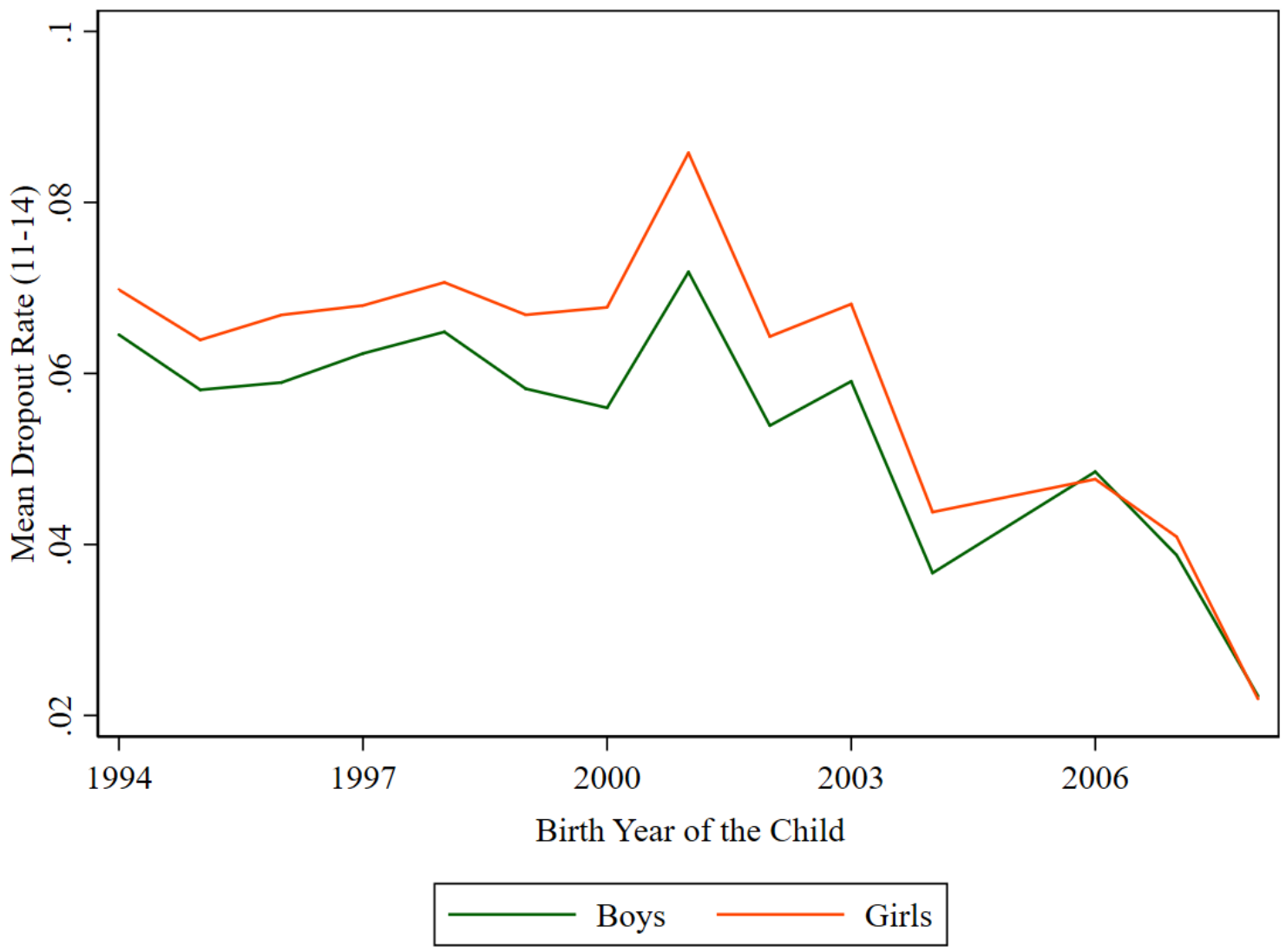
Data Source: Ministry of Women and Child Development

Figure A2: Consumption Pattern of Take Home Rations



Data Source: Ministry of Women and Child Development, ASCI Survey, 2013

Figure A3: Mean Dropout Rate for Children aged 11-14 by Gender



Source: ASER, 2008-2022.

Table A3: Descriptive Statistics

Variable Name	N	Mean	SD	Min	Max
Child Dropped Out between Ages 11-14	2,234,803	0.03	0.18	0	1
Sabla District	2,234,803	0.32	0.47	0	1
Age of the Child	2,234,803	13.32	1.63	11	16
Age when Dropped Out Conditional on Dropping Out	94,417	13.12	1.45	11	16
Child dropped out of school	2,234,803	0.05	0.21	0	1
Girl	2,218,620	0.48	0.50	0	1
Mother Age	2,160,369	36.55	7.32	17	99
Father Age	2,075,968	41.71	7.38	17	99
Mother Education	2,170,038	0.52	0.50	0	1
Father Education	2,070,972	0.73	0.44	0	1
Wealth Index	2,234,803	0.64	0.31	0	1
Electricity in the Village	2,215,092	0.96	0.20	0	1
Road Access in the Village	2,207,570	0.81	0.39	0	1
Government Secondary School in Village	2,126,465	0.23	0.42	0	1
Government Middle School in Village	2,131,260	0.61	0.49	0	1