



SCHOOL OF
ECONOMICS AND
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The Impact of a Supply Side Educational Program on Women's Empowerment: Evidence from Indonesia

by

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Abstract

Education is considered a key component in the empowerment of women, and policy interventions such as investments in education can be effective in reducing gender-based inequality. To investigate the relationship between such a policy intervention and empowerment, this study investigates the impact of a large school construction program in Indonesia, where over 61,000 primary schools were constructed between 1973 and 1979. The study estimates the effect of the program on women's empowerment measured through an individual's share of involvement in intra-household decision making. By utilising variation in an individual's exposure to the school construction program based on district of birth and birth year, a difference-in-differences estimation model is used. The estimations show weak evidence of a positive relationship between greater exposure to the program and a larger share of involvement in household decisions. For every additional school built per 1000 children, the increase in a woman's share of involvement in intra-household decision making ranges from 0.19 to 1.27 percentage points.

Key words: education, women's empowerment, Indonesia, INPRES, intra-household decision making, difference-in-differences

Word count: 8819

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1 Introduction

1.1 Research Problem

It is generally known that gender inequality is an obstacle for economic growth and development outcomes, which makes the room for policy intervention large. Gender inequality persists worldwide and has consequences for women in all regions of the world, because women are more likely to be unemployed, less likely to have access to financial institutions or have a bank account and less likely to have access to social protection (UN Women, 2018). Policy interventions that can be effective in reducing gender inequality include investments in education, health, infrastructure, and the promotion of equal rights (International Monetary Fund, 2018). Education is generally considered a key component for the empowerment of women as it can bring about positive changes in attitudes for socioeconomic and political progress (Bhat, 2015). The well known saying goes; “If you educate a man you educate an individual, but if you educate a girl you educate the whole nation” (Dr James Emmanuel Kwegyir Aggrey, 1926 in Thody (2000, p.45)) and highlights the importance of putting women’s education at the center of the development discourse. An increase in the educational attainment of women and girls is commonly suggested as a means to reduce inequality and can be a contributing factor to the empowerment of women as well as a contributing factor to economic growth and development (UN Women, 2018). Female education can have an effect on the individual lives of women as well as for the development of the country as a whole. In fact, education of women and girls leads to improved maternal health, reduced infant mortality and fertility rates, and increased prevention against HIV and AIDS (Karam, 2014). At the same time, gender inequality in education has a direct negative effect on economic growth by lowering the level of human capital (Klasen, 2002).

This study exploits a supply side educational policy, a large school construction program in Indonesia, in order to estimate the effect of the program on women’s empowerment. The Indonesian government constructed over 61,000 primary schools between 1973 and 1979 under the INPRES program, making it one of the largest

school construction programs ever conducted (Duflo, 2001). To estimate the effect of the INPRES program on women's empowerment, this study focuses on the decision making power of women, since equal participation in decision making is visible at all levels - from households to international institutions. On this basis, this study aims to answer the question: *What is the effect of the INPRES program on women's involvement in intra-household decision making?*

In order to investigate the causal link between the school construction program, INPRES, and women's involvement in intra-household decision making, a difference-in-differences (DiD) method is applied and this study draws from Duflo (2001) and a recent study by Mazumder et al. (2019). As a result of the principles allocating the INPRES program across Indonesian districts as well as individual differences in year of birth, differences in exposure intensity to the program is used to estimate the effect on women's involvement in decisions within the household. My study combines the vast research on outcomes of the INPRES program with concepts from research on measures of women's empowerment. The findings show that for women exposed to the INPRES program, as determined by year of birth and district of birth, there is a weak positive relationship between one additional INPRES school per 1000 school aged children and greater involvement in intra-household decision making.

1.2 Indonesia

Indonesia is the largest economy in South East Asia and the 10th largest economy in the world, in terms of purchasing power parity, and is expected to become the fourth largest economy in the world by 2050 if the current growth rates are sustained. It is the fourth most populous country in the world and the world's most populous Muslim-majority country with 87 percent of the population being Muslim. Indonesia has over 700 ethnic and linguistic groups and the largest ethnic group is the Javanese who make up over 40 percent of the population (The World Bank, 2021, 2020).

The diverse religious and cultural nature of Indonesia along with a struggle for a national identity is reflected in its former education system where the quality of education was varying, schools were dispersed and much of the population were illiterate. When Indonesia became independent after being colonised, the new constitution declared that every citizen should have the right to education. The primary school construction starting in 1973 was a big push toward the effort of increasing education among Indonesia's population and it greatly improved access to education (The World Bank, 2020). As of 2018, Indonesia has one of the highest literacy rates

in Asia with 94 percent of females and 97 percent of males being literate ([Equal Measures 2030, 2019](#)). In their National Review from 2019, a part of the 2030 Agenda for Sustainable Development, the Ministry of National Development Planning of Indonesia states that improvement in education is a way to realise the ideas of the nations founders and that the development of the educational system shows improvement through a continued increase in the level of education in the population ([2019](#)).

Indonesia recently became classified as an upper-middle-income economy and has experienced increasing economic growth since the Asian financial crisis in the 1990's. However, due to global economic contraction during the COVID-19 pandemic the economy has had a slightly more negative forecast than previously expected. Moreover, Indonesia has reduced the poverty rate by more than half since 1999 and it measured 9.8 percent in 2018 ([The World Bank, 2020](#)). Despite these achievements, Indonesia's conservatism and patriarchal culture combined with legal barriers continues to hinder women and girls in Indonesia. For example, inheritance laws and taxation laws discriminate against women and there is weak legislation to protect women against domestic violence. Moreover, Indonesia's female labour-force participation rate was only 51 percent compared to men's 80 percent as of 2017 ([Equal Measures 2030, 2019](#)). On the other hand, there has been an increase in the proportion of seats held by women in parliament as well as an increase in the proportion of women in managerial positions at executive agencies ([Ministry of National Development Planning, 2019](#)).

1.3 The Sekolah Dasar INPRES Program

Indonesia experienced two oil booms in 1973-1974 and 1979-1980 and the revenues resulting from these were used to promote regional development. Indonesia implemented large development programs including physical infrastructure and social development. Many of the development programs were mandated by presidential instruction, so-called Instruksi Presiden or INPRES ([Wihardja, 2016](#)).

One of the development programs was the Sekolah Dasar INPRES program (henceforth only INPRES), a primary school construction program where 61 817 primary schools were constructed across Indonesia between 1973-1974 and 1978-1979. This is equivalent to an average of two schools per thousand school aged children in 1971 and the cost of the program was equivalent to 1.5 percent of the Indonesian GDP in 1973. Following the school construction program, enrolment rates increased from 69 percent in 1973 to 83 percent in 1978 for children aged 7 to 12 ([Duflo, 2001](#)).

The allocation of the INPRES schools was based on enrolment rates in each district and was designed to target children who had not been enrolled in school prior to the implementation of the program. The government recruited and paid the salaries of teachers in the newly built schools while simultaneously training teachers, increasing the stock of teachers by 43 percent (Duflo, 2001).

Alongside the INPRES school construction program were other development programs. The second largest after the INPRES school construction program was the water and sanitation program which was implemented in 1969 by the Ministry of Health to improve health conditions for Indonesia's rural population. Although it started in 1969, very little was done until 1974 after the new presidential instruction funding system was implemented. Under the new funding system, the water and sanitation program aimed at helping local governments to construct water and sanitation facilities in rural areas (Ministry of Health, 1987).

2 Literature Review

Several studies have been done assessing the impact of the school construction program in Indonesia. The most prominent, and the one a large body of research on the subject has been based on, is the study *Schooling and Labor Market Consequences of School Construction in Indonesia: Evidence from an Unusual Policy Experiment* by [Duflo \(2001\)](#). Duflo combines differences in exposure to the INPRES program across districts of birth and across cohorts and uses a difference-in-differences approach, as this study will do. Results from Duflo’s study show that each school constructed during INPRES led to an average increase in educational attainment of 0.12 to 0.19 years and an average increase in wages of 1.5 to 2.7 percent per 1000 children. Following the study by [Duflo \(2001\)](#) several other studies have been done on the impact of the school construction program in Indonesia, see for instance [Ashraf et al. \(2020\)](#), [Akresh et al. \(2021\)](#), [Martinez-Bravo \(2017\)](#), [Somanathan \(2008\)](#), [Breierova and Duflo \(2004\)](#), and [Mazumder et al. \(2019\)](#). Duflo and Breierova (2004) use the school construction program to estimate the effect of education on fertility and child mortality and find that parental education has a strong causal effect on reduction of child mortality. Similar to [Duflo \(2001\)](#), [Mazumder et al. \(2019\)](#) use a difference-in-differences approach and find that exposure to the INPRES primary schools increases the probability of completing primary school for both men and women. [Mazumder et al. \(2019\)](#) emphasize that educational policies such as the school construction program can have, besides purely economic outcomes, important spillover effects which highlights the importance of taking into account long-run and intergenerational benefits of social interventions and policies. By using data from the IFLS and the geographical and cohort variation of the INPRES program they show that for those exposed to the school construction program, there are spillover effects on long term health and intergenerational effects on the health outcomes of the children of those exposed to the program. [Mazumder et al. \(2019\)](#) additionally find some evidence of assortative mating and that women exposed to INPRES are more likely to marry better educated men. Other studies on assortative mating find that there is a tendency for spouses to resemble each other in educational attainment ([Anukriti and Dasgupta, 2018](#)).

To measure women's empowerment different variables have been used by various researchers, including fertility, reproductive health practices, asset ownership, community participation, and decision-making authority (see for example [Samarakoon and Parinduri \(2015\)](#)). As this study does, several researchers have used decision making authority as a measure for women's empowerment. [Pitt et al. \(2006\)](#) use an instrumental variable method to study the effects of microfinance in Bangladesh on women's empowerment using indicators of household decision making. They found that microcredit programs result in women having greater decision making authority within the household as well as having greater access to financial resources, having greater social networks and freedom of mobility, and greater bargaining power in relation to their husband. [Alemayehu and Meskele \(2017\)](#) studied the health care decision making autonomy of women in Ethiopia and found that husbands play a major role in health care decisions concerning their wives. They found that of the participants in their study, 40,9 percent of their health care decisions were made by their husband. The women who had the highest decision making autonomy were more likely to have literate husbands, a lower wealth index, a smaller family size, be of older age, and have employment. [Alemayehu and Meskele \(2017\)](#) concluded that education and employment will have a positive impact on reducing women's dependency on their spouses. [Beegle et al. \(2001\)](#) studied Indonesian women's bargaining power in relation to that of their husband and found that a woman's control over economic resources affects reproductive healthcare decisions and that economic and social dimensions of power between spouses influence the uptake of services offered by reproductive health and family planning programs. Lastly, [Sell and Minot \(2018\)](#) studied which factors explain women's empowerment and looked at decision making among small-scale farmers in Uganda. They found that age and education are associated with greater empowerment.

This study builds upon [Duflo \(2001\)](#) and [Mazumder et al. \(2019\)](#) by also studying the effects of the school construction program in Indonesia through a difference-in-differences method and by using variations in exposure to the program induced by birth cohort and birth district. I use the estimation model from [Mazumder et al. \(2019\)](#) to estimate the effects of the program on primary school completion in the same way they do, but I add to the estimation with a new outcome variable on involvement in decisions and for which I add a control variable for maternal education. By doing this, I add to the existing literature by combining evidence that the INPRES program leads to an increase in educational attainment with concepts of women's decision making authority and household bargaining power from the literature on measures of women's empowerment.

3 Conceptual Framework

This paper exploits a large investment in schooling infrastructure in Indonesia to estimate its impact on women’s empowerment, which will be measured through women’s involvement in intra-household decision making. To establish conceptual foundations for the broader analysis, the concepts of women’s empowerment and intra-household bargaining power are explained further in this section, providing the conceptual framework for this study.

3.1 Women’s Empowerment

The subject of women’s empowerment has gotten increasing attention in economic literature as women’s empowerment is important for the development of a society and a country. In defining women’s empowerment there are several diverse definitions and conceptualisations but most often these refer to women’s ability to make decisions, affect outcomes of importance to the woman herself and her family, and have control over her own life and over resources (Malhotra et al., 2002). One of the most central conceptualisations of empowerment is provided by Kabeer (1999) where empowerment is defined as a “process of change”, meaning that individuals with a great deal of choice may be powerful but they are not *empowered* in the sense that they were not *disempowered* to start with. Following this notion, Kabeer defines three dimensions of the ability to exercise choice:

“[R]esources (defined broadly to include not only access, but also future claims, to both material and human and social resources); agency (including processes of decision making, as well as less measurable manifestations of agency such as negotiation, deception and manipulation); and achievements (well-being outcomes).” (p.435)

Kabeer (1999) further explains that the first dimension, resources, is acquired through societal domains such as the family, the market, or the community. Additionally, access to resources reflects rules and norms which give actors authority over others in determining principles of distribution. Closely related is the second dimension,

agency, which is the ability to define goals and subsequently act upon those goals. Agency has a duality in how it relates to power, it can either be “power to”, in the sense of having power to define life-choices and pursue these, or “power over”, in the sense of having power over actors and overriding the agency of others. Agency is often operationally defined as decision-making but can also be manifested through for example bargaining and negotiation, deception, and manipulation. Lastly, the aforementioned dimensions constitute capabilities, which is about the potential individuals have to achieve their valued ways of living. [Kabeer \(1999\)](#) draws from the well known concepts of capabilities and functionings by [Sen \(1985\)](#) and refers to functionings as all possible ways of “being and doing” and subsequently the third dimension, “functioning achievements”, to conceptualize the ways of being and doing that is fulfilled by individuals. This study draws from [Kabeer’s \(1999\)](#) conceptualisation of empowerment as the power to make choices within the dimension of agency, and is operationally defined as decision making power. Decision making power is measured in this study as the share of involvement in intra-household decisions. To gain further understanding of intra-household decision making, the following section handles the concept of intra-household bargaining power and how it relates to decision making and consequently empowerment.

3.2 Intra-Household Bargaining Power

Models of household behavior have traditionally assumed that members of the household act by maximising a joint utility function and that preference ordering can either be a result of consensus in the household, or the result of the preferences of a dominant family member. The traditional view of common preferences has been challenged and models of household behavior have incorporated individual family members’ preferences in order to instead treat a household as a group of individuals and allow for differences in preferences ([Lundberg et al., 1997](#)).

Including household decision making as a measure of women’s empowerment is based on the notion that the decision making power of a woman can be an indicator of the power structures in the household and a measure of intra-household bargaining power. Power structures within the household have an influence on the household decisions and studies have indicated that resources controlled by women have an influence on investments in children and other family members. In the context of Indonesia, men and women traditionally have different roles in the household which influences the household decision making ([Beegle et al., 2001](#)). Participation in economic activities is often considered a central factor in empowerment and while control over resources is not a guarantee for empowerment, it is seen as accelerating.

While there is a relationship between control of resources and empowerment on a household level, it has been suggested that households do not allocate resources in a fair or optimal manner and that household welfare outcomes depend on the preferences of the person with relatively more power (Sell and Minot, 2018). Ownership of assets or resources as well as a household members' educational level are likely to be an indicator of the economic aspect of power structures within households (Beegle et al., 2001).

As a result, power relations are simultaneously important for household welfare and for allocation of resources. Consequently, intra-household decision making power can be considered a meaningful element of empowerment in itself as it reflects power structures, which in a patriarchal society such as Indonesia is all the more relevant. As household members' educational levels can be an indicator of power structures, it becomes more clear that female education is important for empowerment.

4 Empirical Method and Estimation Model

4.1 Data

For this study I use data from the Indonesian Family Life Survey (IFLS) combined with administrative data¹ on the number of INPRES schools built from 1973 to 1979 at the district level. The IFLS is a continuing longitudinal socioeconomic and health survey that collects data on individual respondents, families, households, and the communities in which they live. The sample of households in the IFLS first wave represents 83 percent of the Indonesian population in 1993 living in 13 of the 26 provinces² in the country. Subsequent waves in 1997, 2000, 2007, and 2014 had the mission to re-interview the same respondents. Waves two to five are used in this study to collect information from as many respondents as possible. I excluded the first wave in my final data set on the basis that it did not contain all the variables I sought to include in my regressions. The data used in this study are primarily from the fifth wave, with complementary data from previous waves when data for some variables were missing in the fifth wave. By doing this the most recent data is utilised. Where there was no data available for certain observations, the gaps could sometimes be filled by previous waves, as the questionnaires are more or less the same for each year. The fifth and latest wave interviewed the same set of households from previous waves as well as household that had split up, which were 16 204 households and 50 148 individuals in total (Strauss et al., 2016). I combine IFLS data used in Mazumder et al. (2019), where they merged data from waves 1 through 5 and the IFLS-E (that contains seven additional provinces which were excluded from the main IFLS), with additional data from waves 2 through 5 to include variables that Mazumder et al. had not included in their data sets. However, this made my sample smaller than theirs for two reasons. Firstly, I use the fifth wave while filling gaps

¹I am grateful to Esther Duflo for kindly providing me with administrative data needed for my analysis.

²Provinces are made up of districts (Kabupaten) and there are 290 districts included in the data, out of 416 in total.

with data from the other waves to get the most recent data as possible and thereby possibly losing some respondents that were no longer in the sample. Between the time of interview for each wave, certain respondents were unable to be interviewed again due to death and were therefore no longer in the sample. Secondly, the decision to exclude the first wave from my final data set, since it did not have all the information needed for this study, meant that no gaps could be filled by data from this wave.

The IFLS is well suited for my analysis since it contains detailed data on my variables of interest which was especially useful when creating the variable on intra-household decision making. Additionally, the survey is well suited for tracking the long term outcomes of individuals and also to maintain a representative sample of the individuals that were exposed to the INPRES program as it covers a large portion of the population. The downside of the IFLS is that although the questionnaires cover a comprehensive set of socio-demographic characteristics, there were some variables of interest that contained many missing variables for several waves and could therefore not fill any gaps, making the sample size smaller. In the IFLS data sets, a missing value indicates that the respondent either did not know the answer to the question or did not answer the question, which causes a smaller sample size when certain variables are included in the estimations.

The administrative data on the INPRES program contains data of interest on the number of primary schools constructed from 1973 to 1979, the enrolment rate in the population in 1971, the allocation of the water and sanitation program³, and the number of school aged children in 1971. These data are available per district and per province, making it suitable to combine with the individual and household level data on district of birth from the IFLS in order to perform the intended analysis.

4.2 Identification Strategy

I apply a difference-in-differences (DiD) estimation in order to estimate the effect of the INPRES program on women's empowerment. DiD is well suited for this study as it utilises INPRES as an exogenous source of variation in education. Estimating the effects of differences in education on empowerment by simply regressing years of schooling on empowerment could provide biased results if there are unobserved characteristics such as a woman's preferences or family background which are correlated with both education and empowerment. A way to solve this is to utilise

³The water and sanitation program was directed to rural areas and was allocated throughout all districts with the exception of districts located in Jakarta, the capital of Indonesia, and two other districts located in larger cities.

sources of variation in education that are unrelated to a woman's characteristics and her empowerment. For this reason, the INPRES program is used as a source of variation in education and is, as I argue below, exogenous to the individuals.

Following [Duflo \(2001\)](#) and [Mazumder et al. \(2019\)](#) I exploit variation in exposure to the INPRES program imposed by individual differences in birth cohort and district of birth. Using the school construction as a treatment is to be considered as an exposure to an increase in the stock of schools. As explained in section 1.1 the allocation of the INPRES schools was based on enrolment rates in each of the districts in Indonesia and the schools were constructed during the years 1973-1974 to 1978-1979. This creates differences in exposure to the INPRES schools as only individuals in primary school age (ages 7 to 12) would have been exposed to the newly built schools and those older than primary school age would not have been exposed. The two sources of variation create an element of intensity in exposure as exposure is determined by both year of birth and by district of birth. The measure of program exposure is the total number of INPRES schools constructed per 1000 school aged children in a given district which is then interacted with the year of birth to capture the effects for those exposed to the program. This approach is only valid under the common trends assumption, which will be explained in section 4.2.1.

The variation in exposure to the INPRES program gives the structure to the sample of interest. The first determinant of exposure is a person's birth cohort. To analyze the outcomes of those exposed to the program and the outcome of those not exposed I define a binary indicator of exposure based on birth cohort. The sample of interest is individuals born between 1950 and 1972 and the start of the INPRES program is 1973. The exposed cohort in this sample contains individuals both partially and fully exposed to the program and following [Duflo \(2001\)](#) and [Mazumder et al. \(2019\)](#) I will present estimates for two sub-samples; one for the partially exposed (an expanded sample) and one for the fully exposed (a restricted sample). The structure of how year of birth relates to level of exposure, the exposed cohorts and non-exposed cohorts, and samples is illustrated in table 4.1 below. The exposed cohort in the expanded sample contains individuals older than 7 but younger than 12 at the time of the start of the program (born between 1963 and 1972), meaning that only some of their primary school years occurred after the program was implemented. Whereas the non-exposed cohort is those born between 1950 and 1962 who were older than primary school age at the start of the program and therefore did not benefit from the program. The exposed cohort for the restricted sample contains individuals who were younger than 7 (born between 1968 and 1972) at the start of the program and therefore had all of their primary school years during INPRES. The non-exposed co-

hort for this sample contains individuals closer in age to the exposed cohort. These were born between 1957 and 1962 and were older than primary school age at the start of the program.

Table 4.1: Illustration of INPRES Exposure

Year of Birth	1950	...	1957	...	1960	...	62	63	64	65	66	67	68	69	70	71	72
School Start (at age 7)	1957	...	1964	...	1960	...	69	70	71	72	73	74	75	76	77	78	79
Exposure	No exposure							Partially exposed									
								Fully exposed									
Expanded Sample	Non-exposed cohort							Exposed cohort									
Restricted Sample								Non-exposed cohort							Exposed cohort		

The second determinant of exposure to the program is the district of birth and is considered exogenous to the individuals. Endogeneity issues would arise if parents moved to other districts before the birth of their child to make sure that the child got enrolled in an INPRES school. This is most likely not the case because the INPRES program would not have been known to the public at the time of birth for the exposed groups in my sample, since the oil shock that made INPRES possible occurred in 1973 (and the first schools were built in 1973). An alternative to the district of birth would be the district of residence during an individual’s primary school age but this is not used because district of residence could potentially be endogenous. This would be the case if families who are more concerned about educational attainment move to another district as a response to a higher intensity of INPRES schools being constructed in other districts.

4.2.1 Difference-In-Differences

This study uses a difference-in-differences (DiD) approach to estimate the effect of the INPRES program. DiD is useful when the treatment varies at the group level, in this case it varies at district level, where omitted variables bias can be captured through group level fixed effects (Angrist and Pischke, 2009, p.227). The DiD examines the effects of INPRES as a treatment for the exposed cohort where INPRES is seen as an exogenous shock to the supply of primary schools. The non-exposed cohort is similar to the exposed cohort but unaffected by the treatment and is used to compare outcomes. Taking the difference between the two groups results in an estimate that represents a trend effect and a treatment effect. The DiD estimate isolates the treatment effect by comparing the differences in the outcome within the districts and across the districts (Angrist and Pischke, 2009, p.229).

Generally, DiD is often used on panel data to compare outcomes before and after treatment. In this study, I use cross-sectional data and the before-after element of

the DiD setup is represented by the birth cohorts where the pre-treatment outcome will be represented by the older cohorts, i.e the non-exposed birth cohorts, and the post-treatment outcome will come from the younger cohorts that were exposed to the INPRES program. Other studies that use this method are [Mazumder et al. \(2019\)](#) and [Duflo \(2001\)](#). The DiD setup is based on potential outcomes in the absence of treatment. A simple version of the DiD estimate, based on the description of DiD from [Angrist and Pischke \(2009\)](#), is outlined below and will present the intuition of the DiD estimation. Here, β is the estimated treatment effect.

$$\begin{aligned} \beta = & [E(y_{idt}|d = \text{higherintensity}, t = \text{exposed}) - E(y_{idt}|d = \text{higherintensity}, t = \text{non - exposed})] \\ & - [E(y_{idt}|d = \text{lowerintensity}, t = \text{exposed}) - E(y_{idt}|d = \text{lowerintensity}, t = \text{non - exposed})] \end{aligned} \quad (4.1)$$

y_{idt} is the outcome of interest for individual i , where d denotes district of birth. In equation 4.1 there is a division of the districts into higher program intensity and lower program intensity which is based on the number of schools per 1000 school aged children in the district. This is to visually illustrate the intuition of the varying intensity of INPRES schools in the districts, although in the regression the variable of INPRES intensity is continuous and ranges from 0.6 to 8.6 schools per 1000 school aged children. t denotes birth year (exposed or non-exposed cohort) for the individual. When taking the differences between these, I get the DiD estimate β which is the causal effect of interest. Following the same intuition, I will in this study use a regression model to estimate the causal effect of the INPRES program on primary school completion, to confirm previous evidence that INPRES exposure leads an increase in educational attainment, and the main outcome of interest; involvement in intra-household decision making. The estimation model is explained in detail in section 4.5.

The key identifying assumption of the DiD framework is that of common trends. The DiD estimation of the causal effect of the INPRES program is only valid if districts with higher program intensity and districts with lower program intensity would have had the same trends in primary school completion rate and involvement in household decisions in absence of the program, and subsequently that there were no other events that could confound the effects of the program. The actual assumption that the trends would be the same in the absence of treatment is not possible to check since I can not observe potential outcomes. Figure 4.1 and 4.2 below illustrates the pre-trends in involvement in household decisions and primary school completion per district and year of birth for pre-program cohorts, for which I use the birth years

1935 to 1960 and again the districts are divided into lower and higher INPRES intensity to get a better visualisation of the differences in intensity⁴. The pre-trends provide a plausibility check of the common trends assumption. This shows that the pre-trends were similar in high- and low INPRES intensity districts for cohorts that would not be exposed to the program as they were too old to benefit from it.

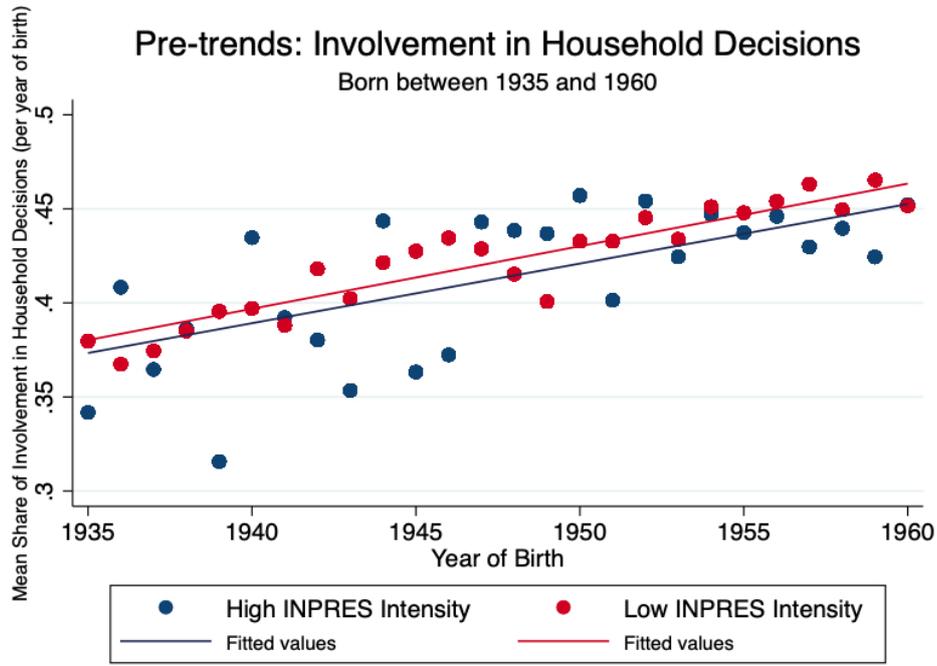


Figure 4.1: Pre-trends: Involvement in Household Decisions

⁴*Involvement in household decisions* represents the mean share of involvement per year of birth and per district with high or low INPRES intensity. The division of low and high intensity is based on whether the district's level of intensity is above or below the average intensity of 2.07 (see table 4.4). *Primary school completion* represents the mean rate of primary school completion per year of birth and per district with high or low INPRES intensity.

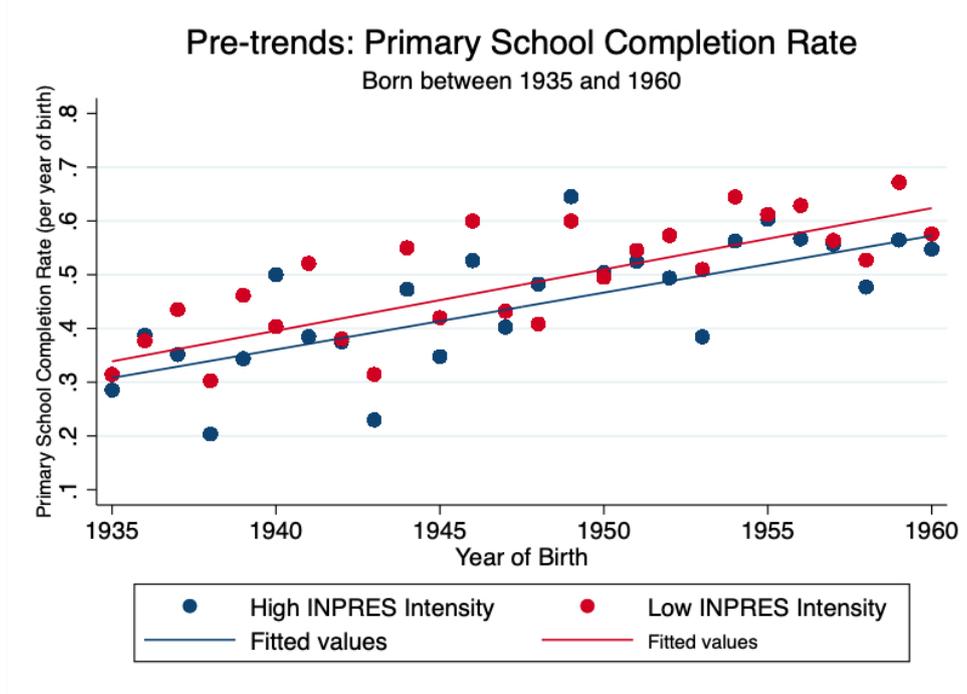


Figure 4.2: Pre-trends: Primary School Completion Rate

4.3 Estimation Model

I estimate the effects of the INPRES program on women’s empowerment as measured through involvement in intra-household decision making. As described in section 4.2 I exploit variation in exposure to the INPRES program introduced by differences in birth cohort and district of birth with varying intensity of INPRES schools in each district. The regression specification in Mazumder et al. (2019) is estimated as follows and is the one that this study is based upon:

$$y_{idt} = \beta(Exposed_t \times INPRES_d) + \sum_{d,t} (P_d \times \tau_t)\delta_{dt} + X'_{idt}\gamma + \alpha_d + \tau_t + \epsilon_{idt} \quad (4.2)$$

In this specification, y_{idt} represents the outcome of interest for individual i born in district d in year t . The primary outcome of interest that the regression specification will estimate is the involvement in intra-household decision making. This variable has been constructed using IFLS data where the respondent answered who is involved in making decisions and for what type of decisions. Using this information I constructed a variable with the respondent’s total share of involvement in household decisions. The respondents in the survey were asked which types of decisions they participate in within the household and how many people were involved in making that type of decision. I summarised how many decisions an individual was involved in (in total) and divided that by the total number of individuals involved in all decisions to get the total share of involvement for each individual. There were 18 types

of decisions regarding for example daily household expenses, education of children, and savings. The people involved could for example be the respondent, their spouse, parents, grandparents and so on. Their total share of involvement in the decisions would for example be 100 percent if they were the only person involved in all 18 types of decisions and 50 percent if there were two people involved in each of the 18 decisions. The second outcome of interest is estimates for the program effect on primary school completion. This is in order to show that exposure to the INPRES program has an effect on educational attainment and this estimate will follow the same specification as used in [Mazumder et al. \(2019\)](#).

$Exposed_t \times INPRES_d$ is an interaction variable where $exposed_t$ is a dummy variable with a value of 1 if individual i was born in a cohort exposed to INPRES. $INPRES_d$ is a measure of the intensity of the program. It is constructed as the number of schools, per 1000 school aged children, constructed in district d during the program. Consequently, β is a measure of the causal effect of one school built per 1000 children on the outcome of interest. $P_d \times \tau_t$ captures district level covariates interacted with birth year fixed effects. The district-level covariates are: the enrolment rate in the district before the start of the program (1971), the number of school aged children in the district in 1971, and the exposure of the district to the water and sanitation program. These covariates control for the allocation of the INPRES program and includes the water and sanitation program to control for the possibility of the effect of other simultaneous programs getting confused with effects of the INPRES program. $\alpha_d, \tau_t, \epsilon_{idt}$ are district fixed effects, year of birth fixed effects and the error term. Lastly, X'_{idt} is a row vector of individual characteristics which are the same characteristics used in [Mazumder et al. \(2019\)](#) (gender, ethnicity, and month of birth fixed effects) but in the regression specification for the effect on involvement in household decisions, I have added a variable of the education level for the mother of the respondent. Maternal education is included because there are several studies that have shown that there are positive effects of maternal education on the outcomes of her child. Maternal education is generally considered a highly important factor in explaining children's health outcomes and has an effect on the reduction in child mortality (see [Breierova and Duflo \(2004\)](#)). There is also evidence that shows that maternal education has a positive effect on the child's school enrolment (see [Cui et al. \(2019\)](#)). Therefore, I have reason to believe that maternal education could have a positive impact on the empowerment of the child since I have argued that education has an impact on empowerment. Consequently, a more empowered mother could potentially raise a more empowered child.

[Mazumder et al. \(2019\)](#) have drawn from the specification of [Duflo \(2001\)](#) but ex-

plain that they have improved upon Duflo’s specification in the sense that their regression specification uses an ethnicity dummy for whether the individual is Javanese as well as month of birth dummies. I have chosen to also include these added dummy variables in my regression model. The reasoning behind this is that beside Mazumder et al, previous studies have included ethnicity dummies in the case of INPRES and Indonesia (see for example [Ashraf et al. \(2020\)](#)). I control for being Javanese since they are the largest ethnic group in Indonesia. Month of birth is included to control for potential seasonality as [Yamauchi \(2012\)](#) have found that there is seasonality in birth weight in rural Indonesia and that variations in birth weight can cause variation in child growth and variation in educational investments.

I will present estimates of the program effect on both outcomes of interest, where the estimation of the effect on primary school completion will be the same specification that is presented in [Mazumder et al. \(2019\)](#). I will present two estimates of the program effect on share of involvement in intra-household decision making, where one is the same specification used in [Mazumder et al. \(2019\)](#) and one where maternal education is added as an individual characteristic. Standard errors are clustered at the district of birth level. These estimations will be done separately for the expanded sample and for the restricted sample as well as separately by gender and together for both men and women.

Other covariates that have been considered for this specification but are not used include the education of the spouse and labour income as well as non-labour income (retirement, scholarships etc.). As discussed briefly in section 2, [Mazumder et al. \(2019\)](#) have found some evidence that better educated women marry better educated men. It is therefore also possible that better educated men have other values regarding gender equality than men with less or no education. For that reason I considered including spousal education, however a control variable like this could suffer from endogeneity since higher education of a woman’s spouse could be a result from her higher educational attainment and therefore an outcome itself of the INPRES program. The same endogeneity reasoning goes for labour- and non-labour income. [Sell and Minot \(2018\)](#) discuss in their paper that access to resources and involvement in decision making are both two large components of women’s empowerment but they will simultaneously affect each other. Empowerment can affect a person’s access to resources, but a greater access to resources can in turn affect empowerment resulting in endogeneity issues caused by simultaneity. At the same time, as discussed in section 3.2, it has been suggested that households do not allocate resources in a fair manner and the household welfare depends on the preferences of the person with more power. Moreover, greater access to resources or greater income can be a

direct result from a person’s higher educational attainment and a result from being exposed to INPRES.

4.4 Descriptive Statistics

Descriptive statistics of the variables used from the IFLS data and the administrative data on INPRES are reported in tables 4.2 (for the expanded sample), 4.3 (for the restricted sample), and 4.4 (for INPRES data). Figures 4.3, 4.4, and 4.5 show histograms for the main outcome variable (Involvement in Household Decisions) by sex of respondent and the distribution of the number of INPRES Schools per 1000 children in the districts. It is worth noting that the INPRES intensity per district ranges from 0.6 to 8.6 schools per 1000 school aged children (table 4.4) with an average of 2.07 schools. As presented visually in figure 4.5, the majority of districts are concentrated around the average number of schools. The descriptive statistics in figures 4.2 and 4.3 show that the variable means are similar for both samples with the exception of primary school completion rate which is slightly higher in the restricted sample. Moreover, both samples have a similar mean of share involvement in household decisions across samples, but the means are higher for women within both samples. When looking at the histograms separately by sex of respondent it is more clear that women’s share of involvement is more skewed to the right compared to men’s share of involvement which is more skewed to the left, indicating that women in both samples have a higher share of involvement than men.

Table 4.2: Expanded Sample: Descriptive Statistics

	(1)		(2)		(3)	
	Women		Men		All	
	Mean	SD	Mean	SD	Mean	SD
Year of Birth	1962.63	6.44	1962.85	6.55	1963.16	6.49
Javanese	0.41	0.49	0.42	0.49	0.43	0.49
Primary School Completion Rate	0.67	0.13	0.68	0.13	0.68	0.13
Involvement in Household Decisions	0.54	0.14	0.40	0.12	0.46	0.14
Education Level of Mother	5.74	2.13	5.88	2.02	5.82	2.07
Observations	7808		7924		18024	

Table 4.3: Restricted Sample: Descriptive Statistics

	(1)		(2)		(3)	
	Women		Men		All	
	Mean	SD	Mean	SD	Mean	SD
Year of Birth	1965.24	5.44	1965.61	5.45	1965.84	5.39
Javanese	0.41	0.49	0.42	0.49	0.43	0.495
Primary School Completion Rate	0.72	0.13	0.73	0.13	0.74	0.13
Involvement in Household Decisions	0.54	0.13	0.40	0.12	0.47	0.14
Education Level of Mother	5.74	2.13	5.96	1.97	5.86	2.05
Observations	4265		4365		10144	

Table 4.4: INPRES Data: Summary Statistics

	Mean	SD	Min	Max	N
INPRES Schools per 1000 Children	2.07	1.16	0.59	8.60	38040
Enrolment rate in the population, 1971	0.17	0.11	0.03	0.99	37899
Number of boys 5-14 in 1971	84953.88	56710.42	1899	279151	38040
Number of girls 5-14 in 1971	79605.56	53392.13	1897	263684	38040
Allocation of the water and sanitation program, 73-78	0.55	0.42	0.16	4.70	36208
Observations	38318				

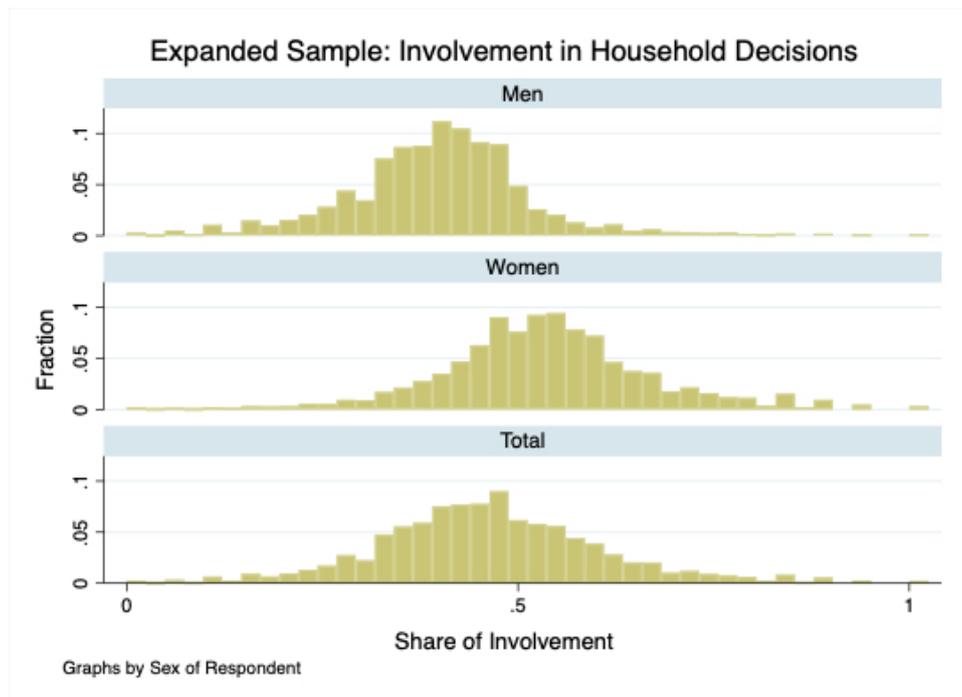


Figure 4.3: Histogram: Involvement in Household Decisions (Expanded Sample)

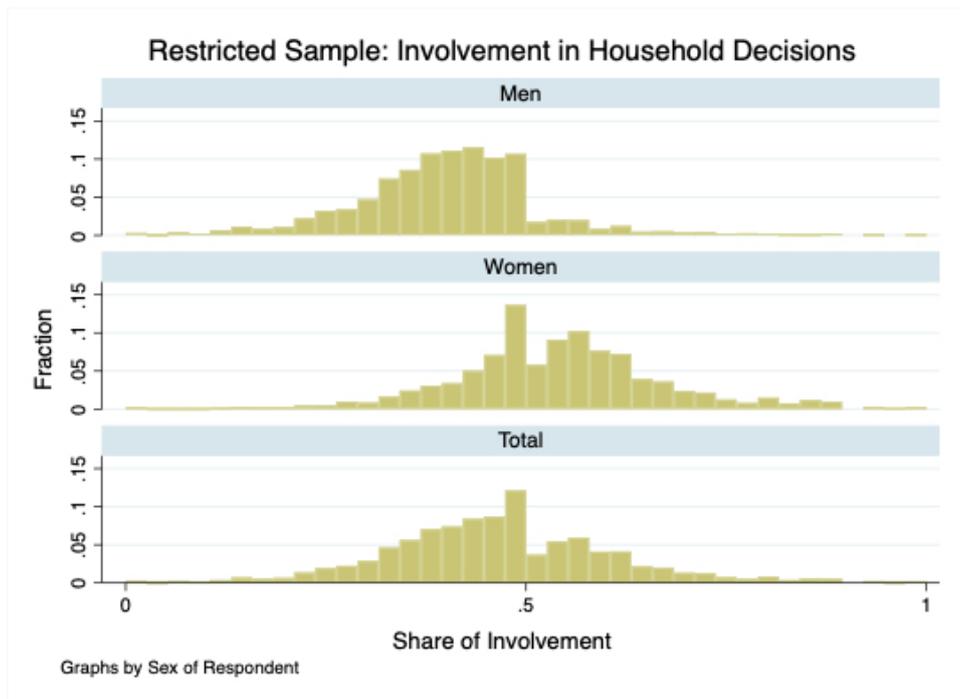


Figure 4.4: Histogram: Involvement in Household Decisions (Restricted Sample)

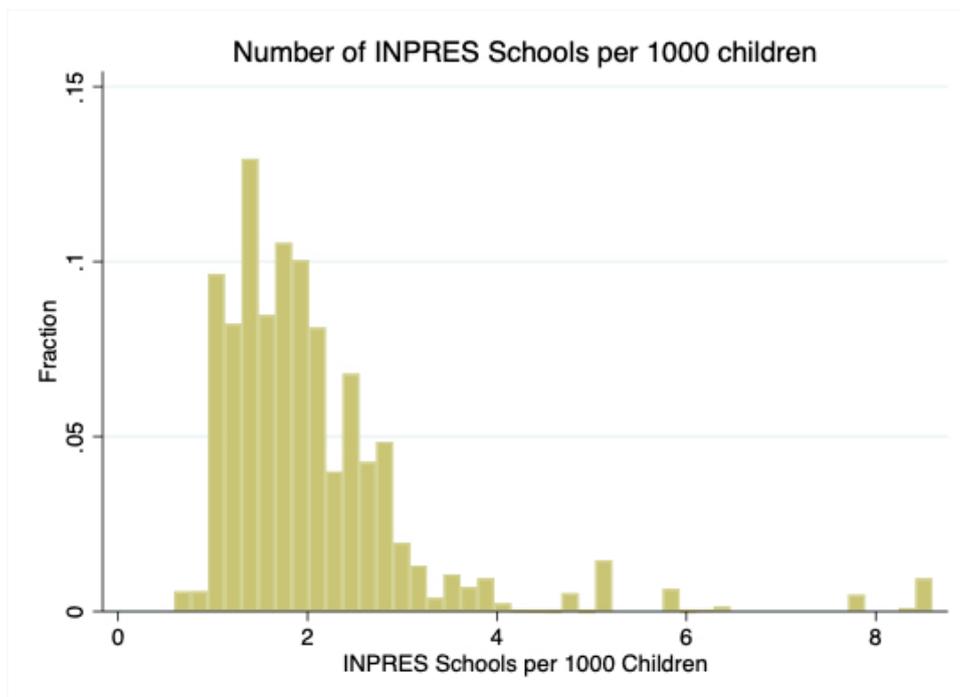


Figure 4.5: Histogram: Number of INPRES Schools per 1000 Children

5 Results

The tables presented in this chapter show the effect of the INPRES program on two outcomes of interest: primary school completion and involvement in intra-household decision making. The program effect on the outcomes are presented in sections 5.1 and 5.2 respectively. The tables show the effect of an additional INPRES school built per 1000 school aged children and are based on the regression specification in section 4.5 (equation 4.2). Estimations are presented for the expanded sample and the restricted sample separately.

5.1 Program Effect on Primary School Completion

Tables 5 and 6 show the effect of one additional INPRES school per 1000 school aged children on primary school completion. The outcome variable, primary school completion, is a dummy variable and results are interpreted as a percentage point change in the probability that an individual completes primary school¹ with every one additional INPRES school per 1000 children.

Table 5.1: Expanded Sample: Program Effect on Primary School Completion

	(1)	(2)	(3)
	Women	Men	All
Expanded: Born bet. 1963-1972 X INPRES	1.20 (0.920)	-0.375 (1.03)	0.48 (0.878)
Constant	15.7 (31.3)	17.9 (28.9)	27.0 (21.7)
Observations	6378	6425	14808
R^2	0.272	0.231	0.231

Program effect on primary school completion. Standard errors in parentheses.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

¹Primary school completion corresponds to 6 years of education.

Table 5.2: Restricted Sample: Program Effect on Primary School Completion

	(1)	(2)	(3)
	Women	Men	All
Restricted: Born bet. 1968-1972 X INPRES	1.51 (1.00)	0.16 (1.49)	0.69 (1.01)
Constant	72.4** (24.5)	30.1 (21.8)	64.2*** (14.1)
Observations	3575	3639	8555
R^2	0.288	0.251	0.236

Program effect on primary school completion. Standard errors in parentheses.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

While keeping in mind that the results are not significant, the DiD results suggest that exposure to the INPRES primary schools has a positive effect on the probability of primary school completion for women as well as for the joint estimation for both men and women. For women in particular, the effects of one additional primary school per 1000 children are the largest and range from a 1.2 percentage point increase in the expanded sample to a 1.5 percentage point increase in the restricted sample. In the joint estimation the effects of one additional school per 1000 children range from a 0.48 percentage point increase in the expanded sample to a 0.69 percentage point increase in the restricted sample. While the effects are slightly larger in the restricted sample, the differences between the estimates are small. Thus, although the results are insignificant the estimations suggest that there is a positive relationship between exposure to the INPRES program and the probability of completing primary school.

Unexpectedly, the separate specification for men shows a small negative effect of 0.375 percentage points on primary school completion in the expanded sample but a positive effect of 0.16 percentage points in the restricted sample. The trade-off between the restricted sample and the expanded sample is that the latter is a larger sample and could therefore show more precise estimates of the effects, while the restricted sample may have less biased estimates. This is due to the fact that the restricted sample contains individuals fully exposed to the INPRES program and the expanded sample has individuals partially as well as fully exposed, creating differences in the sample size and composition. It is therefore difficult to make clear whether there is a negative effect or a positive effect of INPRES exposure when considering the separate estimation for men. The results of the expanded sample that show a negative effect on primary school completion are not in line with evidence from the previous studies by Mazumder et al. (2019) and Duflo (2001). The negative effect was not anticipated since the estimation model used in this study is the

same as the one used in Mazumder et al. (2019). It is possible that this is a result from the sample in this study not being exactly the same as theirs. An explanation for why it is the expanded sample and not the restricted sample that display this negative effect could be that the restricted sample is believed to be more precise than the expanded sample due to the composition of the samples. The composition of the sample along with the fact that my sample size is smaller than the sample in Mazumder et al. (2019) could be part of the reason why the estimates in table 5.1 show negative estimates for men exposed to the INPRES program.

5.2 Program Effect on Share of Involvement in Intra-Household Decision Making

Tables 5.3 and 5.4 show the effect of one additional INPRES school per 1000 school aged children on share of involvement in decision making within the household. Share of involvement is measured in percent and the results should be interpreted as a percentage point change in involvement in intra-household decisions with every one additional primary school per 1000 school aged children.

Table 5.3: Expanded Sample: Program Effect on Share of Involvement in Household Decisions

	(1)	(2)	(3)	(4)	(5)	(6)
	Women	Men	All	Women	Men	All
Expanded: Born bet. 1963-1972 X INPRES	0.19 (0.36)	-0.22 (0.32)	0.03 (0.29)	0.91 (0.88)	-0.98* (0.44)	0.72 (0.595)
Education Level of Mother				0.25 (0.17)	-0.15 (0.14)	-0.05 (0.12)
Constant	61.5*** (10.9)	44.6*** (6.61)	48.7*** (6.54)	71.6** (24.3)	34.6*** (10.4)	44.6*** (10.1)
Observations	5518	5992	13569	2019	2234	5186
R^2	0.093	0.086	0.041	0.177	0.171	0.083

Program effect on share of involvement in household decisions. Standard errors in parentheses.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5.4: Restricted Sample: Program Effect on Share of Involvement in Household Decisions

	(1)	(2)	(3)	(4)	(5)	(6)
	Women	Men	All	Women	Men	All
Restricted: Born bet. 1968-1972 X INPRES	0.32 (0.41)	-0.47 (0.40)	-0.21 (0.42)	1.27 (1.09)	-0.64 (0.63)	1.14 (0.71)
Education Level of Mother				0.19 (0.22)	-0.23 (0.19)	-0.07 (0.15)
Constant	45.5*** (7.24)	27.1*** (6.55)	35.9*** (5.41)	54.9** (18.1)	44.4** (13.4)	49.7*** (11.1)
Observations	3025	3273	7675	1221	1298	3162
R^2	0.128	0.118	0.056	0.220	0.230	0.106

Program effect on share of involvement in household decisions. Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Using the expanded sample I find that an additional school per 1000 school aged children increases a woman's share of involvement in household decision making by 0.19 percentage points in the first specification. When including maternal education this estimate increases to 0.91 percentage points (see table 5.3, columns 1 and 4). In the restricted sample this estimate is larger and suggests that one additional school per 1000 school aged children increases the share of involvement in decision making by 0.32 percentage points and again this estimation is larger when including maternal education as it increases to 1.27 percentage points (see table 5.4, columns 1 and 4).

For men, the estimates instead show a negative effect of one additional school for the expanded sample as well as for the restricted sample with a negative estimate of 0.22 percentage points and a negative 0.47 respectively (see column 2 in table 5.3 and 5.4). In the specification where maternal education is included the estimates for men are increasingly negative with a decrease in the share of involvement in decision making by 0.98 percentage points for the expanded sample and a decrease by 0.64 in the restricted sample (column 5, tables 5.3 and 5.4).

As discussed in section 5.1, the sample sizes are larger in the expanded sample relative to the restricted sample, causing a less precise estimate for the smaller sample but also a less biased estimate due to the differences in the composition of the samples. The sample sizes become smaller for both the expanded sample and for the restricted sample when including maternal education and that is a result of some observations having missing data points for the education level of their mother. This could, again, mean that the larger estimates in the restricted sample could be less

precise but also less biased.

In the expanded sample, the estimation for men and women together show that the effect of one additional INPRES school per 1000 school aged children has a very small positive effect on involvement in intra-household decision making of 0.03 percentage points. When including maternal education this estimate increases to 0.72 for every one additional INPRES school (table 5.3, column 3 and 6). The estimates change in the restricted sample and show a negative effect of 0.21 percentage points in the first specification and a positive effect of 1.14 percentage points when including maternal education (table 5.4, column 3 and 6). Again, I want to emphasize that there is a tradeoff between sample size and precision for these two samples.

All in all, the estimates presented in tables 5.3 and 5.4 do not show significance and the estimates are very small. All results for the main group of interest, women, show a positive effect on share of involvement in decisions of less than two percentage points. Putting this in relation to the average share of involvement in intra-household decision making, which is 54 percent for women in both samples, an increase of less than two percent can be considered a small effect. This indicates that the results may not have any greater economic significance for development or gender equality at a higher level as the effect is very small. However the findings do suggest that women exposed to the INPRES program, by birth cohort and district of birth, may have greater involvement in intra-household decision making compared to the comparison group which can have a small impact on a woman's personal life and her personal feeling of empowerment.

6 Discussion

This study examined the effects of the school construction program INPRES in Indonesia on women’s empowerment, as measured through her involvement in intra-household decision making. By using a DiD estimation I have confirmed that, similar to the existing literature on the effects of the program, there is a positive relationship between exposure to the INPRES schools and increased educational attainment for women. This finding is in line with both [Duflo \(2001\)](#) and [Mazumder et al. \(2019\)](#). However, my estimates differ in the sense that the estimates for men show a positive relationship between INPRES exposure and primary school completion for the restricted sample and a negative estimation for the expanded sample, possibly due to differences between the sample used in this study and the sample used in [Mazumder et al. \(2019\)](#). Although my results show this negative effect, it is probable that the true effect of INPRES exposure on primary school completion is a positive one, since several previous studies have provided evidence that the effect is positive. On the other hand, this study aims at investing effects for women. With the argument (and subsequently the results) that exposure to INPRES increases educational attainment for women as a base for the study, the main line of argument in this paper is that the INPRES program should have a positive effect on the empowerment of women exposed to the program, compared to those not exposed to the program. The results of the DiD estimation of the causal effect of the program have shown that there is indeed a positive relationship between exposure to the program, given birth cohort and district of birth, on a woman’s involvement in household decision making. For both the expanded sample with those partially exposed and the restricted sample with those fully exposed to the program there was a positive relationship between one additional INPRES school in the district and greater involvement in decision making. The estimates were larger when including maternal education as a control, suggesting that there could be intergenerational spillover effects where a mother’s education has an impact on the empowerment of her daughter.

As mentioned previously, [Mazumder et al. \(2019\)](#) discussed that there can be spillover effects of educational programs such as the INPRES program with outcomes beside purely economic ones. This is in line with my findings where the program not only

had an effect on the increase in education for the women who were exposed but also, which was the main research target on this study, had positive effects on the empowerment of women exposed to the program. In relation to intra-household bargaining power, as discussed in section 3.2, these findings imply that it is possible that the increased share of involvement in household decisions is a result of different power structures in households where the woman has been exposed to the INPRES program in contrast to households with women who were not exposed. Keeping in mind that the results show that the differences are small, it is possible that women exposed to the program have a slightly stronger position in the household which positively influences her decision making power and consequently her participation in economic activities.

A possible explanation for the negative effect of INPRES exposure on men's share of involvement in household decisions is that of assortative mating, where individuals tend to marry a partner with similar level of education. A decrease in the share of involvement for a man implies that the share of involvement for others in the household must rise. With the results that women exposed to INPRES have an increased share of involvement in household decisions it is possible that the reason why men who are exposed to INPRES have a decreased share of involvement is that they, due to assortative mating, have a spouse with a high level of education which decreases their own share of involvement in relation to that of their spouse. Additionally, as mentioned briefly in section 4.3 it is possible that better educated men have other preferences or values regarding gender equality than men with less education. However, due to the possible endogeneity of including spousal education in the regression specification (discussed in section 4.3), there is no evidence that this is necessarily true for individuals in this sample.

Possible limitations of the model include potential missing variable bias. In section 4.3 I discussed other covariates that could have been included if it had not been for potential endogeneity issues. It's possible that these variables, i.e spousal education or income, could have an effect on the empowerment of women which this model does not capture the way that it is currently specified. However, the bias arising from these potential missing variables would probably be an upward bias since both spousal education and larger income could have a positive effect on involvement in household decisions. Given that the estimates for the change in women's share of involvement are positive, including these variables would not alter the direction in which I interpret my results since the estimate would only increase. Overall the estimates are larger, both positively larger and negatively larger, in the restricted sample. It does not imply that these results are preferred over the results of the

expanded sample because the estimates are larger, however it is possible that the results from the restricted sample are a more accurate representation of the true effects since these are the results for individuals fully exposed to the program and could therefore show less biased results. However, as discussed previously one must keep in mind that this sample is also smaller than the sample for those partially exposed, creating a trade-off between bias and precision.

7 Conclusion

In this study, women's empowerment has been measured through involvement in intra-household decision making. Consequently, this study aimed to answer the question: *What is the effect of the INPRES program on women's involvement in intra-household decision making?*, and has done so through a DiD estimation by utilising variation in exposure by birth cohort and district of birth. In this study I have shown that exposure to the supply-side educational program INPRES has a weak positive effect on women's involvement in intra-household decision making and effects range from a 0.19 to a 1.27 percentage point increase. Future research on this topic could benefit from expanding the estimation model used in this paper by investigating how to best include the variables that I identified as being a potential source of missing variable bias, i.e the education level of a woman's spouse and labour income as well as non-labour income. By including spousal education one could build upon the finding that INPRES exposure leads to a decrease in the share of involvement for men and improve upon the explanation for this finding. Including labour income and non-labour income together with spousal education could investigate how relative education and relative income contribute to gender roles and power structures in households to gain further understanding of intra-household bargaining power in relation to empowerment.

The results indicate that an educational program such as the INPRES program in Indonesia has a positive impact on women's empowerment. The estimated impact is small and while a small increase in a woman's share of involvement in household decision making could positively impact and empower a woman, it may have little effect on greater gender equality within nations and subsequently development outcomes. Nevertheless, the results imply that a supply side educational policy like the INPRES program does have some effect on women's empowerment and policy interventions to improve empowerment could benefit from being centered around improving access to education in order to not only strengthen women's positions within households but also get important spillover effects on future generations.

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