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The effect of sibling size on forms of child work in Indonesia

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Abstract

This thesis investigates the effect of the number of siblings on child labour among Indonesian children, using an instrumental variable approach that exploits exogenous variation in family size caused by the sex composition of the first two siblings. The prevalence of child labour in Indonesia and its large population make it a crucial context for investigating the relationship between sibling size and child labour. The findings of this study can inform policy and intervention efforts to reduce child labour in Indonesia and similar contexts. The study finds no significant effect of sibling count on child labour for the general population. However, when the sample is stratified by mother's education and child's age, the study shows significant negative effects for boys and girls with more educated mothers and young children. These results indicate that family expansion is less detrimental to households of higher socioeconomic status in terms of child labour.

Introduction

Child labour is a significant issue in Indonesia that affects millions of children. According to the International Labour Organization (n.d.), around 4.05 million children in Indonesia were working children in 2009. Child labour is linked to negative outcomes such as limited educational opportunities (Sugiyanto and Digdowiseiso, 2019; Suryahadi et al., 2005), physical health concerns (Ibrahim et al, 2018), and decreased psychological wellbeing (Sturrock and Hodes, 2016). Therefore, understanding the factors that contribute to child labour is crucial for developing effective policies and interventions to prevent and eradicate this practice. One such factor is the size of a child's family, specifically the number of siblings they have, also referred to as sibling size. It is plausible that having more siblings may increase the likelihood of child labour due to economic and social factors such as limited household resources, traditional cultural values, and lack of education. Therefore, the main question of this study is "what is the effect of the number of siblings on child labour among Indonesian children?"

The motivation for this study is the importance of understanding the factors that contribute to child labour in Indonesia, particularly those related to family dynamics. Previous research focused on Indonesia has examined the impact of sibling size on various child development outcomes, such as educational attainment (Feng, 2021; Maralani, 2008), mental health (Jayawardana et al., 2022), and physical health (Hatton et al., 2018). Concerns regarding

sibling size have also been highlighted by the Indonesian president, who stated that the quality of child development remain a problem to be tackled (Cabinet Secretariat of the Republic of Indonesia, n.d.). However, the role of sibling size in child labour among Indonesian children remains understudied. This study aims to contribute to the existing literature by investigating the relationship between sibling size and child labour among Indonesian children. The findings from this study will inform policymakers and practitioners on the potential impact of sibling size on child labour in Indonesia and how these effects differ for different groups in the population.

While literature on the relationship between sibling size and child labour in Indonesia is scare, there have been many studies have been done on this relationship in other countries, such as Brazil (Ponczek and Souza, 2007), Ghana (Ray, 2002), the UK (Menta and Lepinteur, 2021), Peru (Patrinos and Psacharopoulos, 1997), and India (Deb and Rosati, 2004). More recent literature makes use of the instrumental variable approach to estimate causal effects of sibling size on child labour. These studies generally observe the number of children to positively effect child labour, but the estimated effects found in these studies are context specific and cannot be generalized to other countries or areas. Although there is literature on the association between sibling size and child labour in Indonesia (Abang Ali and Arabsheibani, 2017), this study is unique in measuring the causal effect of sibling size on child labour for the Indonesian population.

The QQ trade-off in terms of child labour is especially important to study in Indonesia because it is a country with a developing economy with large informal sectors where child labour laws are difficult to enforce (Abang Ali and Arabsheibani, 2016). Fertility has also been under scrutiny for many decades by the Indonesian government, as rapid growth has put pressure on environment and on welfare of the population. More recently, progress on decreasing total fertility has wavered due to the decentralisation of family planning in the 1990s. Regardless of this, the fertility rate, nationally equivalent to 2.4 in 2017, is now close to replacement-level fertility rate of 2.1. However, there are still vast differences between households, even at the province level. In Bali and Jakarta, fertility rates were 2.1 and 2.2 respectively, while in East Nusa Tenggara and Maluku respective fertility rates were 3.4 and 3.3 (Bandan Pusat Statistik, n.d.).

To assess the effect of sibling size on children's labour history in Indonesia, this study makes use of the fifth wave of the Indonesian Family Life Survey (IFLS), a longitudinal study representative of 83 percent of the Indonesian population. Specifically, sibling count impact on wage labour, household work, family farm labour, and family non-farm labour incidence are investigated.

An instrumental variable approach is employed to identify the causal effect of sibling count on child labour. The source of exogenous variation comes from the sex composition of the first two children born to the mother of the child. This is done to address potential endogeneity due to a possible correlation between the number of siblings in a family and unobservable factors that affect a child's likelihood of working, such as parental attitudes towards child labour or cultural norms regarding education. Furthermore, heterogeneous effects for several population groups are studied in a subsample analysis to better understand inequities between different population groups. This is motivated by the large diversity in terms of religions and customs in Indonesia, and heterogeneous effects found in other studies on the effect of sibling size on child outcomes (Hatton et al., 2018; Feng, 2021). The sample is split up according to gender, area, age, religion, and education of the child's mother. Because data on child labour may suffer from measurement error due to the legality of child wage labour in Indonesia, this study also investigates the effects survey quality has on reported values of wage labour. This is done by assessing the effect of survey quality indicators on the number of children and including survey quality variables in the regressions.

In contrast to other causal studies on the effect of sibling size on child labour, this paper finds an insignificant negative causal effect of sibling size on child labour for the general population of Indonesia, even though sibling size and child labour are found to correlate positively. This indicates that there are unknown characteristics of the household, for example the financial situation or views of parents on a child's role in the household, which drive differences in child labour outcomes between children with different family sizes, instead of the number of siblings they have. Only for a few subsamples are significant negative causal effects of sibling size on child labour found, namely boys and girls with high educated mothers and young children.

The paper is structured as follows. The second section provides an overview of developments in fertility and child labour in Indonesia. This is followed by a review of the theoretical and

empirical literature surrounding sibling size and child labour in the third section, the methodology and data description in the fourth and fifth sections respectively. Ordinary least square (OLS) and two-stage least squares (2SLS) results are then presented and discussed in the sixth section. Finally, the seventh section concludes this study.

Child labour and fertility

Fertility trends

Indonesia is currently the fourth most populous country worldwide, with a population of approximately 269 million. This is a product of the high fertility rate in the 1970s. During this time, population growth outpaced Indonesia's wealth increase and led to the pursue of more unsustainable development trajectories (Kurniawan and Managi, 2018). From 1970 onwards, the government of Indonesia put a strong emphasis on slowing population growth. A government body called the National Population and Family Planning Board (BKKBN) was founded to decrease the total fertility rate and a national population campaign was enacted. Small families, especially those with two children, were promoted throughout the whole country through posters, television, and radio, but also by adapting traditional puppet-shadow plays called *wayang kulit* and *wayang golek*. The campaign and the BKKBN had a strong effect on fertility.

Contraception use has increased over time in Indonesia. Compared to other Southeast Asian countries, Indonesia ranks high, similarly to Thailand and Cambodia, when it comes to all methods of contraceptive use among women of reproductive age (UN, 2019). But in contrast to Thailand, where female sterilisation is commonplace, Indonesian women rely more on short term contraceptives. Injectables, primarily popular in sub-Saharan Africa, are the most common modern contraceptive method in Indonesia, and were used by 23.2 percent of Indonesian women of reproductive age in 2016.

Definition of child labour

Literature on the link between family size and child labour generally defines child labour as the act of working in the labour market (Patrinos and Psacharopoulos, 1997; Ponczek and Souza, 2007), although there exists literature which covers other aspects of work in relation to sibling size as well (Menta and Lepinteur, 2021; Hazarika and Bedi, 2010; Ponczek and Souza, 2012). This paper follows the broader definition of child labour, as in the latter

examples, by including work at a family farm or non-farm business and housework as well. This wider view on what is considered child labour allows for a more in-depth understanding of the effect of having more siblings. Girls in the UK are, for example, more affected by family size than boys when it comes to housework (Menta and Lepinteur, 2021). In Indonesia, the gender gap increases with age, but it is already present early on, as girls at the age of 8 already spend more time on household labour compared to boys, who work more hours doing market labour (Hsin, 2007). Families may also require labour participation from their children in the form of work at the family business. Indonesian child labourers chiefly work at the businesses of their parents instead of outside the family for wages, specifically at their farms (Kis-Katos and Schulze, 2011). Additionally, work which does not generate wages can still affect schooling (Tan et al., 2022). It is also marked as potentially harmful by the International Labor Organization (ILO).

Child labour in Indonesia is still a contemporary issue. Indonesian children sometimes provide labour in hazardous conditions, such as at palm oil and tobacco production facilities, and are even subjected to commercial sexual exploitation (DOL, 2021). In 2009, an estimated 4.05 million children aged 5-17 were working children in Indonesia (ILO, 2009). Child labour under the age of 15 was originally prohibited completely in Indonesia in 1948 by the provisional government, during the Indonesian struggle for independence (Bessell, 1999). However, this prohibition was not legally binding. A few decades later, in 1987, this prohibition, which had never been enforced, was abolished and replaced by a regulation limiting child labour to four hours daily or at night, at the legal minimum wage rate (White, 2004). In 1997, under domestic and international pressure, child labour was once again banned, with exception for those not working for wages (within the family), working for training wages, or “being compelled to work for certain reasons” (Bessell, 1999).

Child labour impacts child development in multiple ways. Studies indicate that there exists a trade-off between child labour and schooling in Indonesia which hampers human capital growth (Sugiyanto and Digdowiseiso, 2019; Suryahadi et al., 2005). Research also finds strong links between child labour and poor mental health outcomes (Sturrock and Hodes, 2016). At the same time, working as a child can bring benefits. Child labour is argued to sustain the financial costs of education of some children (Psacharopoulos, 1997). Therefore, Sugiyanto and Digdowiseiso (2019) caution for stricter regulation of child labour, due to the

benefits some forms of child labour in safe conditions can provide in terms of work experience, skill development and income to provide for school expenditures.

Theoretical and empirical background

Family size and child labour

The quantity-quality (QQ) trade-off was originally coined by Becker (1960) and later modelled by Becker and Lewis (1973). It was a response to inaccurate demographic predictions made by researchers and aimed to model children as any other goods which generate utility. The QQ-tradeoff theory spurred economic research using family size as an independent variable. It theorizes that adding a child to the family decreases the amount invested per child, thus increasing quantity of the number of children but decreasing the so-called quality of children due to lower investments in their development.[1] Sociologic literature describes this phenomenon as one of finite resources. Families with fewer children have more limited resources – time, money, energy – to invest in each child while larger families have to dilute these resources across the children (Maralani, 2008). For this reason, the outcome variables affected by family size researched are most often concerned with the parents' outcomes or the childrens' outcomes.

One of these outcome variables is child labour. Basu and Van (1998) model child labour to rest on two axioms: the luxury axiom and the substitution axiom. The luxury axiom states that families send their children to the labour market if the household income is insufficient. In the case of family size this would imply that a family is overburdened by the number of children it must provide for and has to resort to increasing household income through child labour income. The substitution axiom states that firms can substitute adult labour for child labour. If the luxury axiom is present, a household with more children, but with the same income, is less likely to be able to send their children to school instead of sending them off to work. This should be especially evident in a country such as Indonesia, considering credit constraints have been shown to be binding in many developing countries (Ranjan, 2001), and have been found to contribute to child labour (Kis-Katos and Schulze, 2011).

Studies measuring the effect of birth order and sibling size on educational outcomes often draw from the confluence model developed by Zajonc and Markus (1975) as well, which

[1] Quality in this context refers to investments made into children.

states that more children in a household indicate a relatively less intellectual environment where children are more influenced by other children than their parents. When a new sibling is born, the average cognitive ability in the household declines. If lower cognitive ability corresponds to lower wages, there is less incentive for children to work (Emerson and Souza, 2008). This effect can, however, be counteracted by less incentive to attend school due to sorting on gains (Heckman et al., 2019). The impact of sibling size on child labour through the confluence model is therefore ambiguous.

Nevertheless, the relationship between sibling size and child labour also seems to be dependent on context. Estimates vary between countries, socioeconomic status, ethnicities, and other characteristics, and can even change sign over time, from positive to negative (Maralani, 2008). Moreover, while it is generally thought that household income increases go hand in hand with a decrease in child labour, in some cases there exists a wealth paradox: at a certain point, household income is large enough to not warrant parents to motivate their children to work early in life. After this point, it is not the budget constraint of the household that drives child labour, but it is the substitution axiom which drives child labour (Fan, 2011).

This is the main motivation for the writing of this paper. The relationship between family size and child labour in Indonesia specifically has not been studied extensively and no paper on this subject has employed an identification strategy to prove causality for the population in Indonesia. Abang Ali and Arabsheibani (2017) map the supply-side determinants of child labour in Indonesia. They observed that the number of children positively impacts labour participation for girls and urban children in 2007. However, no causal identification strategy is employed to assess whether the link between family size and child labour is causal or whether this explanatory variable absorbs the effects of variables omitted from the regression. There are many reasons why estimates of family size on the probability of a child working, under the assumption that family size is exogenously determined, fail to uncover the true effect. The supply-side effect of family size may be underestimated because poorer areas, which have a larger average family size, have less economic activity and thus less child labour demand (Kis-Katos and Schulze, 2011). Additionally, parents deciding to have larger families may have unobserved resources and characteristics which allow them to keep children from working early in life. OLS models examining the QQ trade-off may suffer from omitted variable bias (OVB) which makes these models unable to estimate the true effect of family size. For example, De Haan (2010) finds significant negative effects for family size on

educational attainment measured in years of schooling using an OLS model with controls, but the IV estimates for family size are positive – although insignificant – instead.

Although the effect of exogenous variation in family size on child labour has not been studied in the Indonesian setting, there are papers which find causal relationships between family size and other dependent variables, often making use of the same Indonesian Family Life Survey. Millimet and Wang (2011) study the causal effect of sibling size on short-term and long-term health of children, weight and height respectively, and find no relationship between sibling size and long-term health. The authors uncover the causal effects through an IV approach using the gender mix of the first two born siblings. Hatton et al. (2018) build on the previous study and find a causal relationship between family size and the height of Indonesian children using two context-specific IVs: access to modern media and components of the Indonesian family planning programme, which represent the demand and supply side respectively. They find that family size has a significant negative effect on height, especially for children of low-educated mothers. Educational attainment has also been linked to family size by Feng (2021) who exploited the exogenous variation of sibling size caused by twin birth to assess that sibling size is negatively correlated with completed years of schooling, with larger effects for Muslim children, children with less educated mothers and children belonging to earlier birth cohorts. Maralani (2008) also studies the relationship between family size and educational attainment for several generations of Indonesians using self-reported miscarriages to instrument for family size and finds positive effects for early birth cohorts and negative effects for later cohorts, which contrasts the findings of Feng (2021).

Educational attainment and child labour are interconnected. In many cases, children are put in the unfortunate position of having to choose between school or work, be it due to parents' expectations or the desire for personal income (Bessell, 2009). Sugiyanto and Digdowiseiso (2019) find a significant, negative link between the incidence of child labour and schooling in Indonesia using an instrumental variables approach. They also find that school dropouts are more prevalent when children work more hours and that male children work more hours than female children on average. Suryahadi et al. (2005) find differences in the child labour and schooling nexus in Indonesia between girls and boys. Girls in Indonesia are less likely than boys to drop out of school due to having to work for income. This may be because of different types of work done by girls and boys and differences in opportunity costs associated to working. De Silva and Sumarto (2014) provide evidence for a budget constraint

determining time spent by children to generate income in Indonesia. They analyse the effect of educational transfers and related assistance programmes on the labour supply of children. The main findings of this study are that assistance programmes and cash transfers tied to education significantly tackle time spent generating income by children. This also points to a potential positive link between family size and child labour.

The literature covering family size effects on child labour is not as developed as that of family size effects on educational outcomes, where there are many studies making use of instrumental variables to uncover the true parameters. Patrinos and Psacharopoulous (1997) analyze the effects of being indigenous, number of siblings, sibling activities and sibling age structure on child schooling progress and child non-school activity. They find that family size is an important determinant of child labour. However, they note that family size can act as a proxy for wealth; in this paper, family size is also assumed to be exogenous. Kis-Katos and Schulze (2011) also control for family size as a proxy for wealth and find it is not a significant estimator of child labour. They also find that child labour supply is mainly determined by poverty and negative income shocks, in addition to lack of access to schooling. There are also papers which do include household wealth or income variables in addition to family size. Amin et al. (2004) studies the effect of wealth on child labour and includes household size as a control variable, which is found to significantly increase the probability of a child conducting child labour. Ray (2003) similarly includes the number of children in a household as a control variable and finds a positive effect only for children living in rural areas. Although omitted variable bias from wealth is controlled for, Ray (2003) still cautions for a causal interpretation due to the assumption made that sibling size is exogenous and lack of potential instruments in the data to tackle endogeneity.

In only a few papers are more complex empirical strategies employed to uncover causal links between family size and child labour. Deb and Rosati (2004) are one of the first to take into account endogeneity of fertility when estimating the effect on child labour. Their empirical strategy, using ages of the parents, village-level mortality rate and the gender of the first-born child to instrument for fertility, proves that strategies to tackle the endogeneity problem are necessary to study causal effects of fertility on child labour. Their estimates assuming exogenous fertility point to an insignificant, negative effect of family size on the probability of child labour, while the IV estimates are significant and positive. In Brazil, Ponczek and Souza (2007) find a positive relationship between family size and child labour for boys and

negative effects of family size on school progression for girls. Exogenous variation in family size in this paper is driven by the random occurrence of twin births. Menta and Lepinteur (2021) examine the effect of family size on another form of labour, namely household chores. Using data from the British Cohort Study the authors link family size to children's contribution to household chores at the age of 16 and also their later contribution to study the adult housework gender gap. Using an instrumental variable approach the authors find that family size leads to an increase in contribution to housework of a child, but the effect is only driven by girls. Boys of larger families do not contribute more to housework.

The aforementioned literature shows that there is substantial causal evidence for QQ trade-offs, in terms of educational and health outcomes in Indonesia, and in terms of child labour in other settings. This study aims to contribute by filling the research gap on the causal effect of sibling size on child labour in Indonesia specifically.

Hypotheses

Based on existing literature, the following hypotheses are formulated. A positive effect of sibling size on child labour is expected due to the dilution of the household budget caused by family expansion. This means that children of larger families have a higher likelihood of having worked than their counterpart in small families. This hypothesis is in line with studies from other countries which find causal estimates of sibling size on forms of child labour to be positive (Ponczek and Souza, 2007; Menta and Lepinteur, 2021), and studies on the effect of sibling size on educational outcomes (Feng, 2021; Maralani, 2008), and health outcomes (Hatton et al., 2018), which find negative effects. In terms of birth order, the effect on child labour is expected to be negative. While literature in developed countries points to fewer resources being available for later offspring (De Haan, 2010), earlier born children in developing countries are more likely to suffer from credit constraints due to there being no sibling of working age yet who can support them (Parish and Willis, 1993). There is also evidence in Indonesia of better educational outcomes for later born siblings (Feng, 2021).

Certain subgroups are hypothesized to be effected more prominently than others. Although son preference is not dominant in Indonesia (Guilmoto 2015), there remains gender inequality in favour of men in Indonesia. Gender inequalities in Indonesia develop over the course of life instead of being present at birth (Hsin, 2007). One of these inequalities is the

view of the family on the importance of girls' human capital development. Income shocks due to crop loss in Indonesia result in cutbacks on educational expenditure for girls but not boys (Cameron and Worswick, 2001). Additionally, girls in Indonesia who work for income are less likely to drop out of school than boys (Suryahadi et al., 2005). As stated previously, this may indicate different opportunity costs associated to work or different types of labour conducted between boys and girls. Therefore, it is expected that girls, although they are less likely to have worked on average, are affected more severely by family expansion than boys.

Studies on sibling size effects in Indonesia find more severe effects on children living in urban areas than those living in rural areas in terms of educational attainment (Feng, 2021), and health (Hatton et al., 2018). Given the link between child labour and educational attainment, the hypothesis is that urban children are more positively affected by child labour than rural children.

Although Muslims make up the majority of secular Indonesia, Feng (2021) finds more pronounced effects of sibling size in terms of educational attainment for Muslims compared to non-Muslims. Similarly, this study hypothesises that Muslims are more severely affected in terms of child labour than non-Muslims.

Finally, children with mothers who have completed up to junior high school, or nine years of education, are also expected to be affected more prominently than those with more than nine years of education. This is because highly educated mothers can be associated with a household of greater economic status or having more modern knowledge about child rearing. Additionally, the level of education of Indonesian women is found to correlate positively with contraceptive use (Gafar et al., 2020). Therefore, this comparison demonstrates the resource dilution model, which states that sibling size effects are driven by the financial constraints of the household. Child labour due to financial constraints is in theory more likely to be seen in families with lower economic status. The luxury axiom states that children are motivated to work when household income is below the level of subsistence, a situation not expected to occur due to childbirth for financially well-off households.

Methodology

The analytical framework of this study is similar to that of Ponczek and Souza (2007) and De Haan (2010). Both studies measure the impact of sibling size on child outcome variables

through an instrumental variable approach, although the latter study focuses only on educational outcomes. This study measures the effect on child wage labour and child household work, similarly to Ponczek and Souza (2007), but adds to this participation in family farm and non-farm business as outcome variables. The framework is further augmented to better suit the Indonesian context by examining differences in the effect of sibling size between religious groups, rural versus urban populations and children of differently educated mothers.

The first estimate of this study makes use of an OLS model to estimate the effect of sibling size on the probability of child labour:

$$W_{ij} = \beta_0 + \beta_1 SibSize + \boldsymbol{X_i}\beta_2 + \boldsymbol{X_j}\beta_3 + \varepsilon_{ij} \quad (1)$$

Where the outcome variable W_{ij} is the probability of child i in household j having conducted wage labour, household work, family farm work or family non-farm work expressed in dummy variables. *SibSize* is equal to the number of biological children belonging to the mother of child *i*. $\boldsymbol{X_i}$ is a vector of the characteristics of child i, which consist of age, gender, Javanese ethnicity, religion, and birth order. $\boldsymbol{X_j}$ is a vector of the household characteristics, namely: mother's education, number of adults, urban or rural location, and average birth spacing. ε_{ij} is the error term. For all regressions in this study, standard errors are robust and clustered on the household level.

It is likely that the estimate of sibling size is biased in equation (1) due to unknown characteristics jointly determined with the number of siblings a child has. The arrow of this bias may point upwards because education and economic status are generally negatively associated with fertility, which would result in an overestimation of the real effect of sibling size.

The second specification of this study introduced to tackle potential endogeneity is an IV model, namely two stage least squared (2SLS). The sex composition of the first two children in the household is used to instrument for sibling size. The following two estimations are calculated:

$$SibSize_j = \alpha_0 + \alpha_1 SameSex + \boldsymbol{X_i}\alpha_2 + \boldsymbol{X_j}\alpha_3 + \mu_{ij} \quad (2)$$

$$W_{ij} = \gamma_0 + \gamma_1 SibSize + \boldsymbol{X_i}\gamma_2 + \boldsymbol{X_j}\gamma_3 + v_{ij} \quad (3)$$

In the first stage, equation (2), the number of children is regressed on the instrument sex composition which is denoted as *SameSex*, and control variables from equation (1). This variable is equal to one if the first two children of the child's mother are two girls or two boys. The variable is equal to zero if the first two children are a boy and a girl. In equation (3), child labour outcome variables are then regressed on the predicted value of the number of children from equation (2) and the control variables.

Because the instrument used only comes into effect when a household has at least two children, the study excludes single-child households. This limitation is fitting for this study due to the societal view on a household with two children being optimal which was promoted by the Indonesian government through contraceptives, and by promoting two-child families on billboards, rupiah coins and television (Millimet and Wang, 2011).

Data

This paper makes use of a dataset from the Indonesian Family Life Survey (IFLS): a longitudinal study of 16,204 households containing 50,148 individuals, representative of 13 of 26 Indonesian provinces, or about 83 percent of the whole population. Specifically, data from the fifth wave, conducted during 2014 and 2015, is used (Strauss et al., 2016). The study of this paper requires the dataset to be reduced to individuals who are currently between 5 and 14 years old. This age cut-off is chosen because only for children from 5 and up to and including 14 years of age was the interview section about children's labour participation conducted. This cut-off is also in line with the 1973 ILO Convention 138 (Minimum Age Convention) which states that "the age of admission to employment […] shall not be less than 15 years". More importantly, the Indonesian government ratified the Minimum Age Convention of the ILO in 1999 (ILO, n.d.).[2] This number is further restricted to individuals with at least one sibling due to the identification strategy used in this paper

[2] https://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:11200:0::NO::P11200_COUNTRY_ID:102938

requiring at least two children being born in the family. This leaves the total sample for this study at 8,887 individuals from 6,158 households, for whom descriptive statistics can be found in table 1.

Four types of child labour are measured: (1) whether the child has worked for wages; (2) whether the child has done household work; (3) whether the child has worked for family farm business; and (4) whether the child has worked for family non-farm business. These outcome variables are dummy variables equal to one if a child has ever done the type of work in question and zero if not. The different outcomes measured create a broader picture of the labour provided by children as these cover both work outside the household and intra-household labour, which differ vastly in frequency. As seen in table 1, only 4.35 percent of children are reported to have been engaged in child wage labour while this number for household work is equal to 30.6 percent. Important to note is that the majority of children in this sample did not report these values themselves but instead had a family member, such as a parent or sibling, conduct this interview on their behalf. Sibling size, the main independent variable, is defined as the number of biological children belonging to the biological mother of individual *i* at the time of the survey, including individual *i*. This can include biological children who no longer live in the household. Stepchildren and adopted children were left out of the sibling count, because it cannot be accurately assessed when these children joined the household and therefore what their effect was on the fertility decisions of the mother.

Control variables are included at the level of the individual and at the family level. The former consists of gender, age, birth order, religion, ethnicity, survey quality and the relation of the respondent to the individual. Gender is a dummy variable taking on the value 1 if the child is female and 0 if they are male. In this sample, 48.8 percent is female. Age is a continuous variable expressed in years starting from 5 and capped at 14, the age group interviewed about child labour questions in IFLS. Birth order is assigned by ranking the dates of birth of all biological siblings. The regressions include individual variables for each birth order, except ten and above which are combined in one variable. The variable for first born is omitted as this group functions as the intercept. Religion and ethnicity are introduced as dummy variables denoting whether an individual belongs to the Javanese ethnic group or Muslim religious group. The island of Java is the most populous island of the Indonesian archipelago, with over 150 million inhabitants, and seats the capital city Jakarta. In terms of religion, Indonesia is de jure secular, but Islam plays a prominent role in Indonesian politics

and culture, and approximately 87 percent of the population identifies as Muslim. Because this study relies on reported values of child labour incidence, and in most cases not reported by the individual themselves, the effects of interview quality and relation of the respondent to the child on the reported values are controlled for. Quality indicators consist of interview accuracy, and interview seriousness and attentiveness, both rated by the interviewer. The relation to the respondent is conveyed by dummy variables indicating whether the person interviewed was the individual themselves, their sibling, or another family member. If neither dummy variables are equal to one, a parent was interviewed.

Control variables on family characteristics are also included. Education level of the mother is expressed in completed years of schooling. The area a household is located takes on the form of a dummy variable equal to one if it is a city and zero if it is a village. The number of living adults in the household is also taken into account. This number goes up to fourteen due to multi-generational households being common in Indonesia. Average birth spacing is calculated by dividing the sum of time expressed in years between the births of children in the household by the number of siblings.

Results and discussion

OLS and 2SLS estimates

Table 2 reports the initial results of this study which are estimated using an ordinary least squares specification. The estimate found in column 1 in table 2 estimates that an additional sibling increases the probability that a child has worked by 0.77 percentage points. This effect is significant and remains significant when adding controls. However, these control variables decrease the t-statistic of sibling size, but the estimated effect of sibling size increases to 1.12 percentage points, as seen in column 2 in table 2. These results demonstrate the previously mentioned concerns with OLS regressions and potential endogeneity through omitted variable bias. Although a wide range of control variables are introduced, there is still a potential omitted variable bias which bar these results from being interpreted causally.

Therefore, the gender composition of the two oldest children is introduced as an instrumental variable (IV) to identify causality between sibling size and child labour. The occurrence of the first two children being of the same sex has an impact on fertility. Mothers who experience this are likely to have more children due to a mixed sex composition of offspring

being preferred by parents (Angrist & Evans, 1996). The instrument sex composition of the first two children is especially appropriate in Indonesia. Guilmoto (2015) finds that son preference is weak, due to Indonesia not being characterized on a national level by patrilineal and patrilocal systems. Instead, most Indonesians prefer their children to be balanced in their sex composition. This makes a dummy denoting whether the first two children in a household share the same sex a viable instrument for fertility in the Indonesian setting instead of using the first child's sex as an instrument. The latter is more suited for studies involving countries where there is strong son preference (Chun and Oh, 2002). The previous analysis is in accordance with the data used in this paper: gender composition is a strong determinant of family size. Additionally, this paper assesses whether instrumenting for sibling size using the gender of the first born is a viable option. Similar to Millimet and Wang (2009), who assess the viability of this instrument using the third wave of IFLS, this is found to be an unusable instrument. This is verified through the first stage results of this instrument found under column 4 in table 2. The partial F-statistic for the instrument is equal to 5.18. For a 2SLS estimator to be unbiased relative to the OLS estimator, the instrument must have a strong effect on the endogenous explanatory variable. This is measured through the partial F-statistic which must be larger than 10 for the 2SLS bias to be less than 10 percent of the OLS bias (Staiger and Stock, 1997).

For an instrumental variable estimation to be valid, three assumptions must hold. The first assumption is that the gender composition instrument has a strong effect on the main independent variable, namely the number of siblings. The first stage coefficient found in column 3 of table 2 shows that this is the case. The first two children being of the same sex increases sibling count significantly by 0.613 and the partial F-statistic is equal to 231.437.

The second and third assumptions are the exclusive effect of the instrument on the outcome variable through the main independent variable, and the instrument being independent of other factors that affect the outcome variable. These last two assumptions require the gender composition of the two oldest siblings to have no effect on the outcome variable, child labour, through a channel other than sibling count. Butcher and Case (1994) identify a positive effect on educational outcomes for women with only brothers, while controlling for sibling size. This potential channel is controlled for by including dummies for having only brothers or only sisters, similar to De Haan (2010). Furthermore, the gender composition of the first two children has been employed as instrument in previous papers investigating the

effect of sibling size on other child or parent outcome variables in Indonesia (De Haan, 2010; Millimet and Wang, 2011; Nguyen, 2019), and child labour in Brazil (Ponczek and Souza, 2007).

The 2SLS estimate for sibling size in column 3 in table 2 remains positive and is larger than the OLS estimate at 2.25 percentage points, however, it is statistically insignificant. This result points to the absence of a QQ trade-off in terms of child wage labour for the full sample. De Haan (2010) also finds the effect of sibling size on the outcome variable to turn insignificant and switch from negative to positive when moving from an OLS to a 2SLS specification. It can also be the case that no effect for the full population is found while there is an effect for specific subgroups. In Brazil, Ponczek and Souza (2007) find a positive effect of sibling size on child labour incidence for the full population, although the effect is driven only by boys. Other studies with different outcome variables in the Indonesian setting generally find significant causal effects of family size on outcome variables such as educational attainment (Feng 2021), and height (Hatton et al., 2018). Although in some cases the effect is limited to a subset of the population (Maralani, 2008).

Birth order effects in the OLS specification are significant for all children except those born second. For example, being the third born child in a household decreases the likelihood of having worked for wages by 2 percentage points compared to being the first born. However, no causal effect of birth order on child labour is found. In the 2SLS specification, all birth order effects are insignificant and positive instead.

One explanation for the insignificant causal effect of the number of children on child wage labour for the whole sample may be the higher median length of birth intervals compared to countries where sibling size is found to significantly impact child labour. While the median birth spacing interval in Indonesia in 2007 was 43.7 months, the median birth spacing intervals for Sub-Saharan Africa, and Latin America and the Caribbean around the same time-period were much lower: 32.7 and 29.2 months respectively (USAID, 2011). The higher median birth spacing in Indonesia is a result of successful family planning programs conducted by the government of Indonesia starting in the 1970s (Millimet and Wang, 2011). This has implications for both mother and child. Women with regular intervals between births are at lower risk of maternal death and other adverse maternal outcomes compared to those with very short intervals (Conde-Agudelo and Belizán, 2000). Children born within short

time from their siblings are also affected. Closely spaced children are adversely affected through mechanisms, such as transmission of infectious diseases among siblings and suboptimal lactation from breastfeeding-pregnancy overlap (Conde-Agudelo et al., 2012). These effects have substantial health outcomes. Short birth intervals are associated with lower early childhood height in several low- and middle-income countries (Miller and Karra, 2020).

Additionally, the wide availability of modern contraceptives in Indonesia helps families have more control over when a child is born. From 1987 to 2006, contraceptive use among women in Indonesia grew by 13.4 percentage points, from 44 percent to 57.4 percent (Mahmud et al., 2021). Modern contraceptives are effective in allowing families to decide on the occurrence of births more accurately. This alters the effect of an extra sibling, which without control over childbirth, is a more unexpected shock. If a household expects the birth of a child, the forward-thinking household will dampen this effect by working towards a financial buffer. In such a case, the luxury axiom is less likely to be triggered because the household is not brought below the level of subsistence, thus keeping children out of the labour market.

Furthermore, laws in place in Indonesia deter children from working in formal sectors (Sandra et al., 2020). But this does not fully explain this situation because the bulk of working Indonesians are involved in the informal sectors where child labour laws are more difficult to enforce (Abang Ali and Arabsheibani, 2016).

The choice of instrument in this study may also be a factor of the insignificant 2SLS results. Two studies estimating the effect of sibling size, making use of the same IFLS data, have different outcomes for the effect on height due to the choice of instruments. Millimet and Wang (2011) instrument for sibling size using gender composition of the first two children and find an insignificant effect while Hatton et al. (2018) makes use of different context-specific instruments and finds a significant effect of sibling size. Gender composition as an instrument also has some limitations. While the gender composition of children is random, the decision to have more children, in order to achieve mixed gender offspring, is not random. The group of parents who are motivated to have more children because of this instrument may differ from those who do not want more children, even if they have two boys or two girls at the first two births. If the decision to have more children because of the gender composition is correlated with caring more for and about children, the estimate may be

underestimated due to children of larger families having parents who are more invested in their children. There is, however, no literature indicating the previously speculated situation. A different set of instruments could thus provide different results.

Another possible reason for these insignificant results is the linear specification chosen for this study. Boutin (2012) finds the existence of the wealth paradox amongst Malian households for whom an increase in the land held by an agrarian household increases the probability of a child involved in family farm activities. Although the presence of the luxury axiom is confirmed by the increased probability of child labour caused by a lack of parental resources, the wealth paradox is also present. This paradox is confirmed by the inverted-U shape relationship between child family farm labour and land size: a land size increase initially corresponds with an increase in child labour, but at some point, when the luxury axiom no longer has an effect, the effect of land size on child family fam labour is negative.

Finally, measurement error may dampen the effect of sibling size. Children themselves were not always directly interviewed about their labour history. In many cases, a parent, sibling, or another person in the household was interviewed to give information about the children. Whether the data accurately reflects the actual situation of the individual depends on whether the parents or other family member correctly responded to the survey. Due to the legality of child wage labour, even the children themselves may not honestly answer questions on child labour. Nevertheless, is unlikely that the honesty of the person answering these questions about the child is jointly determined with the number of children they have. However, in accordance with economic theories mentioned before stating that limited resources become diluted over a larger number of siblings, a respondent with many children in the household may not be as aware of the history of a child compared to a parent with less children. The respondent may also change the way they answer questions if the survey had to be conducted a lot of times due to the household containing many children, be it due to boredom or new insights from previous rounds of interviews. This can have a strong effect on answers to a survey. Fisher (2019) finds that individuals interviewed a second time in the same calendar year for the UK Household Longitudinal Study report significantly higher numbers on income the second time around. These estimates being based on reported data from different sources than the children in question and there being cases where those interviewed have gone through multiple rounds of the same questions are therefore grounds for investigation.

The IFLS data includes information about survey quality and which member of the family was the respondent to the survey. On average, respondents with more children in the household responded worse according to the interviewer. By regressing the evaluation of the accuracy of the respondent and how serious and attentive the respondent was in the interview about children on sibling size, we find a significant effect of the quality of interviews on the number of children. This potential measurement error may introduce a bias which distorts the estimate of sibling size on child labour. If inaccuracy comes in the form of parents responding their children have not worked, even though they have worked, this could mean that there is a larger effect of sibling size on child labour and the estimate can become significant. If there is a reverse effect, the estimate is likely to remain insignificant.

In addition to differences in sibling size with respect to survey quality, there is also a difference in average sibling size between children whose parents were interviewed on their behalf and individuals who had someone else take the survey, such as themselves. Table 3 shows the difference in sibling size of an individual depending on who was the respondent compared to the average sibling size of individuals who had a parent interviewed. Differences in sibling size are significant for all groups and especially large for individuals who had a sibling interviewed on their behalf. In that case, the number of siblings was 1.7 larger on average, as seen in column 3 in table 3. This is an intuitive result because the likelihood of there being a sibling available for interview is higher for individuals who have many siblings. If children or adults other than the parents are more likely to report truthfully that the child has worked, because parents in the household are ashamed of admitting their child conducted child labour or afraid of sanctions, the estimate for sibling size is dampened due to downward bias by omitting these variables.

Table 4 introduces these survey quality indicators and dummies indicating whether the child, a sibling, or someone else was interviewed to the OLS and 2SLS regression. Adding these variables previously omitted to the OLS regression decreases the p-value of sibling size and increases the magnitude of the coefficient. A child being interviewed themselves increases the likelihood of having worked for wages by 3.43 percentage points in the 2SLS specification and is the only significant new control variable introduced to the regression. Although the coefficient for sibling size in the 2SLS regression increases slightly, the estimate remains insignificant. These results are expected considering there is no reason for interview quality to be greatly affected by the gender composition of the first two children

born in a household. From here on out these additional controls are included in the regressions because they do affect some of the stratified outcomes.

Besides wage labour, children are also able to support their family by helping in family farm and non-farm business or by doing household work. While child labour is a relatively rare event, and more prone to underreporting due to it being illegal in most cases for children under 15, intra-household labour does not suffer from the latter mentioned issue. Especially helping with household chores as a child is a common occurrence, with respondents reporting 30 percent of all children to have helped in the house. The effect of sibling size on these outcomes are found in table 5. In all cases, the 2SLS estimates, which can be interpreted as the causal effect, are insignificant. This table also highlights the importance of a causal estimation of the effect of sibling size. Using an OLS specification, sibling size correlates with household work in column 1 and family farm labour in column 3. These estimates indicate that an additional sibling increases the likelihood of a child helping with household work by 1.19 percentage points and with family farm business by 0.8 percentage points. This result indicates that there is no QQ trade-off in terms of other forms of child labour for the whole population either. Similar to the results for wage labour, there are no significant birth order effects on other child labour outcome variables. Only the eighth child in a family is 15.8 percentage points more likely to work for family non-farm business than the first born. Because the number of families with at least 8 children is very small and there are no effects on other birth orders, no real conclusions can be drawn from this result.

The effect of sibling size on household work turns from significantly positive to insignificant in the 2SLS. Children are not more likely to do household work when living with more siblings. This result corresponds with those of Hazarika and Bedi (2010), who find that while children in Pakistan are more likely to work in the labour market when schooling costs rise, intra-household child labour is insensitive to such changes.

Heterogeneous effects

This study also investigates the effect of sibling size stratified by gender, area, religion, and mother's education. The percentages of children who have worked are listed in table 6 per the beforementioned subgroups. Column 3 shows that, within the sample, 4 percent of girls have worked for wages. This rate is higher for boys at 4.88 percent. On the other hand, girls are

more likely to have done household work. 38.21 percent of girls have done household work while this percentage is 22.2 for boys. A trend visible all over the world is children in urban areas being less likely to work than those in rural areas (De Silva and Sumarto, 2014). Here too are the averages higher for rural children than urban children in all cases except non-farm family business, although these averages are not found to differ statistically significantly. Additionally, Muslims are less likely to have performed household work than non-Muslims and less likely to have worked for wages.

The 2SLS estimates for these subsamples are reported in table 7. For none of these subsamples are significant effects of sibling count found on any child labour outcome variable. Only when further stratifying the sample by both education of the mother and gender in table 8 are significant effects found. Boys of high educated mothers in large families are less likely to have done household work. One additional sibling decreases the likelihood of having done household work by 9.95 percentage points. On the other hand, girls of high educated mothers are less likely to have worked for wages when sibling count increases. One additional sibling corresponds with a 1.92 percentage points decrease in the likelihood of having worked for wages. Because children of high educated mothers are associated with households of higher social economic status, these results coincide with the resource dilution mechanism, for which the effects are more likely to be felt by poorer households. These estimates also showcase Indonesian gender roles. Boys with more siblings are more likely to have sisters who can be made responsible for household work, while girls with more siblings are more likely to have brothers who can conduct wage labour.

Finally, the sample is differentiated according to age in table 9. Two cohorts are compared, from age five to nine and age ten to fifteen. Young children, aged five to nine, are less likely to work when sibling count increases. Children aged ten and above are unaffected by sibling count in terms of child labour outcomes. This result is counterintuitive to the resource dilution mechanism. The model and the results can be reconciled by considering that the need for child labour in a household does not grow proportionately with sibling count for younger children. It also corresponds with findings by Parish and Willis (1993), who state that older siblings in developing countries often support their parents and in turn allow younger siblings to enjoy better outcomes than themselves.

In sum, no effects are found for the general population. The stratified analysis allows for a more sensitive understanding of the role of sibling count on child labour. Instead of the expected positive effect of sibling count on child labour, this study finds negative effects of sibling count on child labour for groups for whom an increase in sibling count was hypothesized to be least costly, namely, boys and girls with high educated mothers and young children. These results demonstrate the resource dilution model and the developed world phenomenon of older children assisting their parents and younger siblings (credit constraints for older siblings. May lead parents to rely on their older children's income to finance their younger children's education and health).

Conclusion

This study is the first to assess the causal effect of sibling count on child labour outcomes in Indonesia. Causality was established by employing sex composition of the first two children in a household as instrumental variable. The main results of this study break with recent literature on the causal effect of sibling count on child outcomes in Indonesia which finds significant effects on education (Feng, 2021), and health (Hatton et al., 2018). Although OLS estimates are significant and remain so when control variables are introduced, the relationship for the general population breaks down in the 2SLS regression. An investigation into the effect of interview quality and the relation of the respondent to the individual also confirm the insignificant results found.

Negative effects of sibling count on child labour are found for subsamples of the population, namely children with more educated mothers and the youngest cohort of children between five and eight years old. For girls with more educated mothers, the likelihood of having worked for wages decreases while for boys the likelihood of having done household work decreases when sibling count increases. The youngest cohort of children is less likely to have worked for wages when sibling count increases. These effects are explained through the resource dilution model, as these groups are less socioeconomically vulnerable than their counterparts, the children with less educated mothers and the older cohorts.

This study has three limitations. One is that this study measures child labour outcomes as a binary variable indicating whether a specific form of child labour has been done by the child. This does not describe the amount of time children spend providing child labour, whether the children are still working at the moment of survey, or the type of work done. Therefore, it is

unknown if these children worked for a short moment in time or if they work many hours a week, which can hamper their school performance and personal wellbeing. It is also not known whether children in large families work different or more dangerous jobs. Further research into this topic is necessary to understand the degree to which the different effects of sibling count on child labour amongst certain groups within the Indonesian population are harmful.

A second limitation is that the instrument used in this study does not directly alter the number of children households have. While the gender composition of offspring does impact fertility choices of parents, parents can still decide whether they want to have more children or not. As seen in another study, the same relationship between sibling count and an outcome variable can be found to be statistically significant instead of insignificant when instruments other than gender composition are used (Hatton et al., 2018).

Finally, a limitation of this study is that the sample is not representative for all of Indonesia. While 83 percent of Indonesians are represented, provinces on the periphery such as Aceh and North Sulawesi are not included in the data. The remaining 17 percent of the Indonesian population may experience vastly different effects of sibling count and require different data for their situation to be understood.

Nevertheless, this study provides another viewpoint on the effect of sibling count in Indonesia and contributes to the literature on the causal effect of sibling count in a country where family planning has long been at the forefront. It also provides a more nuanced view on the effect of sibling count on child labour through the heterogeneous analysis offered. More importantly the difference between the findings of this study for the Indonesian population and previous studies for different countries also showcase the need to individually assess the effect of sibling count on child labour for each new context.

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Appendix

Table 1

Descriptive statistics.

Variable	Mean	S.D.	Min.	Max.
Wage labour	0.0435	0.204	0	1
Family farm labour	0.0358	0.186	0	1
Family non-farm labour	0.0460	0.210	0	1
Household work	0.306	0.461	0	1
Sibling size	4.283	2.219	2	18
Female	0.488	0.500	0	1
Age	9.491	2.794	5	14
Adult size	2.298	1.047	0	14
Mother's education	8.973	4.097	0	16
Muslim	0.888	0.315	0	1
Javanese	0.386	0.487	0	1
Birth order	2.951	2.023	1	18
Average birth spacing	2.275	2.302	0	32.61
Urban	0.591	0.492	0	1
Gender composition	0.789	0.408	0	1
Accuracy respondent	1.858	0.560	1	4
Seriousness and attentiveness respondent	1.858	0.561	1	4
Child interviewed	0.327	0.469	0	1
Sibling interviewed	0.0230	0.150	0	1
Other interviewed	0.0327	0.178	0	1
Number of families	6,158			
Number of observations	8,887			

Table 2
Effect of the number of siblings and birth order on child wage labour.

	OLS (1)	OLS with controls (2)	2SLS (3)	First child instrument (4)
Sibling count	0.00767***	0.0112***	-0.0140	
	(0.00131)	(0.00282)	(0.0105)	
Second		-0.00357	0.00249	
		(0.00598)	(0.00651)	
Third		-0.0208***	0.0130	
		(0.00683)	(0.0159)	
Fourth		-0.0209**	0.0269	
		(0.00913)	(0.0219)	
Fifth		-0.0273**	0.0501	
		(0.0121)	(0.0344)	
Sixth		-0.0443***	0.0474	
		(0.0148)	(0.0405)	
Seventh		-0.0576***	0.0682	
		(0.0199)	(0.0553)	
Eighth		-0.0676***	0.0776	
		(0.0239)	(0.0650)	
Ninth		-0.0718**	0.108	
		(0.0363)	(0.0828)	
Tenth and above		-0.0957**	0.127	
		(0.0377)	(0.100)	
Coefficient first stage			0.6125972***	-0.090499**
			(0.0402679)	(0.0397747)
Partial *F*-statistic first stage			231.437	5.17696
Observations	8887	8887	8887	8887

Note: All regressions include controls at child level for age, gender, ethnicity, and religion, and at household level for number of adults, mother's education, average birth spacing, and area. Standard errors (in parentheses) are clustered at the household level to allow for correlation within families. * Significant at 10% level. **Significant at 5% level. ***Significant at 1% level.

Table 3
Relationship between survey quality indicators and sibling count.

	(1)	(2)	(3)
Accuracy	0.257***		
	(0.0419)		
Seriousness and attentiveness		0.244***	
		(0.0419)	
Child interviewed			0.569***
			(0.0498)
Sibling interviewed			1.699***
			(0.155)
Other interviewed			-1.435***
			(0.131)
Observations	8887	8887	8887

Note: 'Accuracy' and 'seriousness and attentiveness' are measured, by the interviewer, on a scale from 1 to 4 with 4 being the least accurate or serious and attentive.

Table 4
Effect of the number of siblings on child wage labour, including survey quality and respondent's relation to child included as controls.

	OLS	2SLS
	(1)	(2)
Sibling count	0.0115***	-0.0124
	(0.00282)	(0.0106)
Second	-0.0239***	0.00827
	(0.00692)	(0.0161)
Third	-0.0228**	0.0226
	(0.00915)	(0.0222)
Fourth	-0.0321***	0.0416
	(0.0122)	(0.0349)
Fifth	-0.0490***	0.0381
	(0.0150)	(0.0411)
Sixth	-0.0623***	0.0570
	(0.0201)	(0.0560)
Seventh	-0.0741***	0.0639
	(0.0243)	(0.0659)
Eighth	-0.0769**	0.0939
	(0.0363)	(0.0839)

Table 4 continued

	OLS	2SLS
	(1)	(2)
Ninth	-0.104***	0.108
	(0.0383)	(0.102)
Tenth and above	0.000714	-0.00155
	(0.00120)	(0.00163)
Accuracy	-0.00645	-0.000728
	(0.0139)	(0.0147)
Seriousness and attentiveness	0.0109	0.00725
	(0.0139)	(0.0145)
Child interviewed	0.0369***	0.0343***
	(0.00707)	(0.00720)
Sibling interviewed	0.0291	0.0255
	(0.0177)	(0.0180)
Other interviewed	0.00203	-0.00593
	(0.00897)	(0.00986)
Observations	8887	8887
Coefficient first stage		0.6050609***
		(0.0404311)
Partial *F*-statistic first stage		223.958

Note: All regressions include controls at child level for age, gender, ethnicity, and religion, and at household level for number of adults, mother's education, average birth spacing, and area. Standard errors (in parentheses) are clustered at the household level to allow for correlation within families. * Significant at 10% level. **Significant at 5% level. ***Significant at 1% level

Table 5

Effect of the number of siblings on other forms of child labour: household work, family farm business, and family non-farm business.

	Household work	Household work	Family farm labour	Family farm labour	Family non-farm labour	Family non-farm labour
	(1)	(2)	(3)	(4)	(5)	(6)
Sibling count	0.0119**	0.00711	0.00735***	-0.0000927	-0.000654	-0.0169
	(0.00495)	(0.0220)	(0.00241)	(0.0103)	(0.00286)	(0.0108)
Second	-0.00814	-0.00693	-0.00357	-0.00171	-0.00542	-0.00135
	(0.0128)	(0.0139)	(0.00496)	(0.00553)	(0.00623)	(0.00684)
Third	-0.0327**	-0.0262	-0.00992*	0.000106	-0.00888	0.0130
	(0.0149)	(0.0327)	(0.00596)	(0.0151)	(0.00730)	(0.0163)
Fourth	-0.0405**	-0.0313	-0.00674	0.00743	-0.00855	0.0224
	(0.0184)	(0.0448)	(0.00839)	(0.0212)	(0.00882)	(0.0221)
Fifth	-0.0559**	-0.0411	-0.00750	0.0155	0.00309	0.0532
	(0.0242)	(0.0707)	(0.0114)	(0.0350)	(0.0127)	(0.0349)
Sixth	-0.0545*	-0.0369	-0.0307**	-0.00352	-0.0185	0.0408
	(0.0296)	(0.0842)	(0.0136)	(0.0397)	(0.0141)	(0.0404)
Seventh	-0.0382	-0.0141	-0.0319	0.00524	-0.00117	0.0801
	(0.0381)	(0.115)	(0.0197)	(0.0583)	(0.0203)	(0.0583)

Table 5 continued

	Household work	Household work	Family farm labour	Family farm labour	Family non-farm labour	Family non-farm labour
	(1)	(2)	(3)	(4)	(5)	(6)
Eighth	-0.0824*	-0.0546	-0.0633***	-0.0203	0.0636**	0.158**
	(0.0470)	(0.133)	(0.0187)	(0.0622)	(0.0311)	(0.0707)
Ninth	-0.146**	-0.111	-0.0422	0.0110	-0.0192	0.0971
	(0.0611)	(0.166)	(0.0312)	(0.0804)	(0.0287)	(0.0786)
Tenth and above	-0.0977*	-0.0550	-0.0267	0.0392	-0.0160	0.128
	(0.0589)	(0.199)	(0.0348)	(0.0988)	(0.0306)	(0.0970)
Observations	8887	8887	8887	8887	8887	8887

Note: All regressions include controls at child level for age, gender, ethnicity, and religion, and at household level for number of adults, mother's education, average birth spacing, and area. Standard errors (in parentheses) are clustered at the household level to allow for correlation within families. * Significant at 10% level. **Significant at 5% level. ***Significant at 1% level.

Table 6
Child labour frequencies, by gender, region, religion and mother's education.

		By gender		By region		By religion		By mother's education	
	Full sample	Male	Female	Urban	Rural	Muslim	Non-muslim	Non-middle school	middle school(+)
Dependent variable									
Wage labour	0.0435	0.0492	0.0376	0.0379	0.0517	0.0364	0.1008	0.0551	0.0272
	0.204	(0.2164)	(0.1902)	(0.1910)	(0.2214)	(0.1872)	(0.3012)	(0.2282)	(0.1627)
Household work	0.306	0.2263	0.3893	0.2783	0.3456	0.2822	0.4940	0.3228	0.2818
	0.461	(0.4185)	(0.4876)	(0.4482)	(0.4756)	(0.4501)	(0.5002)	(0.4676)	(0.4500)
Family farm labour	0.0358	0.0477	0.0233	0.0120	0.0701	0.0269	0.1069	0.0482	0.0182
	0.186	(0.2131)	(0.1509)	(0.1089)	(0.2554)	(0.1617)	(0.3091)	(0.2141)	(0.1338)
Family non-farm labour	0.0460	0.0428	0.0494	0.0501	0.0401	0.0432	0.0685	0.0470	0.0446
	0.210	(0.2025)	(0.2166)	(0.2182)	(0.1963)	(0.2033)	(0.2528)	(0.2117)	(0.2065)
Observations		4551	4336	5250	3637	7895	992	5211	3676

Table 7
Stratified effects of the number of siblings on child labour, by gender, area, religion, and mother's education.

		By gender		By region		By religion		By mother's education	
	Full sample	Male	Female	Urban	Rural	Muslim	Non-muslim	Non-middle school	middle school(+)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dependent variable									
Wage labour	-0.0124	-0.0280	-0.0062	-0.0136	-0.0093	-0.0135	-0.0173	-0.0151	-0.0052
	(0.0106)	(0.0258)	(0.0123)	(0.0125)	(0.0184)	(0.0097)	(0.0631)	(0.0178)	(0.0093)
Household work	0.0071	-0.0022	0.0234	0.0093	0.0091	0.0179	-0.101	0.0297	-0.0148
	(0.0220)	(0.0435)	(0.0275)	(0.0279)	(0.0351)	(0.0219)	(0.113)	(0.0329)	(0.0278)
Family farm labour	-0.0001	-0.0126	0.00511	-0.0084	0.0105	-0.00361	0.0186	-0.0003	0.0015
	(0.0103)	(0.0278)	(0.0102)	(0.0089)	(0.0209)	(0.00879)	(0.0666)	(0.0175)	(0.0077)
Family non-farm labour	-0.0169	-0.0180	-0.0159	-0.0201	-0.0112	-0.0126	-0.0538	-0.0245	-0.0074
	(0.0108)	(0.0221)	(0.0140)	(0.0149)	(0.0156)	(0.0107)	(0.0573)	(0.0163)	(0.0133)
Coefficient first stage	0.6051***	0.4272***	0.7288***	0.6129***	0.5942***	0.6269***	0.4403**	0.5131***	0.7892***
	(0.0404)	(0.0618)	(0.0573)	(0.0563)	(0.0553)	(0.0382)	(0.1793)	(0.0542)	(0.0545)
Partial F-test	223.958	47.8187	162.031	118.565	115.456	269.225	6.03532	89.7146	209.658
Observations	8887	4551	4336	5250	3637	7895	992	5211	3676

Note: All regressions include controls at child level for age, gender, ethnicity, and religion, and at household level for number of adults, mother's education, average birth spacing, and area. Standard errors (in parentheses) are clustered at the household level to allow for correlation within families. * Significant at 10% level. **Significant at 5% level. ***Significant at 1% level.

Table 8

Stratified effects of the number of siblings on child labour, by mother's education and gender simultaneously.

		Up to middle school mother		Middle school(+) mother	
	Full sample	Male	Female	Male	Female
	(1)	(2)	(3)	(4)	(5)
Dependent variable					
Wage labour	-0.0124	-0.0622	0.0088	0.0233	-0.0192*
	(0.0106)	(0.0436)	(0.0205)	(0.0193)	(0.0114)
Household work	0.0071	0.0752	0.0211	-0.0995*	0.0280
	(0.0220)	(0.0653)	(0.0425)	(0.0602)	(0.0329)
Family farm labour	-0.0001	-0.0437	0.0158	0.0303	-0.0060
	(0.0103)	(0.0466)	(0.0173)	(0.0187)	(0.0103)
Family non-farm labour	-0.0169	-0.0279	-0.0263	-0.0095	-0.0023
	(0.0108)	(0.0322)	(0.0216)	(0.0283)	(0.0169)
Coefficient first stage	0.6051***	0.3550**	0.6024***	0.5857***	0.9733***
	(0.0404)	(0.0789)	(0.0758)	(0.0900)	(0.0788)
Partial F-test	223.958	20.2265	63.2576	42.3812	152.746
Observations	8887	2671	2540	1880	1796

Note: All regressions include controls at child level for age, gender, ethnicity, and religion, and at household level for number of adults, mother's education, average birth spacing, and area. Standard errors (in parentheses) are clustered at the household level to allow for correlation within families. * Significant at 10% level. **Significant at 5% level. ***Significant at 1% level.

Table 9
Stratified effects of the number of siblings on child labour, by age.

	Full sample	By age	
	Children aged 5-14	Children under 10	Children 10 and above
	(1)	(2)	(3)
Dependent variable			
Wage labour	-0.0124	-0.0248*	-0.0055
	(0.0106)	(0.0138)	(0.0140)
Household work	0.00711	0.0158	-0.0107
	(0.0220)	(0.0449)	(0.0237)
Family farm labour	-0.0001	0.0111	-0.0004
	(0.0103)	(0.0129)	(0.0129)
Family non-farm labour	-0.0169	-0.0144	-0.0186
	(0.0108)	(0.0165)	(0.0135)
Coefficient first stage	0.6051***	0.3739***	0.8143***
	(0.0404)	(0.0400)	(0.0567)
Partial F-test	223.958	87.3413	206.325
Observations	8887	4501	4386

Note: All regressions include controls at child level for age, gender, ethnicity, and religion, and at household level for number of adults, mother's education, average birth spacing, and area. Standard errors (in parentheses) are clustered at the household level to allow for correlation within families. * Significant at 10% level. **Significant at 5% level. ***Significant at 1% level.