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Child work, health and policy change in Colombia

Analysis using Demographic and Health Surveys from 2000, 2005 and 2010

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LIST OF ABBREVIATIONS

AVE……..Average Marginal Effect
BMI.....Body Mass Index
DD……Difference-in-Differences
DHS.....Demographic and Health Survey
CH.....Child health
CW……Child work
ILO.....International Labor Organization
LMICs……..Low and Middle Income Countries
PH……..Parent health
PW……..Parent work
SH……Sibling Health
YS……Younger sibling
cat……categories
educ……education
hh……...household
hlth……..health
hrs……hours
mbr……...member
nbr……number
oldsibl……older sibling
pp……..percentage points
prob……problem
reg……regular
wrk.....work

ABSTRACT

While child work is still prevalent around the world, there is still a lack of evidence on the subject and many surveys have been underexploited. Using the Demographic and Health Surveys of 2000, 2005 and 2010, we studied the relationship between child work (including household chores) and child, sibling, and parental health. Using Colombia's child work policy change implemented in 2006, we are also able to begin to investigate the causal relationships between these factors. First we focused on the relationship between child work and the child health, then on the one between child work and the health of the younger siblings, and finally on the one between child work and parent health. Our descriptive analysis using logit multivariate regressions finds significant and positive associations at the extensive margin between child work and poor child health. Similarly, we conclude that child work and the probability of the younger siblings having a health event are significantly and positively correlated. For the associations between parent health and child work, we found they are significant and positive for extensive measures of child work and intensive measures of household chores. Using a difference-in-differences strategy to evaluate the policy change of 2006, we found evidence of a significant and negative effect on prevalence of child work among children 14-15 years old. Our chores results suggest a significant effect but these results are quite sensitive. Assuming the evidence of the correlation between child work and child health reflects in part a causal effect of children working on their health, child work policy could also improve child health. Our results also suggest that we would need to take into account the association between parent health and child work in the elaboration of policy.

ABSTRACT (Français)

Travail des enfants, santé et changement de politique en Colombie,
Analyse utilisant les Enquêtes de Démographie et Santé (DHS) de 2000, 2005 et 2010

Alors que le travail des enfants est encore largement répandu dans le monde, il existe un manque de preuves sur le sujet et beaucoup de données d'enquêtes ont été sous-exploitées. A travers les DHS de 2000, 2005, 2010, nous avons étudié la relation entre le travail des enfants (incluant les tâches ménagères) et la santé des enfants, frères et sœurs et parents. Utilisant le changement de politique sur le travail des enfants mis en place en 2006 en Colombie, nous avons aussi pu examiner les relations causales entre ces facteurs. Premièrement, nous nous sommes concentrés sur la relation entre le travail des enfants et la santé des enfants, ensuite sur celle entre le travail des enfants et la santé des jeunes frères et sœurs et enfin sur celle entre la santé des parents et le travail des enfants. Notre analyse descriptive avec un modèle logit multivariable nous amène à conclure à une association significative et positive entre le travail des enfants et la santé des enfants en utilisant une mesure extensive du travail. De la même manière, nous concluons à une relation significative et positive entre le travail des enfants et la probabilité pour les jeunes frères et sœurs de rencontrer un problème de santé. En appliquant une stratégie des doubles différences pour évaluer l'effet du changement de politique mené en 2006, nous avons identifié un effet significatif et négatif sur la prévalence du travail des enfants parmi les 14-15 ans. Nos résultats concernant les tâches ménagères suggèrent un effet significatif mais ce résultat apparaît dépendant de la spécification du modèle. Supposant que les preuves de la corrélation entre travail des enfants et de la santé des enfants reflètent en partie une relation causale, les politiques sur le travail des enfants amélioreraient également la santé des enfants. Nos résultats nous montrent qu'il faut aussi prendre en compte l'association entre la santé des parents et le travail des enfants dans l'élaboration de politiques.

THESIS BODY

Introduction

Although a global will to reduce child labour exists, there are still a large number of children labourers. The ILO estimates for 2012 were 264.4 million children in employment, 168 million in child labour and 85.3 million involved in hazardous work (International Programme on the Elimination of child labour, 2013). “Child in employment” refers to every child involved in work, and several important subcategories exist. The term “child labour” is often defined “as work that deprives children of their childhood, their potential and their dignity, and that is harmful to physical and mental development.” Hazardous work is “labour that jeopardises the physical, mental or moral well-being of a child, either because of its nature or because of the conditions in which it is carried out.” To avoid these and to find way to eradicate it, one must study it to have a better understanding.

Child work has mainly been studied in terms of its links with reduced school attendance and how it can impact the human capital of the child through this channel. But one must not forget that child work in itself can positively develop human capital of the child through experience, the learning of skills. In this way child work may not necessarily be seen as negative as long as it does not interfere with schooling. However, child work can also have direct negative effects on the child if it has negative impact on health. Child work has often been said to be harmful for the child but the relationship between child work and health has been little studied and there’s no clear evidence on it. This may be due to some methodological issue such as the measurement of child work, the measurement of health, the healthy worker effect, the establishment of clear causal relations due to the multiple possible interactions between work and health. The work here proposes to add to the sum of evidence needed to establish the relationship between work and health. Being well-aware of the limits of it, we propose here novel analyses which should continue to be built on in future research.

First, we adopt a larger view on the relationship between child work and the health of multiple family members. Second we use a large, global survey that hasn’t been used yet for the study of child work. Third we focus this analysis on Colombia to be able to study the effect of a policy change. With DHS data we can adopt a larger view of child work, not only considering child economic activities but also child involvement in chores. Since we are not only focusing on the relationship between child work and the health of the child working but studying also the relationship between child work and his/her younger sibling’s health, data at the household level are necessary and provided with the DHS. To our knowledge, this relationship has not been studied yet. It seems of some importance to us as we are elaborating policies to fight child work to

consider that this may have an impact on other members in the household, particularly the most fragile ones: the siblings below five years old.

Still in considering the different aspects of the relationship between child work and health, we want to add to the work on the relationships between child work and parent's health. It has been shown that child work can be used to compensate for some idiosyncratic shocks (Beegle, Dehejia, & Gatti, 2006). Health shocks due to accident, illness are among these. We add to this literature by studying the relationship between the overall health of the parents and child work. This may have implications in the implementation of policies against child work, where other insurance mechanisms for household may be needed. We were able to identify vulnerable populations and a special interest should be brought to them.

To complete this large study of child work and health in Colombia, we evaluate the impact of a policy change. Colombia implemented a new regulation of child work in 2006 and thanks to the surveys taken before and after this policy, we can have a first glance at its effects. Implementing policies appears as a useful step to fight against child work and its effects but one must make sure that these have the expected impact and are not having unintended effects. Using a difference-in-differences strategy, we propose here an evaluation of the policy change in Colombia.

Framework

Literature review

a) Child work and child health

There is ambiguous and/or little evidence in the literature on the relationship between child work and health in Low and Middle Income countries (LMICs). It's a dynamic relationship, with different potential and short-run and long-run health effects. Causal effects may run in both directions: from work to health and from health to work. Indeed, studying the health effects of child work, one must make a distinction between the direct and indirect effects and finally the negative and positive possible effects (Table 1). Child work may cause a poorer health due to work exposures, tiredness, inadequate equipment but at the same time (s)he brings more resources to the household, a step to food security and better health, and also more food may be allocated to him/her due to his/her work status: the one bringing resources into the household must stay healthy to continue to do so. The mechanisms can also operate on the long-run: if the child works and do not go to school, it is likely to damage his/her future health since he won't enjoy the positive future effect of schooling. Work exposures at a young age could also have future repercussions later in life. Having in mind these mechanisms between child work and child health, we draw an overview of the existing literature on the subject.

The different ways to measure the work-health relationship have been summarized the following way (Dorman, 2008):

- Compare the overall health status of child workers to an appropriate reference group, the inference being than the difference is attributable to work activity,
- To identify exposures associated with work activities and environments
- One can document the record of injuries and illnesses child workers have experienced at work or as a result of it.

Our work uses on the first method, so we focus only on the literature on this matter. Briefly we can say that the literature of the effect of child work and the study of exposures must be extended. One may be tempted to apply the existing literature occupational health among adults to children, but children are not “small” adults. More specific investigations of the effect of children’s exposure at work are necessary.

Given the two-way relationship between child work and child health, it is difficult to offer proper econometric specifications to identify the effect of work on health, and most studies are focusing on descriptive analysis and the identification of child work determinants (poverty, markets imperfections, parental characteristics, macroeconomic factors,…(Fors, 2012)).

Most of the time, the analyses are performed on longitudinal data, allowing to control for fixed effects. The results are overall pretty conclusive to say there is a relationship in the long-run (Giuffrida, Iunes, & Savedoff, 2005; Kassouf, McKee, & Mossialos, 2001) but the results in the short-run are more ambiguous. An another econometric way to take into account child work endogeneity on health is to use instruments (Beegle et al., 2006; Lee & Orazem, 2007; Owen O’Donnell, Rosati, & van Doorslaer, 2005; Wolff & Maliki, 2008). Results from these models do not support the existence of a causal relationship from work to health.

A special focus on how the amount of time spent working impacts children’s health is also needed. Especially since in the adult occupational health literature, a relationship between working hours and negative health outcomes has been shown. But when it comes to children the literature is quite poor. One can cite a work investigating this relationship in Bangladesh, Cambodia and Brazil (Guarcello, Lyon, & Rosati, 2004). Using a Heckman probit estimation, they found a positive association between working hours and the probability of being injured.

Recently, some others econometrics specifications have been used to study the association between child labour and health in Bangladesh (Ahmed & Ray, 2014). Using a bivariate probit framework allowing for potential endogeneity, the authors showed a positive and significant association between child labour and the probability of being injured or becoming ill. This association holds when studying the relationship between the numbers of hours worked and the probability of being injured or ill, using the semi-parametric approach.

One must underline the fact that while the relationship between work doing chores and health is an interesting one, it has rarely been examined in the existing literature. Work has been done to set standards regarding the study of chores as child labour (F. C. Rosati, Lyon, Valdivia, & Guarcello, 2005; Furio C Rosati, Lyon, & Ranzani, 2013). The relationship between the involvement in chores and the child health is studied in this work, but it is mainly descriptive statistics. There are some econometric specifications as well for Nicaragua and Guatemala. They are using illness and injuries as a measure of the overall health, which is quite limited. Another work used BMI to study this relationship in six countries (Brazil, Guatemala, Guinea, Kazakhstan, Peru and Gambia) but again it is only descriptive statistics (Francavilla & Lyon, 2003). We are adding to this literature here using the self-assessed health measure.

b) Younger sibling health and child work

Not only to have consequences for the working child, child work may also have spillovers. At the household level, one can expect that it increases the overall well-being through a contribution to the household resources. This overall increased in well-being could be reflected on the resources allocated to younger siblings who do not work because they are too young. They would have a positive net input from child work on their health: without suffering from the negative direct of it, they could enjoy the indirect effects of an increase in household resources. But as mentioned (O. O'Donnell, van Doorslaer, & Rosati, 2002), the siblings could experience a lower nutritional status and greater morbidity than the working children. One could explain this by the fact that food is allocated to those who need it the most that is to say to those having an activity. Indeed, those are the one bringing resources to the household and one must make sure that they are able to do it properly. Hence, the first indirect positive effect of child work on the younger sibling health must be mitigated by this second indirect negative allocation effect. We also have to take into account that if a child work outside the household, it would reduce its share of work at home and it may decrease the care for the youngest siblings. Still, the younger sibling with an older working sibling could receive more resources than the younger sibling without an older working sibling and hence have a better health.

Overall, some mechanisms are at play between young sibling health and their sibling involved in child work (Table 1). Studying this relationship could help us understand the allocation choices inside the household and help to anticipate consequences of child work policy at the household level. If it appears that child work and young sibling health are connected, one cannot implement policies without taking it into account.

The relationship between child work and the siblings of the working child has been very little studied. When studied, siblings are considered as a determinant of child work (Edmonds, 2006).

Especially, the sibling composition, birth order have been studied (Chesnokova & Vaithianathan, 2008; Dammert, 2009; Emerson & Souza, 2008; Patrinos & Psacharopoulos, 1997; Seid & Gurmu, 2015) but we have found no evidence of a study analysing the relationship between an older working sibling and the health of the younger non-working sibling.

c) Parent health and child work

Studying parent health effects on child work, we no longer look at the consequences of child work but one of the possible determinants. Prior to any work on the determinants of child work, one must recall the two axioms stated in the seminal paper of child labour economics (Basu & Van, 1998).The first one is the luxury axiom: “a family will send the children to the labour market only if the family’s income from non-child-labour sources drops very low” and the substitution axiom: “from a firm’s point of view, adult labour and child labour are substitutes.” These axioms are the basis to study how negative shock in income can lead to child work.

One way to see child work is as insurance in case of a shock occurring at the household level. When household’s assets are illiquid or inexistent, one way to cope with a dire situation may be to send child work or to increase the number of hours worked by the child to bring more resources to the household. In this sense, child work can be considered as a cushion to face tough financial situation (Table 1).

There is solid evidence on this matter across different countries and using different techniques and they are pretty consistent to say that a shock can lead to more child work, especially when the access to credit is limited. The seminal paper on this matter Jacoby and Skoufias (Jacoby & Skoufias, 1997) have shown in rural India that, in a context of financial market imperfections, school attendance fluctuations resulting from shocks are a form of self-insurance. The consequences of different type of production shock have been studied: poor harvests, urban adult employment, collective and individual (Beegle et al., 2006; Dammert, 2008; Duryea, Lam, & Levison, 2007; Guarcello, Mealli, & Rosati, 2009; Kruger, 2007). These shocks leading to negative income shocks, their results are that it increases the incidence of child labour. In this sense, increasing the insurance coverage appears as a way to reduce the incidence of child work. The theoretical work of Pouliot with incomplete insurance markets and functioning credit markets showed that child labour can be a result from this system (Pouliot, 2006). More recently, authors described how households facing adverse shocks in a dynamic model with heterogeneous agents may use child labour as a mean to smooth their consumption (Fabre & Pallage, 2015). In this setting, unemployment insurance and/or a universal basic income would help to reduce child labour. Overall, there is empirical and theoretical evidence that child labour is a self-insurance at the household level when formal insurance markets are non-existing or incomplete.

Table 1: Summary of the associations between work and health and the potential underlying mechanism

	Potential Underlying Mechanisms		
	Poor child health and child work	**Poor sibling health and child work**	**Child work and parent health**
Association			
Positive association	*More child work and poorer CH or less child work and better CH*	*More child work and poorer SH or less child work and better SH*	*More child work and poorer PH or less child work and better PH*
	CW has a negative impact on health	CW because need more resources for the sick younger sibling	Poor PH -> Parent loss in productivity -> less resources -> CW
	Family lacks resources -> CW and poor CH	More resources allocate to the working child and less for the younger sibling	Not enough resources -> poor PH and CW
	more resources in the household -> less CW and better CH	more resources in the household -> less CW and better SH	CW -> more resources to the worker, less for the parent -> poor PH
			more resources in the household -> less CW and better PH
Negative association	*More child work and better CH or less child work and poorer CH*	*More child work and better SH or Less child work and poorer sibling health*	*More child work and better PH or less child work and poorer parent health*
	Healthy worker effect	CW -> More resources in the household ->better SH	CW -> more resources in the household -> better PH
	CW-> More resources in the household -> better CH	CW -> Parents can afford to work less -> more time to take care of the YS -> better SH	CW -> parent work less -> better PH
	CW-> better resources allocation to the worker -> better CH	CW outside the household -> less care for the younger sibling -> poorer SH	CW complementary to PW
			Altruistic parent -> no CW -> parent work more -> poorer PH
Null association	Positive and negative mechanisms cancel each other	Positive and negative mechanisms cancel each other	Positive and negative mechanisms cancel each other
	No association	No association	No association

When it comes to a parent's health shock, the response to illness shocks in Northern Mali has been studied (Dillon, 2012). The effects depend on the complementarity of child work and adult work. The results of the paper are that health shocks have little effect on child labour participation but they impact child work at the intensive margin. Parental health shocks have also been studied in Tanzania (Alam, 2015). The results suggest that parent illness and of other household members do not affect children's school attendance due to an increase in child labour.

Adding to this we propose to study if the global state of health of a parent is likely to increase the probability for a child to work. Supposing that a bad health would lead to a loss of productivity for

the parent and from that would gain fewer resources, child work can be a way to cope with the situation. We also hypothesized that not only to impact child work, this could impact the involvement of the child in the household chores.

d) Policy change

Once we understand the determinants and causes of child work, one can consider policies implementations to reduce child work and/or reduce its effect, child work becoming the outcome of interest. In our case, we are interested in how a policy can mitigate child work (and hence reduce its negative health effects). This study allows us to have a deeper analysis of the phenomenon and move beyond the descriptive correlations to the identification of causal relationships and mechanisms.

There is not just one type of public policy that can impact child work. As theorized by (Basu & Van, 1998), child work is a market so as any market there is two sides to it: demand and supply. Public policy can act on both sides either separately or at the same time. Indeed, for example, a public policy defining the legal framework of child work may act on the both sides. On the demand side if it is deterrent to employ a child without being in the framework of the law, in this case the demand for child work will diminish and it could lead to an overall decrease in the prevalence of child work. On the supply side, if it is deterrent for the child to work, it will diminish labour supply and will decrease the prevalence of child work as well. Though, we need to make sure that the informal sector will not flourish after a ban of child work. It would not change the prevalence of child work and would put the child in illegal and likely more dangerous situations than previously to the ban. To avoid the increase of the incidence of hazardous work, one must make sure that the policy is enforced and it may be difficult, especially in remote rural areas. Even if the policy is perfectly enforced, one cannot be sure of the result. That has been shown theoretically: a perfect enforcement can lead to negative effects if adult wages do not increase enough to compensate for the income loss due to the ban of child work (Basu & Van, 1998). When changing the policy one must make sure it has no unwanted pernicious effects, especially on vulnerable population. This is true for all public policies and the relationship between child work and public policies is quite complex.

The effects of public policy on child work have been intensively studied and very well summarized in “The complex effect of public policy on child labour” (de Hoop & Rosati, 2013). They review the impact of seven types of public interventions: social protection, education, labour markets, human settlement, microfinance and access to finance, community driven development and health and family planning. They selected only the empirical rigorous evidence on this issue. Their general conclusion is that transfers programs generally tend to reduce child labour, other policies risk

increasing child labour, in particular if they affect household's productive structure. But the overall effect on child work seems still hard to predict, the gathering of evidence on this matter must continue. They underlined the fact that most impact evaluations focus on economic activity without considering household chores, which lead only to a partial view of the real effect.

They studied cash transfers interventions effect in another review (de Hoop & Rosati, 2014) and their general conclusion is that cash transfers, unconditional or conditional, participate to decrease child labour as well as the number of hours worked.

But, to our knowledge, the effect of the policy change in the legal framework of child work has not been studied yet. Given that it is a strategy adopted by many countries, under the pressure of international conventions, it seems important to gather some evidence on the subject.

Context in Colombia

Colombia is a country where child labour is still quite prevalent even if it has been decreasing: in 2014, there were still more than 1 million of children working (DANE, 2014). We cannot deny though that the country has made some real efforts overtime to decrease this prevalence by adopting the international conventions on child labour and implementing policy. In results, the proportion of working children has been steadily decreasing.

Between 1989 and 2005, based on Decree n° 2737 of 1989, the minimum age for work was 14, but children over the age of 12 were also allowed to do light work. Light work had to be 4 hours a day maximum and it also came with other restrictions such as the authorization from the labour inspectorate in exceptional circumstances. Otherwise 12 -13 year olds could work maximum 4 hours a day or 24 hours a week and 14-15 year olds could work max 6 hours a day or 36 hours a week.

In 2006, with the adoption of Act. 1098 (Code for Children and Adolescents), the minimum age for employment increased to 15 and there was no exceptional age for light work. Also the same requirements that used to apply to 12 year olds, now applied to 15 year-olds: i.e. a labour inspectorate's permission was needed. The hours of work were also changed. 15-16 year olds could only work maximum of 6 hours a day or 30 hours a week. 17 year olds could work 8 hours a day or 40 hours a week (Figure 1). We identify several age groups that have not been impacted equally by the policy change. This difference in exposure can allow us to study the effect of this policy on child work across the different age groups. Documenting any policy effect on child work or chores is an important first step to assess whether the policy impacted child or sibling health outcomes. It can further be used as a source of exogenous variation to estimate the causal effect of child work on health.

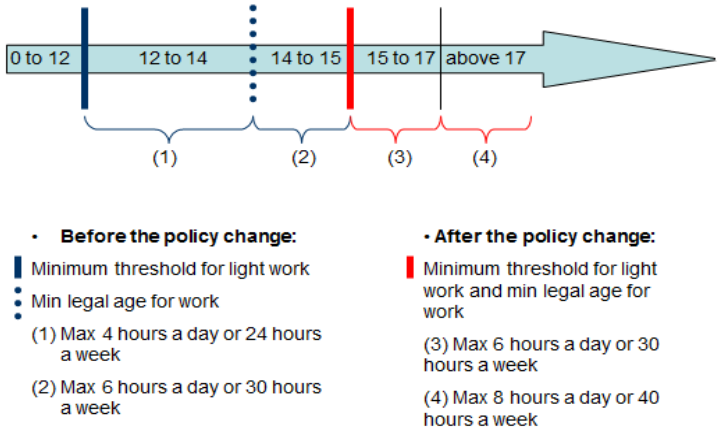

Figure 1 : Summary of the policy change in Colombia in 2006

Methods

Survey

The Demographic and Health Surveys (DHS) "are nationally-representative household surveys that provide data for a wide range of monitoring and impact evaluation indicators in the areas of population, health, and nutrition." The DHS include two questionnaires: one on the household characteristics and one individual questionnaire filled by an eligible individual, in the case of Colombia: women between 13 and 49 years old. These surveys can include a module on child labour in the case of LMICs. The DHS including this module has been conducted in particular in Colombia in 2000, 2005 and 2010. Not only to give us information on child work and a wide-range of health variables for children between 6 and 17 years old, children below 5 years old and adults, the fact that the surveys have been conducted before and after the policy change allow us to draw some conclusions about the effect of this policy.

Using the DHS data, we consider child work as both economic and non-economic activities, including household chores in this definition. Besides providing information on child work, DHS provides also information on health. Given the age and the status of the individual, different assessment of health are done. There are both subjective and objective assessments of health. The objective measures are anthropometric measures realized on children under 60 months (that is to say under 5 years old) and on some female individuals older than twelve years old (one per household). The subjective assessment is done through a self-evaluation of own health asked to individual above 6 years old. This assessment is complete with questions on health events (diarrhea, cough and fever) for children under five and on health problems and disabilities to individual above 6 years old.

Moreover, we have variables on the characteristics of the household and on the household members, thanks to the household questionnaire. This would allow us to control for individual and household characteristics in our analysis. For a summary of the variables used in the project, see Annexe 1 – Variables list.

Sample selection, key variables and descriptive statistics

a) Child work and child health

Sample selection – To study the relationship between child work and the health associated to these children, we keep only children that may be child workers, that is to say children between 6 and 17 years old. This criterion leaves us with 104,372 children in 56,763 households.

Outcome variables – The measurement of someone's health causes some issues and it is difficult to assess properly someone's health. Among the common measures used, there is the self-evaluation of own health. This measure has been shown to be quite a good proxy for morbidity (Idler & Benyamini, 1997). This question is asked in the DHS 2000, 2005 and 2010, the possible responses are "very good/good/regular/bad". We regroup these responses in a variable equal to 0 if the self-evaluation of owns health is "very good" or "good" and equal to 1 if the self-evaluation of owns health is "regular" or "bad". With this variable we have a global assessment of the children health.

Health can also be assessed through the occurrence of health event(s). The question asked in the DHS 2000, 2005, 2010, is whether any member in the household had a health problem in the last thirty days which did not involve hospitalization and if it was an illness (yes/no), an accident (yes/no), a dental problem (yes/no) or another health problem (yes/no). In our sample, the results "yes" were too low for other, so we decided not to study it. "Dental problem" was not taken into account as well, due to its lack of relevance in the context of child work. The bivariate analysis between child work and the variable "dental problem" turned out to show no association and to confirm our choice to exclude this variable. We also created an indicator for a health problem in the last thirty days, based on these health problem variables. The variable takes the value of one if the individual had at least one health problem in the last thirty days that did not involve hospitalization.

The last way of evaluating health allowed with the questions of the DHS 2005 and 2010 on whether or not the individual suffers from different sort of disability. If the answer is "yes" the cause of this disability is asked, the possible answers being "birth", "illness", "accident", "violence", "don't know". We create an indicator equals to one if the individual suffers from a disability due to "illness" or "accident". We put aside the causes "birth", "violence" and "don't know" as we want to study if work is a cause of the disability.

Table 2: Descriptive statistics of the main child health variables

variables	N	mean	sd	min	max
hlth prob	104,372	.0879738	.2832581	0	1
illness	104,372	.0719733	.258445	0	1
accident	104,372	.0048097	.0691855	0	1
disability	92,508	.0162581	.126467	0	1
Reg/bad selfhealth	104,325	.1520153	.3590375	0	1

Independent variables of interest – As we want to study the relationship between health and work and especially how work impacts health, our main independent variables are the work characteristics of the child. The first variable is the most straightforward: "did you work last week?" (yes/no). We have also variables on the characteristics on the work performed: whether the child was involved in work for a family member or not a family member. The interest of this distinction is that we can assume that the protection and the exposure at work won't be the same, depending on the work environment. Our hypothesis is that work for a family member is more likely to be less regulated, so the child would be less protected and it's more likely to have an impact on its health. Finally, we also have an intensive measure of work. We know how many hours the child worked last week for the surveys 2000 and 2005. We created a categorical variable for the number of hours worked and a "threshold" variable: whether the child worked more than 14 hours a week. Fourteen hours a week being the way the ILO measures light work (Statistical Information and Monitoring Programme on Child Labour., International Programme on the Elimination of Child Labour., & International Labour Organization., 2004). This variable gives us an idea whether the child was involved in light work or not.

As we said above, we do not want to look only at work outside the household, we also want to study the domestic work. This is accounted for in the variable "did you help in household chores last week" ("chores" (yes/no)). Same as for work, this variable is available for the three years but we have the intensive measure (number of hours spend in household chores last week) only for 2000 and 2005. The same way than previously, we created a threshold variable using the threshold of 14 hours a week.

Table 3: Descriptive statistics of the main child work variables

variable	N	mean	sd	min	max
wrk	104,039	.0914176	.2882035	0	1
wrkfamily	103,296	.0488305	.2155147	0	1
wrkother	103,330	.0364657	.1874468	0	1
wrk more14hrs	4,958	.6603469	.4736392	0	1
cat wrk hrs	4,958	3.378983	1.92867	1	7
chore	104,241	.7257701	.4461275	0	1
cat chore hrs	35,374	1.436903	.7325591	1	4
chore more14hrs	35,374	.1352406	.3419852	0	1

Covariates – We choose our covariates based on the variables available in the three years of the survey and on the literature on child health. The covariates constitute three groups: the gobal characteristics, the child characteristics and the household characteristics. The global characteristics include baseline information: the year of the survey, whether the child is living in a rural or urban area and the region where (s)he is living in. The child characteristics include the basics we want to control for: age, sex, relationship to the head of the household (is a family member or not) (status). We also added whether the child attends school and whether the child has a health insurance. The household characteristics include the number of household members, the number of children of five or under, the wealth of the household and the education of the head of the household.

Table 4: Descriptive statistics of the covariates

variable	**N**	**mean**	**sd**	**min**	**max**
Global characteristics					
year	104,372	2.380677	.6805197	1	3
rural	104,372	1.327253	.4692126	1	2
region	104,372	3.066828	1.702058	1	6
Child characteristics					
female	104,372	.4940501	.499967	0	1
age	104,372	11.47837	3.416181	6	17
status	104,370	1.087027	.2818759	1	2
school	104,346	.896824	.30419	0	1
hlth insurance	103,654	.760646	.4266912	0	1
Household characteristics					
nbr hh mbr	104,372	5.776961	2.296177	1	13
nbr child under 5	104,372	.5791208	.8354677	0	7
hh wealth	104,372	2.530535	1.338724	1	5
head hh educ	103,617	1.419053	.799403	0	3

b) Younger sibling health and child work

Sample selection – Identifying siblings was the key in the selection of the observations. To be sure we were studying siblings we only kept the sons and daughters of the household head. Younger sibling refers to sons and daughters under five years old. To be part of the population of interest, it requires another criterion: having an older sibling that meet the age criteria of child work, that is to say is between 6 and 17 years old. Then, the population of interest includes 13,322 younger siblings distributed in 10,979 households. We narrowed it down again due to missing values on control variables. Hence, the final population of interest is composed of 11,341 younger siblings distributed in 9,308 households. From now on, when we refer to younger sibling, it implies a child less than five years old who is the son/daughter of the head of the household and has at least one

older sibling between 6 and 17 years old. Similarly, when we refer to older sibling, it implies a child between 6 and 17 years old who is the son/daughter of the head of the household and has at least one younger sibling under 5 years old.

Outcome variables – Given the fact that we are interested in the health of children under five years old, the health variables are different from those presented previously. Thanks to the anthropometric measures the height for age, the weight for age, the height for weight and the BMI for age (all z-scores) have been evaluated. Thanks to these variables, we are able to detect malnutrition. Using thresholds (Food and Nutrition Technical Assistance, 2011) we created from the variable height for age an indicator for stunting, from weight for age an indicator for underweight, from height for weight an indicator for wasting and one for overnutrition and from BMI for age another indicator for overnutrition. To have a more general view and deal with number sample limitations, we constructed a variable "malnutrition" summarizing if the child suffer from a lack of nutrition, that is to say either from stunting or underweight or wasting.

The others health assessments at our disposal are whether the child suffered from diarrhea, cough or fever in the last two weeks. We have an indicator variable whether the child suffered from at least one health event and indicators variables for each health event (diarrhea, cough or fever).

Table 5: Descriptive statistics of the younger sibling health variables

variable	N	mean	sd	min	max
malnutrition	12152	.1913265	.3933617	0	1
stunting	12123	.2143034	.4972486	0	2
underwght	12151	.0664143	.2844971	0	2
wasting	12145	.0186908	.1568478	0	2
overnutrition	12145	.0433923	.2320876	0	2
overnutritionbmi	12152	.0492923	.2443458	0	2
hlth evt	12632	.5156745	.499774	0	1
diarrhea	12643	.1345409	.341246	0	1
fever	12642	.2582661	.4376984	0	1
cough	12645	.3973112	.4893608	0	1

Independent variables of interest – The child work variables are the same than before, but here we have for each younger sibling the work status of the older siblings between 6 and 17 years old: whether at least one older sibling is working, whether at least one older sibling is involved in household chores, the number of older sibling working and the number of older sibling involved in household chores. Similarly to the child work analysis, we also have threshold variables for "the older siblings worked more than 14 hours a week on average" and "the older siblings spent more than 14 hours a week on average in chores (hours estimations are only available for the 2000 and 2005 surveys).

Table 6: Descriptive statistics of the main older sibling work variables

variable	N	mean	sd	min	max
wrk oldsibl	13304	.1221437	.327464	0	1
wrk oldsibl nbr	13304	.1647625	.4970665	0	4
wrk oldsibl more 14hrs	879	.6211604	.4853743	0	1
chore oldsibl	13310	.7996243	.4002965	0	1
chore oldsibl nbr	13310	1.377235	1.113882	0	7
chore oldsibl more14hrs	5199	.1211771	.3263644	0	1

Covariates – The covariates are close to what we used previously studying child health, but to the three previous groups (global characteristics, child characteristics and household characteristics), we add a fourth one: oldest sibling characteristics. It includes an indicator on whether the oldest sibling between 6 and 17 years old is attending school, an indicator on the sex of the oldest sibling between 6 and 17 years old and a variable accounting for the age of the oldest sibling between 6 and 17 years old. The other groups are slightly different than before. The “child characteristics” set of variables include sex and age of the younger sibling and the age of the mother. The “household characteristics” one includes the number of parents working last week, the number of household members, the number of son/daughter under 5 in the household, the wealth of the household, the mother education and the father education.

Table 7: Descriptive statistics of the covariates

variable	N	mean	sd	min	max
Global characteristics					
year	13322	2.367963	.68968	1	3
rural	13322	1.389131	.4875714	1	2
region	13322	3.158685	1.770831	1	6
Child characteristics					
female	13322	1.492419	.4999613	1	2
age	13322	2.27053	1.401497	0	4
agemum	13279	32.2394	5.861791	15	65
Older sibling characteristics					
school oldsibl	13322	.8931091	.308986	0	1
female oldsibl	13322	.4849872	.4997933	0	1
age oldsibl	13322	10.87389	3.396945	6	17
Household characteristics					
parent wrk	13322	1.144648	.5581738	0	2
nbr hh mbr	13322	5.82953	1.875525	3	13
nbr under five	13322	1.38838	.5917457	1	4
hh wealth	13322	2.232548	1.266452	1	5
mum educ	13269	1.528676	.7497532	0	3
dad educ	11341	1.511683	.7582411	0	3

c) Parent health and child work

Sample selection - To study how a parent's poor health correlates with child work for their children, we kept in our sample the children who have the status as son/daughter (identified by the variable "relationship to the head"), hence have identifiable parents and that are potential child workers due to their age (between 6 and 17 years old). This explains why the sample is smaller than the one studied in the study of the relationship between child work and its own health. Hence, parents are those who are head of the household or wife/husband of the head. We exclude the children that are between 6 and 17 years old and that were considered as parents because they are head or wife/husband. The final population of interest comprises 75,375 sons and daughters between 6 and 17 years old in 42,512 households.

Outcome variables – Here, the outcome variables are no longer health variables but rather indicators of child work. The same variables we have been presenting as independent variables of interest are now outcomes variables. This means we have a variable on whether or not the child worked last week, whether or not the child helped in household chores last week for 2000, 2005 and 2010. For 2000 and 2005, we have similarly to before a variable on whether or not the child worked more than 14 hours a week and whether or not the child spent more than 14 hours a week in household chores.

Table 8: Descriptive statistics of child work variables

variable	N	mean	sd	min	max
wrk	75,199	.0903469	.2866801	0	1
wrk more14hrs	3,479	.6369646	.480944	0	1
chore	75,307	.7421222	.4374693	0	1
chore more14hrs	25,793	.1300353	.3363488	0	1

Independent variables of interest – The main independent variables we want to look at are the one assessing parent's health. We have the same variables that those used for assessing child health: categories for self-evaluation of own health, occurrence of any heath problem in the last thirty days (illness, accident or dental) and indicators for each problem. We created variables indicating that at least one parent had a health problem and others indicating how many parents had a health problem. We also have the same questions on disability and we created three variables from these: first, the same than the one created for child health: whether or not at least one parent has a disability, second: whether or not at least one parent has a physical disability, third: whether or not at least one parent has a non-physical disability. We also have information on whether or not the mother is pregnant. Finally, using mother's BMI measures we created a categorical variable: less than 18.5 (underweight); [18.5, 25[(normal); [25, 30[(overweight); above 30 (obese).

Table 9: Descriptive statistics of the parent's health variables

variable	N	mean	sd	min	max
parent hlth prob	75375	.1989121	.3991844	0	1
parent hlth prob nbr	75375	.2254196	.4770991	0	2
parent ill	75375	.1680531	.3739159	0	1
parent ill nbr	75375	.1902488	.4454752	0	2
parent accident	75375	.0114494	.1063883	0	1
parent reg/bad self-hlth	75373	2.42766	.681528	1	4
mother bmi	58097	2.783018	.7899892	1	4
parent disability	66516	.0894522	.2853974	0	1
parentdisab_physical	66516	.0638042	.2444056	0	1
parentdisab_nonphysical	66516	.034082	.1814413	0	1
pregnant mother	66912	.0273643	.1631438	0	1

Covariates – The covariates were chosen based on the determinants of child work identified in the literature and the variables available in DHS. Similarly to before, we have three groups: global characteristics, child characteristics and household characteristics. Global characteristics are the same as previously. The child characteristics group includes sex, age and attendance at school. The household characteristics group is constituted with the number of household members, the number of children of five and under, the wealth of the household, the age of the head of the household, the head of the household education, the number of parent who worked last week, whether at least one parent has a health insurance, whether the head of the household is a female and the number of parent for the child.

Table 10: Descriptive statistics of the covariates

variable	N	mean	sd	min	max
Global characteristics					
year	75375	2.385367	.6869717	1	3
rural	75375	1.334249	.4717303	1	2
region	75375	3.122454	1.704501	1	6
Child characteristics					
female	75375	1.48674	.4998274	1	2
age	75375	11.49983	3.372788	6	17
school	75358	.9106001	.285322	0	1
Household characteristics					
nbr hh mbr	75375	5.513167	2.057969	2	13
nbr child under 5	75375	.5658242	.812782	0	7
head hh age	75367	41.68961	8.775758	17	92
hh wealth	75375	2.518647	1.337453	1	5
head hh educ	74952	1.511274	.7819841	0	3
parent wrk	75375	1.155728	.5882025	0	2
female head	75375	.2514096	.4338264	0	1
parent hlth insurance	75300	.8258699	.3792239	0	1
parent nbr	75375	1.781055	.4135342	1	2

Analytic Methods

a) Descriptive analysis methods for child work and child health, child work and sibling health, and child work and parent's health

After the descriptive statistics of the variables, we did a bivariate analysis of the relationships between the outcome variables and the independent variables to select the relationships worth studying. We then ran multivariate logit regressions for each relationship including relevant controls according to the literature (using the software Stata 13.1). From these regressions results we estimated the average marginal effects (using the margins, dydx command), readable as percentage points and comparable with the percentage mean of the outcome variables.

b) Estimating the effect of the policy change – Difference-in-differences analysis

In order to estimate the impact of the policy change which occurred in Colombia in 2006, we had to find a control group to serve as a counterfactual for what would have happen in the absence of the policy change. While the policy applies to the whole country and at first glance affects all Colombians, in fact the status of children at different ages between 6 and 17 years old were affected differently by the policy (see Figure 1 and Table 11). As the policy did not change anything for children under twelve, we consider them an untreated control group. Children from 12 to 17 inclusive can be pooled together as the treated group to estimate the average policy effect. We can also conduct a more refined analysis estimating the effect for each age group identified in Table 11 separately, as their legal labor force eligibilities were all changed in different ways. We expect the larger effects for the group aged 14 to 15 years old: they are the ones who experienced the biggest change in terms of their status to work legally.

Table 11: Age groups and policy change

Age groups	**Before the policy change**	**After the policy change**	
Under 12 years old	not allowed to work	not allowed to work	No change
From 12 to 14 years old	allowed to do light work up to 4hrs a day or 24hrs a week	not allowed to work	Change
From 14 to 15 years old	allowed to work up to 6hrs a day or 30hrs a week	not allowed to work	Change
From 15 to 17 years old	allowed to work like an adult	allowed to do light work up to 6hrs a day or 30hrs a week	Change
From 17 to 18 years old	allowed to work like an adult	allowed to do light work up to 8hrs a day or 40hrs a week	Change

The surveys of 2000 and 2005 constitute our pre-policy years and allow us to estimate linear trends in our outcome of interest before the policy. The year 2010 gives us the observations post-

policy. In the Difference-in-Differences (DD) strategy, we use pre and post policy observations, so we pooled the years 2000 and 2005. We used the same covariates we had while studying parent's health status on child work (see Annexe 5).

Given this available information, we can apply a DD strategy to evaluate the changes due to the policy. DD models estimate the change over time for the treated group relative to the change over time for the control group. Indicator variables for the treated group and for the post-policy period mean that the estimated effect is conditional on time-invariant differences between the two-groups and shared secular trends, respectively. The estimated equation is the following:

$$Y_{ijt} = \beta_0 + \beta_1 E_j + \beta_2 Post_t + \beta_3 E_j \times Post_t + \beta_4 X_{ijt} + \varepsilon ijt$$

(Equation 1)

Where i is for each individual, j the exposure status (j=0 : control; j=1 : treated) and t the time-period (t=0 : pre-policy; t=1 : post-policy). Y is the outcome variable (in our case an indicator), E an indicator variable for the exposed group, $Post$ an indicator variable for after the policy change, X our set of covariates and ε the error term. The estimate we are interested in is the one of the interaction term $E_j \times Post_t$: it is the estimate for the exposed group after the policy change. This way we isolate the effect of the policy on the outcome of the exposed group controlling for the changes in the outcome which occurred in the control group. The estimate β_3 is the treatment effect of the policy.

Since this policy change has been done in the perspective of reducing child labor, our first outcome of interest is child work at the extensive margin and we expect a negative significant estimate for the interaction term, reflecting a decrease in child work in the exposed group due to the policy change. Household chores appear as another aspect of child wok that should not be neglected. Moreover, we must make sure that the decrease in child work seen previously is not compensated by an increase in household chores. We must make sure that by restraining child work, the policy does not have as second effect to increase household chores. We could also expect from the policy to have a negative effect on the participation in household chores for the child. By setting rules on child work, this may raise people awareness on child work, including the participation in household chores. In this sense, the effect of the policy could be to decrease the prevalence of involvement in household chores. Given our outcome variables, we used a linear probability model for the estimation and controlled our results with a logit model.

For the DD strategy to estimate an unbiased treatment effect, we need to know that the trends were the same before the policy between the control and the treated group. This lends support to the counterfactual assumption: that the changes that occurred for the controls between before and after the policy reflect the changes that would have occurred for the treated group between before and after the policy without the policy. The exchangeability of the control and treated groups can also be assessed through an examination of their characteristics in the pre-policy period (see

Annexe 5). The groups are pretty different but this can be explained due to the age difference between the exposed and control groups. What matters is that these differences are time-invariant (so we can account for it by controlling for them in the regression), which we can assume if they are explained with the age difference.

Another assumption to conclude to a causal effect is the exogeneity of the policy change. An unbiased treatment effect supposes there are no reverse causality and no cofounding. That is to say that it is indeed the policy which is driving the outcome and not the outcome which is driving the policy and that there is no unobservable time-varying characteristics cause of both the policy and the outcome. We are assuming this assumption but this could be checked running the regression on an outcome which is not supposed to be impacted by the policy change ("placebo test"). If the treatment effect estimates is not significant, it supports the policy exogeneity assumption.

Results

Descriptive analysis – Multivariate regressions

a) Child work and child health

Work and child health

The relationship between the extensive margin of child work and child health depends on the measure of health used. We found positive association between working and having a health problem: children who work are 1.4 percentage points (16%) more likely to report a health problem. Decomposing this relationship between accident and illness (the two principal types of health problems), we found that the relationship is primarily driven by illness (Table 12).

For health measured by disability and having a regular/bad self-assessed health variables the relationship between work and those variables is negative and significant: children who work are 0.84 percentage points (6%) less likely to report regular/bad health. This likely reflects the healthy worker effect.

Further detail on the child work variable also added some nuance to our results. We found large and statistically significant positive associations between working for a family member and having a health problem (1.9pp, 22%), being ill (1.1pp, 15%) and having an accident (0.19pp, 40%) (Table 12). Furthermore, the estimates on working for a family member are higher than the one for work in general. We found a smaller positive association between work for a non-family member and having a health problem (0.89pp, 10%), significant at only the 10% level. These results are in line with our hypothesis that work for a family member is less likely to be subject to regulation or

oversight, and may contribute more to a negative health outcomes than work for non-family member.

In terms of the intensive margin of child work, we found no significant association between working for more than 14 hours and any of the health variables (results not shown). For categories of hours, we found that the category [30,40[is negatively associated with the probability of having a health problem (-5.5pp, -63%) and of having an illness (-4pp, -56%). Again, this likely reflects the healthy worker effect.

Table 12: Estimated marginal effects: child work and child health

dydx	Hlth prob		Illness		Accident		Reg/bad selfhealth	
	AME	SE	AME	SE	AME	SE	AME	SE
Work variables								
Work	.0139***	(.0035)	.0079**	(.0033)	.0017**	(.0008)	-.0084**	(.004)
Pseudo R^2	0.0233[m]		0.0231[f,m]		0.0206[m]		0.0384	
Obs.	102,627		102,627		102,627		102,615	
Work hours categories[f,m]								
[1;10[	ref		ref		ref		ref	
[10;20[	-.0069	(.0126)	-.0062	(.0109)	.0046	(.0046)	.0117	(.0173)
[20;30[	-.0244*	(.0132)	-.0203*	(.0114)	-.0025	(.0039)	.00234	(.0184)
[30;40[	-.0551***	(.0142)	-.0396***	(.0126)	-.0012	(.0048)	-.0049	(.0223)
[40;50[	-.0103	(.0151)	.0005	(.0138)	-.0026	(.004)	-.0025	(.0192)
[50;60[	.0005	(.0231)	-.0040	(.0205)	-.0013	(.0057)	-.0157	(.0269)
more than 60	.0161	(.0208)	.0287	(.0198)	-.0006	(.0054)	.0366	(.0255)
Pseudo R^2	0.0523		0.0638		0.0709		0.0270	
Obs.	4,858		4,858		4,858		4,858	
Wrkfamily	.0185***	(.0044)	.0108***	(.0041)	.0019**	(.0009)	-.0079	(.0050)
Wrkother	.0089*	(.0053)	.0045	(.005)	.0016	(.0011)	-.007	(.0058)
Pseudo R^2	0.0232[m]		0.0229[f,m]		0.0204[f,m]		0.0385[f,m]	
Obs.	101,894		101,894		101,895		101,883	
Chores variables								
Chores[m]	.0046**	(.0021)	.0047**	(.0019)	-.0004	(.0005)	.0026	(.0027)
Pseudo R^2	0.0231		0.0230		0.0198		0.0384	
Obs.	102,803		102,803		102,803		102,791	
Chore hours categories[f]								
[1;10[	ref		ref		ref		ref	
[10;20[	.0001	(.0042)	.001	(.0039)	-.0008	(.0010)	-.0036	(.0049)
[20;40[	.0052	(.0063)	.0044	(.0058)	-.0016	(.0014)	.0032	(.0069)
40 and more	.0063	(.0134)	.0066	(.0123)	-.0035	(.0022)	.0258*	(.0147)
Pseudo R^2	0.0237[m]		0.0257[m]		0.0305[m]		0.0432	
Obs.	34,873		34,873		34,873		34,871	

Note: Each set of independent and dependent variables represents a different regression. For each logit regression we estimated the average marginal effects. Control variables in all regressions include indicators for the child's rural residence, age, female, not related to the household head, school attendance, health insurance and categorical variables for year, region, household wealth, and head of household's education. We control for involvement in chores in the work regressions. [f]: control for number of children under five in the household; [m]: control for number of household members
We report the pseudo-R^2 and the number of observations for each logit regression.
Note 2: dy/dx for factor levels is the change associated with a discrete change from the reference category.
Note 3: *** p<0.01, ** p<0.05, * p<0.1

Involvement in chores and child health

The results for the extensive margin of doing chores were very similar to those for child work across measures of health. We found a positive and significant association between doing chores and having a health problem (0.5pp, 5%) (Table 12), particularly having an illness (0.5pp, 5%) but not an accident (not statistically significant). We found no association between doing chores and regular/bad self-assessed health. We found a negative and significant association between doing chores and having a disability due to an illness or an accident, again reflecting the healthy worker effect (results not shown).

To study the intensive margin of doing household chores, we decomposed the hours spent in chores in four categories. We found no association with a health condition except an association between the category indicating to have spent more than 40 hours a week in chores and a self-assessment of health regular or bad (2.6pp, 17%).

Overall, our exploration of the association between child work or chores and child health shows large, consistent, and statistically significant correlations only on the extensive margin. Children who work for a family member are more likely to declare a health issue. The estimated marginal effects are larger for work than for chores.

b) Younger sibling health and child work

Older sibling work and younger sibling health

The study of the relationship between at least one older sibling working and the health status (malnutrition, stunting, underweight, wasting, overnutrition) of the younger sibling showed no significant results. In contrast, we found significant and positive relationship between the incident health events of the younger siblings and at least one older sibling working (4.8pp, 9%). Decomposing this relationship into the different health events (diarrhea, fever, cough), we found that the results hold (Table 13). According to Table 1, this may reflect that the older sibling is working because the younger sibling health is poor and the household need more resources or this may reflect the fact that the household is quite poor and that's why the older sibling is working and the younger sibling has a poor health. Due to sample number limitations, this is the only work variable we have been able to study properly.

Older sibling involved in chores and younger sibling health

We find a significant and positive association between the occurrence of a health event for the younger sibling and the study of the relationship between the extensive margin of older sibling involvement in chores (4.1pp, 8.5%) (Table 13). Decomposing the relationship among the different health events, only the associations with diarrhea and cough are significant with a lower

significance level (5%). We also note that the estimated marginal effect of at least one older sibling involved in chores is larger on the probability of having a health event than on the probability of diarrhea (1.6pp, 12%) and the probability of cough (3pp, 7.5%). The aggregation of the health events does not seem to reflect the reality of the different health events take separately.

Table 13: Estimated marginal effects: extensive margin of child work and sibling health

dy/dx	**Health event**		**Had diarrhea**		**Had fever**		**Had cough**	
	AME	**SE**	**AME**	**SE**	**AME**	**SE**	**AME**	**SE**
At least one older sibling worked last week	.0483***	(.0165)	.0378***	(.0097)	.048***	(.0144)	.0396**	(.0162)
Pseudo R^2	0.0192[am,sx,ao,co]		0.0458[am,co]		0.0166[m,so,ao]		0.0157[am,sx,ao,co]	
Obs.	10,731		10,741		10,742		10,740	
At least one older sibling was involved in chores last week[am]	.0414***	(.0128)	.016**	(.0088)	.0115	(.0114)	.0292**	(.0126)
Pseudo R^2	0.0187[ao]		0.0444[m]		0.0159[m,so,sx,ao,pw]		0.0156 [m,so,sx,ao,pw]	
Obs.	10,736		10,746		10,745		10,747	

Note: Each set of independent and dependent variables represents a different regression. For each logit regression we estimated the average marginal effects. Control variables in all regressions include indicators for the child's rural residence, age, female, the number of sons and daughters in the household and categorical variables for year, region, household wealth, mother's education, and father's education.[am]: control for mother's age; [m]: control for number of household members; [so]: control for the school attendance of the oldest sibling between 6 and 17 years old; [sx]: control for the oldest sibling between 6 and 17 years old is a female; [ao]: control for the age of the oldest sibling between 6 and 17 years old; [co]: control for the involvement in chores of the oldest sibling between 6 and 17 years old; [pw]: control for number of parents who worked last week. We report the pseudo-R^2 and the number of observations for each logit regression.
Note 2: dy/dx for factor levels is the change associated with a discrete change from the reference category.
Note 3: *** p<0.01, ** p<0.05, * p<0.1

Given the fact that more older siblings are involved in household chores than in work, we were able to study the intensive margin using the variable threshold "the older sibling(s) worked on average more than 14hrs last week". But still some sample number limitations are encountered; we could only have proper estimations for malnutrition, stunting and the indicator of a health event. We found no evidence of an association between the intensive measure of involvement in chores of at least one older sibling and health event (results not shown). We found no evidence either of an association of the intensive measure of chores and malnutrition. Though, we found evidence of a significant and negative association with stunting (3.5pp, 17%) (Table 14). The explanation to this could be that since the older sibling are spending a substantial amount of hours in household chores, the parents could spent less time doing it and more time at work. More work would mean more resources for the family, so more nutritional intake for the younger sibling and less chance to suffer from stunting.

These different conclusions using either extensive or intensive measures may be explained by the fact that the comparison group is not the same for both. In the extensive margin study, we compare the younger siblings with at least one older sibling involved in chores to the younger siblings with

no older sibling involved in chores. While for the intensive margin study, we compare the younger sibling with older sibling(s) spending on average more than 14 hours in chores to the younger sibling with older sibling(s) spending on average less than 14 hours in chores. The groups are more alike in the case of intensive margin; it accounts more for unobservable characteristics.

Table 14: Estimated marginal effects: extensive margin of child helping with chores and sibling health

dy/dx	**Malnutrition**		**Stunting**	
	AME	**SE**	**AME**	**SE**
Nbr of hrs spent on average in chores by older children greater than 14hrs	-.0335	(.0207)	-.0357**	(.0197)
Pseudo R^2	0.0675[so]		0.0818	
Obs.	3,966		3,954	

Note: Each set of independent and dependent variables represents a different regression. For each logit regression we estimated the average marginal effects. Control variables in all regressions include indicators for the child's rural residence, age, female, the number of household members, the number of sons and daughters in the household, the oldest sibling between 6 and 17 years old is a female, the age of the oldest sibling between 6 and 17 years old and categorical variables for year, region, household wealth, mother's education, and father's education. [so]: control for the school attendance of the oldest sibling between 6 and 17 years old. We report the pseudo-R^2 and the number of observations for each logit regression.
Note 2: dy/dx for factor levels is the change associated with a discrete change from the reference category.
Note 3: *** p<0.01, ** p<0.05, * p<0.1

c) Parent health and child work

Parent health and work

All the parent's health variables for which we studied their relationship with work are significantly and positively related to the fact that the child worked last week, except the categories of mother's BMI (results not shown), and the categories of self-assessed health (only the fact of having at least one parent declaring him/herself with a good health is significant at the 5% level and negatively associated with the probability of a child to have worked last week) (Table 15).

So overall, the results meet our expectations: child work seems to be a way to cope with a difficult parent health situation (at least one parent had at least one health problem (1.5pp,17%); at least one parent was ill (1.4pp,16%); at least one parent had an accident (1.5pp,17%); at least one parent has a disability (physical or non-physical)(1pp,11%); pregnant mother (1.4pp,16%)). In terms of magnitude on the probability for the child to work, they are alike. But we notice a larger effect for the children with two parents having a health problem (2.4pp, 27%) and two parents being ill (3.1pp, 34%).

Surprisingly, control for parent's health insurance is not significant (see the example regression in Annexe 4). This can be explained in several ways. Either the parents who have health issues don't have a health insurance and in this case cannot rely on it; or health insurance is not efficient enough to deal with the health issue and parents don't have the choice but to send their child to work. Studying more carefully this relationship, it appears that having a health insurance is

negatively correlated with parents having a health issue (results not shown). This means that those who need it the most don't have one, hence child work as a health insurance.

Table 15: Estimated marginal effects: parent's health and child work

dy/dx	Worked last week		Worked more than 14 hrs		Helped with chores last week		Spent more than 14 hrs in chores last week	
	AME	**SE**	**AME**	**SE**	**AME**	**SE**	**AME**	**SE**
Parentprob[f]	.0151***	(.0022)	.0044	(.0166)	.0144***	(.0038)	.0109**	(.0046)
Pseudo R^2	0.261[m,pw,pn]		0.194[m,pn]		0.0964[fh,m,pw]		0.156[fh,pn]	
Obs.	74,702		3,436		74,802		25,603	
Parentprob_nbr [a,f,pn]								
1	.0144***	(.0026)	.0098	(.0175)	.0114***	(.004)	.0095*	(.0050)
2	.0244***	(.0064)	-.0269	(.0378)	.0327***	(.009)	.0253**	(.0118)
Pseudo R^2	0.261[m,pw]		0.194[m]		0.0965[fh,m]		0.158[fh,pw]	
Obs.	74,694		3,436		74,802		25,603	
Parentill [a,f]	.0157***	(.0024)	.0115	(.0172)	.0151***	(.0041)	.0128***	(.0048)
Pseudo R^2	0.261[m]		0.194[m]		0.0964[fh,m]		0.158[fh,]	
Obs.	74,694		3,436		74,802		25,603	
Parentill_nbr[a]								
1	.0144***	(.0027)	.0203	(.0181)	.0120***	(.0042)	.0135**	(.0053)
2	.0308***	(.0071)	-.0368	(.0393)	.0339***	(.0098)	.0107	(.0124)
Pseudo R^2	0.261[f,m,pw,pn]		0.195[m,pn]		0.0965[fh,f,m,pw]		0.158[fh,f,pw,pn]	
Obs.	74,694		3,436		74,802		25,603	
Parentacc [a,f,pw]	.0149*	(.0086)	.0064	(.0674)	.0382**	(.0149)	.0307*	(.0165)
Pseudo R^2	0.260[m,pn]		0.194[m,pn]		0.0963[fh,m]		0.157[fh,pn]	
Obs.	74,694		3,436		74,802		25,603	
Parentsh[a,fh,f,m,pw,pn]								
Good	-.0097**	(.0043)	.0479	(.0413)	-.0020	(.0061)	.0251***	(.0095)
Regular	-.0004	(.0044)	.0303	(.0415)	.0042	(.0064)	.0300***	(.0097)
Bad	.0031	(.0059)	.0867*	(.0477)	-.0009	(.0098)	.0527***	(.0129)
Pseudo R^2	0.261		0.196		0.0963		0.158	
Obs.	74,692		3,436		74,800		25,603	
Parentdisab[a,fh,f,m,pw,pn]	.0101***	(.0031)	-.0268	(.0264)	-.0056	(.0057)	.0197***	(.0069)
Pseudo R^2	0.260		0.1127		0.0961		0.146	
Obs.	65,934		2,556		66,022		19,585	
Pregnant mother[a,fh,f,m,pw,pn]	.0139**	(.0059)	-.0874*	(.0480)	.0195**	(.0099)	.0097	(.0124)
Pseudo R^2	0.256		0.196		0.0965		0.157	
Obs.	66,350		2,751		66,440		22,295	

Note : Each set of independent and dependent variables represents a different regression. For each logit regression we estimated the average marginal effects. Control variables in all regressions include indicators for the child's rural residence, age, female, school attendance, parent's health insurance and categorical variables for year, region, household wealth, and head of household's education. We control for involvement in chores in the work regressions. [a]: control for head of household age; [fh]: control for head of household is a female; [f]: control for number of children under five in the household; [m]: control for number of household members; [pw]: control for number of parents who worked last week; [pn]: control for the number of parents the child has. We report the pseudo-R^2 and the number of observations for each logit regression.

Note 2 : dy/dx for factor levels is the change associated with a discrete change from the reference category.

Note 3 : *** p<0.01, ** p<0.05, * p<0.1

One can also note the fact that school and chores appear as substitutable to child work since the involvement in school or chores is negatively associated to work in the different regressions.
We found only one positive significant relationship studying the intensive work margin: between working more than 14 hours and bad self-assessed health category (8.7pp,14%), with only a 10% significance level (Table 15). This reflects a very vulnerable population where at least one parent has a very poor health and the household is in such a situation that the child is more likely to work more than 14 hours a week.

Parent health and child involvement in chores

Investigating the relationship between involvement in household chores and parent's health, we found significant and positive relationships between doing chores and the following parent's health measures: at least one parent had a health problem (1.4pp,2%), number of parent with a health problem (for two: 3.3pp,4%), at least one parent had an illness (1.5pp,2%), number of parent with an illness (for two: 3.4pp,4.6%), at least one parent had an accident (3.8pp,5%), the mother is pregnant (2pp,2.7%) (Table 15). The other relationships between doing chores and parent's health measures are not significant. They are some differences of magnitude that are worth underlining: a parent who had an accident is impacting more the probability of child to be involved in chores (average estimated marginal effect of 3.8pp) than a pregnant mother or a parent with an illness.
One must also underline some cumulative effect in the case that two parents have a health problem or two parents had an illness. The marginal effect on the probability of involvement in chores of the first parent having a health problem or an illness is pretty low (1.2pp,1.6%) but the one of the second show larger effect (3.4pp,4.6%).
In terms of covariates, we can note that, again, the health insurance variable is not significant (results not shown). Besides, school and chores seem to be complementary. One can assume from this that the parents that send their children to school are the same that involve their children in household chores.
We previously saw that there was no adjustment at the intensive work margin. The adjustment is in fact done at the intensive household chores margin. Indeed, the associations between the fact of having spent more than 14 hours in chores last week and parent health status are significant and positive (except for the second ill parent and a pregnant mother).

Policy change analysis – difference-in-differences

a) Policy impact on child work

First, we want to study how the policy change impacted its main objective: to reduce rates of child work. While rates of child work are lower after the policy, this is true among both the treated and

the control group. In fact, we noticed a downward trend in both groups before the policy that we want to account for in determining whether the policy was successful or not.

Table 16: Percent of children working in the control and treated groups

%	Control	Treated
2000	3.37	17.33
2005	2.57	16.08
2010	2.76	14.82
Total	2.28	15.59

We visualize this trend with a graph (Figure 2). We see that the two trends were parallel before the policy: we can therefore assume the changes which occurred for the control are a good estimate of the changes that would have occurred for the treated group without the policy. After the policy, we can see a slight change in trend indicating that the policy may have had an effect.
Checking the parallel assumption with multiple treatment groups, the only group for which it is not met is the one from 17 to 18 (Figure 3).

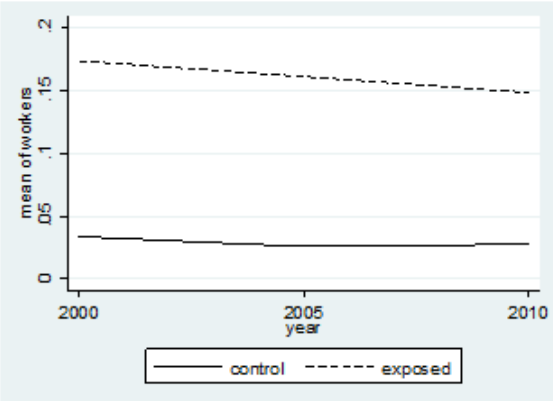

Figure 2 : Comparison means of workers trends

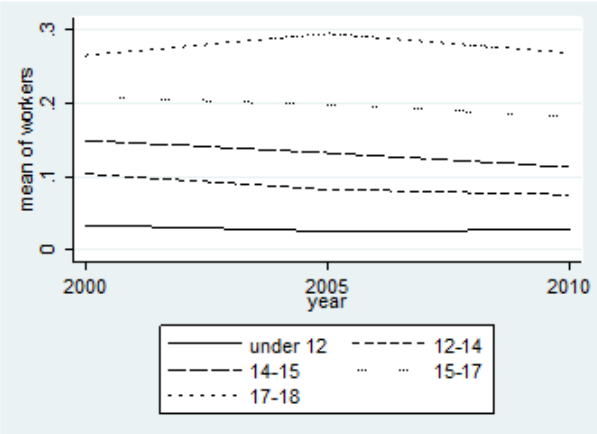

Figure 3 : Comparison means of workers trends for different levels of exposure

Running the linear probability regressions with different set of covariates, we found that without controls, the policy seems to have a significant effect and in the way we would have expect it: rates of child work decreased more among the treated than the control group (-1.6pp, -18%) (see Annexe 6a, regression (1)). But once we control for individual characteristics, the significance is reduced, as well as the magnitude of the effect (-1.4pp, 15.6%). Finally, when we control for our all set of covariates, it appears that the policy did not have a significant effect on the reduction of child work (Table 17).

Given that the policy is making a distinction between different age groups, we want to relax the assumption that the effect of the policy is the same for all these groups. To study this heterogeneity, we decomposed the treated group in several groups, following the different age groups identified before. The only group for which the estimate of the policy treatment is significant is the 14 years old one (-1.5, -12%) which is line with our hypothesis that the largest effect would be on that group. For the other groups, the policy does not have a significant effect.

We also checked our results using a logit regression and the results are consistent with what we found even if the results are less significant (higher level of significance) (Table 17 and 18).

Table 17 : Estimated marginal effects with one group of exposed

dydx	**Linear - work**		**Linear - chores**		**Logit - work**		**Logit - chores**	
	Coeff	SE	Coeff	SE	AME	SE	AME	SE
Exposed	-.0074**	.0036	-.0172***	.0059	.0099**	.0038	-.0356***	.0061
Post	.0057**	.0023	.0970***	.0037	.0038	.0034	.0767***	.0034
Exposed* Post	-.0050	.0032	-.0227***	.0052	-.0046	.0038	.0226***	.0054
R^2	0.181		0.110		0.261		0.0989	
Obs.	103,271		103,472		103,271		103,472	

Note: Each column represents a different regression. For each logit regression we estimated the average marginal effects. Control variables in all regressions include indicators for the child's rural residence, age, female, school attendance, number of household members, number of children under five, age of the household head, number of parents who worked last week, number of parent the child has and categorical variables for year, region, household wealth, and head of household's education. We control for involvement in chores in the work regressions.
Note 2: For the logit regressions, we report the pseudo R^2.
Note 3: the marginal effects of the variables are calculated using the delta method, the one of interaction terms using the contrast delta method, *** p<0.01, ** p<0.05, * p<0.1

b) Policy impact on doing household chores

For our analysis of the impact of Colombia's child labour policy on involvement in household chores, we proceeded the same way as above. Checking the parallel trend assumption (Figure 4 and 5), it appears there are slight differences in the pre-period trend when comparing the control and pooled treatment groups (Figure 4) and somewhat more important differences in the pre-policy trends for age groups 12-14 and 15-17. We therefore need to interpret our effect estimates for these age groups, as children ages 12 and under may not be an ideal control group.

With the linear probability model we estimate a significant and negative effect of the policy on doing chores (-2.3pp,-3%) while the logit model conclude to a still significant but positive effect of the policy on chores, which warrants further investigation. We observe the same change of sign with different level of exposure ([14,15[: -3.5pp,-4.2%) (Table 17 and 18).

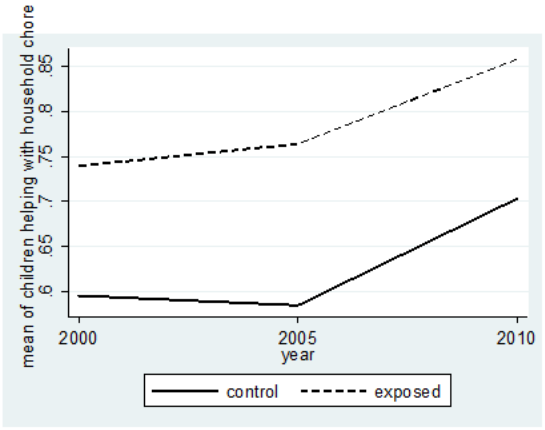

Figure 4 : Comparison trends of means of child involved in chores

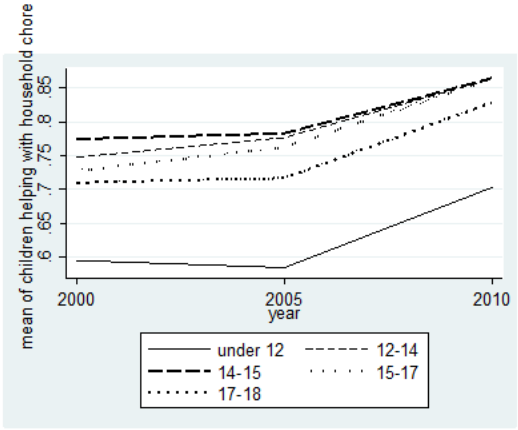

Figure 5 : Comparison trends of means of child involved in chores with different level of exposure

Table 18 : Estimated marginal effects with different level of exposure

dydx	**Linear - work**		**Linear - chores**		**Logit - work**		**Logit - chores**	
	Coeff	SE	Coeff	SE	AME	SE	AME	SE
Exposed								
[12,14[	.0062	.0041	-.0737***	.0066	-.00412	.0053	-.0604***	.006
[14,15[	.0240***	.0056	-.155***	.0089	-.0101	.0066	-.1297***	.0086
[15,14[	.0452***	.0057	-.269***	.0090	-.0211***	.0072	-.2381***	.0080
[17,18[	.0663***	.0072	-.389***	.0115	-.0363***	.0081	-.3507***	.0098
Post	.0049**	.0023	.0990***	.0037	.0045	.004	.0670***	.0028
Exposed*Post								
post*[12,14[	-.0059	.0046	-.0243***	.0073	-.0073	.0056	.0204***	.0069
post* [14,15[	-.0148**	.006	-.0354***	.0096	-.0109*	.0059	.0198*	.0104
post* [15,14[	-.0033	.0046	-.0128*	.0074	-.0035	.0047	.0508***	.0081
post* [17,18[	.0012	.0063	-.0099	.0100	-.0017	.0049	.0380***	.0109
R^2	0.183		0.126		0.261		0.110	
Obs.	103,271		103,472		103,271		103,472	

Note: Each column represents a different regression. For each logit regression we estimated the average marginal effects. Control variables in all regressions include indicators for the child's rural residence, age, female, school attendance, number of household members, number of children under five, age of the household head, number of parents who worked last week, number of parent the child has and categorical variables for year, region, household wealth, and head of household's education. We control for involvement in chores in the work regressions.
Note 2: For the logit regressions, we report the pseudo R^2.
Note 3: the marginal effects of the variables are calculated using the delta method, the one of interaction terms using the contrast delta method, *** p<0.01, ** p<0.05, * p<0.1

Discussion

Comments

Studying the relationship between child work and poor child health, we found large, consistent, and statistically significant correlations only on the extensive margin. The conclusions are different

when making the distinction between working for a family member vs a non-family member. The stronger association found between working for a family member and child health must draw our attention. This may be a sign of unprotected work, more likely to damage child health. It could also be an indication of the type of work done: one can imagine that work for a family member is more likely to happen in rural areas, and being involved in agricultural work has been shown to have more side effects on health. One can also imagine that this is informal work, leaving the child with no formal labour protections. Future research should try to more fully understand this relationship.

The study of the relationship between sibling health and child work showed us some evidence of association, but our results are quite limited due to the small number of observations. Having larger datasets and also more information on whether the older sibling cares for the younger sibling would help us to have a better insight on this association.

In addition to identifying some risk factors for child and sibling health related to child work, we also identified parent health factors that are associated with child work. The relationship between the number of parents with an illness and work is positive and significant, but does not seem linear. This can be explained by the fact that the family where both parents are ill are in a very poor financial situation and that's why the child works. But it can also be explained by the fact that to pay for medical care or to compensate for the loss of resources due to parents' lower productivity, the child has to work. If this is the main driver of the association, we have to find ways to prevent the entry of the child on the labour market.

The results on the relationship between parent's health and child work also indicate a positive and significant relationship between a pregnant mother and the child working. This could be explained by the fact that the pregnant mothers are different than the non-pregnant mothers and this is this difference which is explaining child work. A possible difference could be the age: pregnant women are more likely to be younger than non-pregnant women, meaning they are less settle in life, have less resources and hence the child works to bring more resources. Another explanation could be that the household is anticipating more expenses due to the coming baby and the involvement of the child in work is a way to bring more resources into the household in anticipation of these future expenses. Child work could also be a way to compensate for the loss of revenue due to the mother working less if the pregnancy prevents her from working. This idea is reflected by the significant positive estimated correlation between a mother's pregnancy and the child's involvement in chores. The household chores are more often done by the mother, so if the mother becomes unable to perform her tasks, their responsibility can be transferred to the child. The involvement in chores might change but the time burden wouldn't increase (marginal effect non-significant between chores more 14 hours and pregnant mother).

According to our estimates, the 2006 policy change decreased the child work rates of the 14 years old. Regarding child doing chores rates, the results are not conclusive. The policy change effect appears significant in both regressions models but the estimates signs are opposite. Further research need to be done to understand these contradictory results. Assuming the evidence of the positive correlation between child work and poor child health reflects in part a causal effect of children working on their health, child work policy could also improve child health.

Limitations

Our analysis is mostly descriptive and in this sense it has some limitations. We cannot draw any conclusions on causal effect for the relationships studied but they are still worthy in the sense they show evidence of associations or not. Given the fact that research in this area is still in its early stages, our work contributes toward assembling evidence.

Beyond that, the two main outcomes we have been interested in encounter measurements difficulties and one must not rely too much on the specific estimates but more on the general ideas they convey. First, current health likely reflects past, more than present work activity, so the time frame is not the same for the health we measure and the implication in work or not. We tried to overcome this by studying more acute health events rather than a global state of health but these still reflects past health as well. Second, child work measurement is known to have issues because of a definition problem. Children, parents, researchers, and policymakers may have different ideas in mind when they think about what is considered child work. Asking the child if he worked last week may lead to a “no” answer that reflects his perceptions of what is “work” as much as the activities he performed in the last week. The DHS questions do not offer a degree of refinement on this question, so one must interpret the results with caution.

Then we have some limitations in the identification of the associations themselves. Regarding the association between child work and child health, we only have an average association across heterogeneous types of the child work: one cannot assume that a child working in the field the whole day has the same kind of work than child working in a shop. These differences cannot be accounted for here given the little information we have on the child work characteristics, and it remains a lead to follow for further research. Still our estimates of the association between child work and child health is understated because of the healthy worker effect: individuals in good health are more likely to work that individual with poor health creating a bias in the estimated effect of work on health. Quite similarly, if individuals born with a predisposition to poor health are also those who are most likely to engage in work as child, correlations between child work and health will overstate the impact. On the other hand, if healthy individuals are selected into work early as a child, the true impact of child work will be understated. This aspect leads us to an important limitation of our study: we are only able to study a contemporaneous correlation while this

relationship likely evolves over a longer time frame that we cannot account for. That's why the best type of survey to study the relationship between child work and health remains longitudinal ones.

To draw more valid conclusions, one must also think more carefully about the comparison group. When we were examining the extensive margin, we were comparing working children to those not involved in child work and when we were examining the intensive margin we were comparing children involved in child work to different extents. Since it appears that children involved in child work are really different from those who are not, using non-working children as a comparison group may require further refinements (propensity score adjustment, for example).

Regarding our analysis of the 2006 policy change, causal interpretation of our results are somewhat more justified. However it appears that models estimating the impact on doing chores are quite sensitive and more work needs to be done to understand why. Also more work needs to be done to check the validity of the results. We assumed the exogeneity of the policy change and finding an outcome to run a 'placebo test' would allow us to test this assumption. For the parallel pre-policy trend assumption, the graphs suggested that it may not be met for all the different age groups. In the work study, the control group chosen is not really well-suited for the age group [17,18[, nor it is for the age groups [14,15[and [15,17[in the chores study. We also need to underline the fact that the child work questions, and therefore measures vary across surveys. Finding other surveys with estimates of child work in Colombia would be able to provide a good test to the validity of these data. Our results on the policy must be interpreted cautiously and there is more work to be done to obtain strong valid results.

Recommendations – Conclusion

Our study analysed all kinds of relationships between child work and health thanks to the DHS data. This could constitute a basis on further child work research using DHS data in different countries. Our work constitutes also a first step in the use of repeated cross-sectional DHS to evaluate child labour policy change. While we provide a rich overview of the complicated relationships between child work and child, sibling, and parental health, our study does not allow us to draw conclusion on causal relationship. To overcome this limitation the identification of instrumental variables and the use of doubly robust estimation could be leads to explore. Not only would this improve our ability to identify the causal mechanisms, it could help us to understand the different vulnerable populations (child with pregnant mother, child working for a family member, younger sibling with a working older sibling) that we identified in this study. The understanding of these vulnerable populations must be pursued to further be able to take them into account in the elaboration of policies. The difference between extensive and intensive margin is also quite important to take into account in the implementation of policies. There are some factors that can

lead to more children entering the labour market and even if it does not change the probability of doing more than light work, it is still some child work that could be prevented.

Causal relationships could also be further explored via more work on the 2006 policy change. One possible extension could be to use difference-in-difference-in-differences with parent health variables (such as a parent who add an accident) to investigate if some vulnerable populations are more impacted by the policy or less. In the case they were less affected, it may reflect that the policy needs to adopt specific laws to take into account these more vulnerable populations.

It would also be interesting to study the effect of the policy in terms of hours spent at work and in household chores, things that cannot be done with the DHS data. For the moment we only have a partial view, intensive measures would help us to obtain a more complete picture.

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ILLUSTRATION TABLE

ANNEXES

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Note: we didn't report all the regressions, we only reported some to have examples of how we run our analysis. The estimates reported are odds ratio (estimates under the exponentiate form) for the logit regressions (Annexe 2 to 4). In Annexe 6, the estimates reported are those of the linear probability model.

Annexes

1. Annexe 1: List of variables

Variable names	Description	CH	SH	PH
Child work variables				
wrk	Indicator that the child worked last week	Indep.		Outcome
wrkfamily	Indicator that the child worked for a family member	Indep.		
wrkother	Indicator that the child worked not for a family member	Indep.		
wrk_more14hrs	Indicator that the child worked more than 14 hours last week	Indep.		Outcome
cat_wrk_hrsbis	Categories for hours a week normally worked: [1,10[; [10,20[; [20,30[; [30,40[; [40,50[; [50,60[; 60 and more	Indep.		
chore	Indicator that the child helped with household chores last week	Indep.		Outcome
chore_more14hrs	Indicator that the child spent more than 15 hours in household chores last week	Indep.		Outcome
cat_chore_hrs	Categories for hours spent in chores: [1,10[; [10,20[; [20,40[; 40 and more	Indep.		
wrkoldsiblbis	Has at least one older sibling who is working		Indep.	
wrkoldsiblnbr	Number of older sibling working in the household		Indep.	
wrk_oldsibl_more 14hrs	Indicator that on average the older sibling(s) worked more than 14 hours		Indep.	
choreoldsiblbis	Has at least one older sibling involved in household chores		Indep.	
chore_oldsibl	Number of older sibling involved in household chores		Indep.	
chore_oldsibl_mo re14hrs	Indicator that on average the older sibling(s) worked more than 14 hours		Indep.	
Child health variables				
ind_hlthprob	Had at least one health problem (illness, accident, dental, other) in the past two weeks	Outcome		
illbis	Health problem: illness	Outcome		
accbis	Health problem: accident	Outcome		
ind_disab	Has a permanent disability due to illness or accident	Outcome		

Variable names	Description	CH	SH	PH
cat_selfhealth	Self-evaluation of owns health is bad or regular	Outcome		
Sibling health variables				
malnutrition	Indicator for malnutrition (wasting or stunting or underweight)		Outcome	
stuntingbis	Indicator for stunting (chronic malnutrition)		Outcome	
underweightbis	Indicator for underweight (chronic and acute malnutrition)		Outcome	
wastingbis	Indicator for wasting (acute malnutrition)		Outcome	
overnutritionbis	Indicator for overnutrition (based on weight for age)		Outcome	
overnutritionbmibis	Indicator for overnutrition (based on BMI for age)		Outcome	
ind_evt	Had at least one health event in the last two weeks		Outcome	
h11	Had diarrhea in the last two weeks		Outcome	
h22	Had fever in the last two weeks		Outcome	
h31	Had couch in the last two weeks		Outcome	
Parent health variables				
parentprob	Has at least one parent with at least one health problem			Indep
parentprob_nbr	Number of parents with at least one health problem			Indep
parentill	Has at least one parent with at least one health problem: illness			Indep
parentill_nbr	Number of parents with a health problem: illness			Indep
parentacc	Has at least one parent with at least one health problem: accident			Indep
parent_sh	Categories of self-evaluation of owns health: has at least one parent in the category: very good/good/regular/bad			Indep
mother_bmi	Categories of mother BMI: below 18.5 (underweight); [18.5,25[(normal); [25,30[(overweight); above 30 (obese)			Indep
parentdisab	Has at least one parent with at least one disability			Indep
parentdisab_physical	Has at least one parent with at least one physical disability			Indep
parentdisab_nonphysical	Has at least one parent with at least one non-physical disability			Indep
parentprego	Has a pregnant mother			Indep

Variable names	Description	CH	SH	PH
Covariates				
Geo-temporal characteristics				
year	1: 2000, 2: 2005, 3: 2010	Indep	Indep	Indep
hv025	Area: 1: rural, 2: urban	Indep	Indep	Indep
hv024	Region: 1: atlantica, 2: oriental, 3: central, 4: pacifica, 5: bogota, 6: territories nacionale	Indep	Indep	Indep
Child characteristics				
hv104/female	Indicator for female	Indep	Indep	Indep
hv105	Age	Indep	Indep	Indep
status	Indicator that the individual is not family related	Indep		
school	Indicator for school attendance	Indep		Indep
indinsurance	Indicator for health insurance	Indep		
agemum	Age of the mother		Indep.	
Older sibling characteristics				
schoololdsibl	Indicator that the oldest sibling is attending school		Indep	
sexoldsibl	Indicator that the oldest sibling is a female		Indep	
ageoldsibl	Age of the oldest sibling		Indep	
Household characteristics				
hv009	Number of household member	Indep.	Indep.	Indep.
hv014	Number of children under five years old in the household	Indep.		Indep.
hv014bis	Number of siblings under five years old in the household		Indep.	
actparent	Number of parent working last week		Indep.	
parentwrk	Number of parent who worked last week			Indep.
femalehead	Indicator that the head of the house is a female			Indep.
parent_nbr	Number of parents the child has			Indep.
parentins	At least one parent has a health insurance			Indep.
hv270	Wealth index: poorest/ poorer/ middle/ richer/ richest	Indep.	Indep.	Indep.
hh_educ	Highest educational level of the head of the household: no education, preschool/ primary/ secondary/ higher	Indep.		Indep.
mum_educ	Highest educational level of the mother		Indep.	
dad_educ	Highest educational level of the father		Indep.	

2. Annexe 2: Child work and child health regressions (examples)

a. Annexe 2a: Child work and have a health problem regressions

VARIABLES	(1) have a hlth prob	(2) have a hlth prob	(3) have a hlth prob	(4) have a hlth prob	(5) have a hlth prob
Worked last week	0.877***	0.934*	1.035	1.005	1.189***
	(0.0349)	(0.0375)	(0.0446)	(0.0406)	(0.0523)
year of the survey = 2, DHS 2005		0.846***			0.837***
		(0.0293)			(0.0293)
year of the survey = 3, DHS 2010		0.696***			0.644***
		(0.0240)			(0.0233)
type of place of residence		0.691***			0.805***
		(0.0177)			(0.0279)
region = 2, oriental		1.391***			1.296***
		(0.0490)			(0.0473)
region = 3, central		1.293***			1.214***
		(0.0416)			(0.0408)
region = 4, pacífica		1.127***			1.076*
		(0.0421)			(0.0410)
region = 5, bogotá		1.313***			1.165***
		(0.0626)			(0.0581)
region = 6, territorios nacionales		1.160***			1.109***
		(0.0438)			(0.0428)
is a female			1.084***		1.067***
			(0.0242)		(0.0240)
age			0.973***		0.965***
			(0.00343)		(0.00346)
relationship to head			0.582***		0.610***
			(0.0284)		(0.0302)
attendance at school			1.149***		1.081*
			(0.0487)		(0.0470)
helped with household chores			0.977		1.065**
			(0.0249)		(0.0278)
indicator for health insurance			0.999		1.014
			(0.0261)		(0.0282)
number of household members				0.894***	0.896***
				(0.00507)	(0.00519)
wealth index = 2, poorer				1.197***	1.069*
				(0.0392)	(0.0393)
wealth index = 3, middle				1.306***	1.066
				(0.0450)	(0.0462)
wealth index = 4, richer				1.304***	1.046
				(0.0489)	(0.0494)
wealth index = 5, richest				1.238***	0.974
				(0.0523)	(0.0509)
highest educational level of the head of the household = 1, primary				1.101**	1.089*
				(0.0487)	(0.0486)
highest educational level of the head of the household = 2, secondary				1.312***	1.329***
				(0.0607)	(0.0623)
highest educational level of the head of the household = 3, higher				1.460***	1.554***
				(0.0797)	(0.0864)
Constant	0.0976***	0.167***	0.202***	0.126***	0.469***
	(0.00112)	(0.00808)	(0.0166)	(0.00714)	(0.0560)
Observations	104,039	104,039	103,357	103,287	102,627
r2_p	0.000180	0.00809	0.00431	0.0149	0.0233
ll	-30980	-30735	-30760	-30353	-30003

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

b. Annexe 2b: Child work and illness regressions

VARIABLES	(1) illness	(2) illness	(3) illness	(4) illness	(5) illness
Worked last week	0.818***	0.866***	0.987	0.933	1.126**
	(0.0366)	(0.0391)	(0.0477)	(0.0424)	(0.0554)
year of the survey = 2, DHS 2005		0.857***			0.850***
		(0.0325)			(0.0327)
year of the survey = 3, DHS 2010		0.708***			0.664***
		(0.0268)			(0.0263)
type of place of residence		0.696***			0.807***
		(0.0195)			(0.0307)
region = 2, oriental		1.426***			1.318***
		(0.0545)			(0.0522)
region = 3, central		1.259***			1.173***
		(0.0445)			(0.0432)
region = 4, pacífica		1.133***			1.077*
		(0.0461)			(0.0448)
region = 5, bogotá		1.191***			1.044
		(0.0636)			(0.0582)
region = 6, territorios nacionales		1.136***			1.085*
		(0.0470)			(0.0460)
helped with household chores			0.987		1.076**
			(0.0276)		(0.0308)
is a female			1.138***		1.121***
			(0.0278)		(0.0276)
age			0.969***		0.961***
			(0.00374)		(0.00381)
relationship to head			0.575***		0.604***
			(0.0310)		(0.0332)
attendance at school			1.142***		1.071
			(0.0534)		(0.0514)
indicator for health insurance			0.977		0.987
			(0.0278)		(0.0300)
number of household members				0.879***	0.887***
				(0.00632)	(0.00649)
number of children 5 and under				1.062***	1.020
				(0.0202)	(0.0197)
wealth index = 2, poorer				1.190***	1.065
				(0.0428)	(0.0430)
wealth index = 3, middle				1.285***	1.058
				(0.0488)	(0.0505)
wealth index = 4, richer				1.305***	1.060
				(0.0541)	(0.0551)
wealth index = 5, richest				1.280***	1.030
				(0.0594)	(0.0591)
highest educational level of the head of the household = 1, primary				1.075	1.068
				(0.0519)	(0.0520)
highest educational level of the head of the household = 2, secondary				1.233***	1.259***
				(0.0624)	(0.0645)
highest educational level of the head of the household = 3, higher				1.408***	1.506***
				(0.0837)	(0.0913)
Constant	0.0789***	0.134***	0.172***	0.112***	0.422***
	(0.000986)	(0.00708)	(0.0155)	(0.00699)	(0.0553)
Observations	104,039	104,039	103,357	103,287	102,627
r2_p	0.000391	0.00748	0.00500	0.0146	0.0231
ll	-26913	-26723	-26713	-26367	-26067

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

c. Annexe 2c: Child work for family and other and have a health problem regressions

VARIABLES	(1) have a hlth prob	(2) have a hlth prob	(3) have a hlth prob	(4) have a hlth prob	(5) have a hlth prob
Worked for a family member	0.926	1.035	1.040	1.091	1.261***
	(0.0485)	(0.0548)	(0.0561)	(0.0579)	(0.0692)
Worked NOT for a family member	0.850***	0.844***	1.061	0.941	1.118*
	(0.0530)	(0.0529)	(0.0703)	(0.0592)	(0.0749)
year of the survey = 2, DHS 2005		0.843***			0.835***
		(0.0292)			(0.0293)
year of the survey = 3, DHS 2010		0.694***			0.644***
		(0.0240)			(0.0233)
type of place of residence		0.689***			0.802***
		(0.0177)			(0.0280)
region = 2, oriental		1.391***			1.295***
		(0.0492)			(0.0475)
region = 3, central		1.297***			1.217***
		(0.0419)			(0.0410)
region = 4, pacífica		1.136***			1.084**
		(0.0425)			(0.0414)
region = 5, bogotá		1.317***			1.169***
		(0.0629)			(0.0584)
region = 6, territorios nacionales		1.162***			1.111***
		(0.0440)			(0.0430)
is a female			1.082***		1.067***
			(0.0242)		(0.0240)
age			0.973***		0.965***
			(0.00344)		(0.00347)
relationship to head			0.586***		0.615***
			(0.0286)		(0.0305)
attendance at school			1.148***		1.071
			(0.0494)		(0.0472)
helped with household chores			0.979		1.065**
			(0.0250)		(0.0279)
indicator for health insurance			1.003		1.018
			(0.0263)		(0.0285)
number of household members				0.894***	0.896***
				(0.00509)	(0.00521)
wealth index = 2, poorer				1.197***	1.067*
				(0.0394)	(0.0394)
wealth index = 3, middle				1.310***	1.066
				(0.0453)	(0.0463)
wealth index = 4, richer				1.306***	1.044
				(0.0491)	(0.0494)
wealth index = 5, richest				1.241***	0.972
				(0.0525)	(0.0510)
highest educational level of the head of the household = 1, primary				1.097**	1.085*
				(0.0487)	(0.0486)
highest educational level of the head of the household = 2, secondary				1.302***	1.319***
				(0.0604)	(0.0620)
highest educational level of the head of the household = 3, higher				1.454***	1.546***
				(0.0796)	(0.0862)
Constant	0.0975***	0.168***	0.200***	0.126***	0.471***
	(0.00111)	(0.00815)	(0.0165)	(0.00718)	(0.0565)
Observations	103,294	103,294	102,616	102,550	101,894
r2_p	0.000147	0.00813	0.00419	0.0148	0.0232
ll	-30791	-30546	-30574	-30174	-29829

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

3. Annexe 3: Child work and younger sibling health regressions (example)

VARIABLES	(1) at least one health event for child under 5	(2) at least one health event for child under 5	(3) at least one health event for child under 5	(4) at least one health event for child under 5	(5) at least one health event for child under 5	(6) at least one health event for child under 5
has at least one older sibling between 6 and 17 who is working	1.131**	1.148**	1.189***	1.242***	1.092	1.220***
	(0.0681)	(0.0711)	(0.0735)	(0.0806)	(0.0686)	(0.0828)
year of the survey = 2, DHS 2005		0.619***				0.614***
		(0.0406)				(0.0407)
year of the survey = 3, DHS 2010		0.697***				0.676***
		(0.0451)				(0.0448)
type of place of residence		0.909**				0.741***
		(0.0377)				(0.0425)
region = 2, oriental		0.595***				0.617***
		(0.0370)				(0.0400)
region = 3, central		0.649***				0.681***
		(0.0374)				(0.0412)
region = 4, pacífica		0.774***				0.786***
		(0.0514)				(0.0536)
region = 5, bogotá		0.535***				0.583***
		(0.0498)				(0.0571)
region = 6, territorios nacionales		0.795***				0.755***
		(0.0481)				(0.0469)
age			0.907***			0.903***
			(0.0126)			(0.0128)
age of the mother			0.987***			0.992*
			(0.00341)			(0.00420)
has at least one older sibling involved in chores				1.215***		1.190***
				(0.0620)		(0.0628)
the oldest sibling between 6 and 17 of the child under 5 is a female				1.038		1.036
				(0.0406)		(0.0411)
age of the oldest sibling between 6 and 17 in the household				0.969***		0.981**
				(0.00625)		(0.00756)
number of son/daughter of under 5 in the household					0.943*	0.875***
					(0.0323)	(0.0310)
wealth index = 2, 2 = poorer					0.927	0.832***
					(0.0487)	(0.0498)

wealth index = 3, 3 = middle					0.839***	0.741***
					(0.0517)	(0.0569)
wealth index = 4, 4 = richer					0.751***	0.679***
					(0.0552)	(0.0609)
wealth index = 5, 5 = richest					0.716***	0.684***
					(0.0640)	(0.0728)
highest educational level of the mother = 1, primary					0.869	0.914
					(0.0785)	(0.0844)
highest educational level of the mother = 2, secondary					0.898	0.890
					(0.0873)	(0.0885)
highest educational level of the mother = 3, higher					0.837	0.848
					(0.102)	(0.105)
highest educational level of the father = 1, primary					1.009	1.065
					(0.0854)	(0.0921)
highest educational level of the father = 2, secondary					1.122	1.080
					(0.102)	(0.100)
highest educational level of the father = 3, higher					1.116	1.065
					(0.128)	(0.125)
Constant	1.059***	2.318***	1.979***	1.235***	1.370***	7.889***
	(0.0218)	(0.202)	(0.223)	(0.0879)	(0.163)	(1.729)
Observations	10,737	10,737	10,736	10,735	10,733	10,731
r2_p	0.000280	0.0109	0.00486	0.00235	0.00246	0.0192
ll	-7433	-7355	-7399	-7416	-7414	-7289

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

4. Annexe 4: Parent health and child work regressions (example)

VARIABLES	(1) Work	(2) Work	(3) Work	(4) Work	(5) Work
number of parents with a health problem: illness = 1	1.228***	1.222***	1.182***	1.268***	1.245***
	(0.0420)	(0.0425)	(0.0450)	(0.0448)	(0.0493)
number of parents with a health problem: illness = 2	1.352***	1.304***	1.480***	1.381***	1.554***
	(0.106)	(0.103)	(0.129)	(0.112)	(0.141)
year of the survey = 2, DHS 2005		0.897***			1.024
		(0.0374)			(0.0498)
year of the survey = 3, DHS 2010		0.820***			1.108**
		(0.0338)			(0.0552)
type of place of residence		2.455***			1.515***
		(0.0645)			(0.0627)
region = 2, oriental		1.329***			1.415***
		(0.0545)			(0.0679)
region = 3, central		1.182***			1.228***
		(0.0455)			(0.0554)
region = 4, pacífica		1.290***			1.245***
		(0.0546)			(0.0612)
region = 5, bogotá		0.676***			0.891
		(0.0543)			(0.0791)
region = 6, territorios nacionales		1.208***			1.207***
		(0.0529)			(0.0601)
is a female			0.364***		0.364***
			(0.0113)		(0.0117)
age			1.288***		1.337***
			(0.00647)		(0.00758)
attendance at school			0.179***		0.243***
			(0.00589)		(0.00867)
helped with household chores			0.743***		0.605***
			(0.0242)		(0.0210)
number of household members				1.094***	1.055***
				(0.00812)	(0.00904)
number of children 5 and under				0.923***	1.041*
				(0.0171)	(0.0221)
wealth index = 2, poorer				0.604***	0.633***
				(0.0204)	(0.0266)
wealth index = 3, middle				0.507***	0.579***
				(0.0206)	(0.0322)
wealth index = 4, richer				0.434***	0.485***
				(0.0221)	(0.0323)
wealth index = 5, richest				0.329***	0.374***
				(0.0227)	(0.0311)
age of head of household				1.033***	0.998
				(0.00154)	(0.00182)
highest educational level of the head of the household = 1, primary				0.858***	0.811***
				(0.0359)	(0.0394)
highest educational level of the head of the household = 2, secondary				0.531***	0.583***
				(0.0266)	(0.0331)
highest educational level of the head of the household = 3, higher				0.271***	0.330***
				(0.0228)	(0.0298)
number of parent who worked last week				1.516***	1.657***
				(0.0386)	(0.0474)
the parent has an health insurance				0.907***	0.957
				(0.0303)	(0.0378)
number of parent the child has				0.526***	0.634***
				(0.0188)	(0.0257)

Constant	0.0955***	0.0265***	0.0787***	0.0658***	0.0382***
	(0.00135)	(0.00159)	(0.00689)	(0.00657)	(0.00609)
Observations	75,199	75,199	75,187	74,705	74,694
r2_p	0.00100	0.0339	0.208	0.0746	0.261
ll	-22788	-22039	-18058	-20929	-16702

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

5. Annexe 5: Descriptive statistics pre policy change

	Unexposed					**Exposed**					**Test mean difference**
variable	**N**	**mean**	**sd**	**max**	**min**	**N**	**mean**	**sd**	**max**	**min**	**If unequal variance : Welch t-value (p-value)**
wrk	26,558	.027487	.1635007	1	0	25,985	.1635944	.3699142	1	0	t = -54.3450 (0.0000)***
chore	26,604	.5872425	.4923392	1	0	26,041	.7586498	.4279104	1	0	t = -42.6618 (0.0000)***
hv025	26,679	1.314892	.4644815	2	1	26,097	1.29398	.4555917	2	1	t = 5.2203 (0.0000)***
hv024	26,679	2.909479	1.615652	6	1	26,097	2.906733	1.621308	6	1	t = 0.1949 (0.8454)
hv104	26,679	1.492672	.4999557	2	1	26,097	1.497184	.5000016	2	1	t = -1.0364 (0.3000)
hv105	26,679	8.532516	1.694502	11	6	26,097	14.44055	1.699082	17	12	t = -4.0e+02 (0.0000)***
school	26,676	.9459439	.2261326	1	0	26,074	.7930122	.4051545	1	0	t = 53.3655 (0.0000)***
hv009	26,679	5.941152	2.318626	13	2	26,097	5.906809	2.368728	13	1	t = 1.6828 (0.0924)*
hv014	26,679	.6950036	.8945706	7	0	26,097	.5171859	.8094547	7	0	t = 23.9546 (0.0000)***
hv220	26,679	44.36688	13.12688	98	14	26,097	47.05081	12.48316	98	13	t = -24.0733 (0.0000)***
hv270	26,679	2.621238	1.334936	5	1	26,097	2.701307	1.352194	5	1	t = -6.8443 (0.0000)***
hh_educ	26,432	1.389074	.7967521	3	0	25,901	1.371105	.8034418	3	0	t = 2.5685 (0.0102)**
parentwrk	26,679	1.0265	.6298145	2	0	26,097	1.012109	.6367962	2	0	t = 2.6099 (0.0091)***
parent_nbr	26,679	1.738971	.4392041	2	1	26,097	1.703644	.4566586	2	1	t = 9.0548 (0.0000)***

6. Annexe 6: Policy change regressions (examples)
    a. Annexe 6a: Child work outcome regressions (example)

VARIABLES	(1) Worked last week	(2) Worked last week	(3) Worked last week	(4) Worked last week	(5) Worked last week
exposed to the policy change = 1	0.136***	0.138***	-0.00587	0.138***	-0.00739**
	(0.00245)	(0.00243)	(0.00367)	(0.00244)	(0.00363)
after the policy change = 1	0.000110	-0.00569**	0.0119***	-0.00696***	0.00571**
	(0.00246)	(0.00245)	(0.00232)	(0.00245)	(0.00233)
1.exposed#1.post	-0.0155***	-0.0139***	-0.00553*	-0.0133***	-0.00503
	(0.00348)	(0.00345)	(0.00328)	(0.00344)	(0.00325)
type of place of residence		0.0812***			0.0309***
		(0.00187)			(0.00244)
region = 2, oriental		0.0220***			0.0237***
		(0.00278)			(0.00269)
region = 3, central		0.00955***			0.0111***
		(0.00249)			(0.00243)
region = 4, pacífica		0.0181***			0.0143***
		(0.00281)			(0.00269)
region = 5, bogotá		-0.0144***			-0.00176
		(0.00398)			(0.00390)
region = 6, territorios nacionales		0.0165***			0.0111***
		(0.00283)			(0.00271)
is a female			-0.0659***		-0.0630***
			(0.00166)		(0.00164)
age			0.0184***		0.0200***
			(0.000495)		(0.000492)
attendance at school			-0.257***		-0.232***
			(0.00283)		(0.00287)
helped with household chores			-0.0321***		-0.0446***
			(0.00193)		(0.00193)
number of household members				0.00125***	0.00154***
				(0.000479)	(0.000454)
number of children 5 and under				0.00428***	0.00273**
				(0.00128)	(0.00121)
age of head of household				-0.000310***	-0.000283***
				(7.98e-05)	(7.56e-05)
wealth index = 2, poorer				-0.0593***	-0.0367***
				(0.00240)	(0.00254)
wealth index = 3, middle				-0.0736***	-0.0396***
				(0.00265)	(0.00312)
wealth index = 4, richer				-0.0874***	-0.0512***
				(0.00297)	(0.00347)
wealth index = 5, richest				-0.0938***	-0.0582***
				(0.00343)	(0.00392)
highest educational level of the head of the household = 1, primary				-0.0228***	-0.0158***
				(0.00310)	(0.00295)
highest educational level of the head of the household = 2, secondary				-0.0521***	-0.0323***
				(0.00351)	(0.00333)
highest educational level of the head of the household = 3, higher				-0.0655***	-0.0441***
				(0.00438)	(0.00416)
nbr of parent worked last week				0.0309***	0.0312***
				(0.00160)	(0.00152)
number of parent the child has				-0.0273***	-0.0254***
				(0.00221)	(0.00210)

Constant	0.0275***	-0.0887***	0.231***	0.135***	0.215***
	(0.00172)	(0.00332)	(0.00604)	(0.00653)	(0.00934)
Observations	104,039	104,039	104,022	103,287	103,271
R-squared	0.050	0.070	0.159	0.080	0.181
ll	-15524	-14423	-9200	-13669	-7637

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

b. Annexe 6b: Chores outcome regressions (example)

VARIABLES	(1) Helped with household chores	(2) Helped with household chores	(3) Helped with household chores	(4) Helped with household chores	(5) Helped with household chores
different age categories exposed = 1, [12,14[	0.183***	0.184***	-0.0739***	0.187***	-0.0737***
	(0.00532)	(0.00529)	(0.00664)	(0.00530)	(0.00658)
different age categories exposed = 2, [14,15[	0.194***	0.195***	-0.160***	0.202***	-0.155***
	(0.00702)	(0.00699)	(0.00894)	(0.00701)	(0.00887)
different age categories exposed = 3, [15,17[	0.168***	0.170***	-0.278***	0.177***	-0.269***
	(0.00541)	(0.00538)	(0.00908)	(0.00540)	(0.00901)
different age categories exposed = 4, [17,18[	0.128***	0.131***	-0.402***	0.137***	-0.389***
	(0.00734)	(0.00731)	(0.0116)	(0.00733)	(0.0115)
after the policy change = 1	0.116***	0.107***	0.115***	0.104***	0.0990***
	(0.00380)	(0.00381)	(0.00369)	(0.00381)	(0.00371)
1.treated#1.post	-0.0235***	-0.0213***	-0.0276***	-0.0195***	-0.0243***
	(0.00759)	(0.00756)	(0.00736)	(0.00755)	(0.00730)
2.treated#1.post	-0.0327***	-0.0305***	-0.0352***	-0.0317***	-0.0354***
	(0.00993)	(0.00989)	(0.00964)	(0.00988)	(0.00956)
3.treated#1.post	-0.00804	-0.00542	-0.0129*	-0.00622	-0.0128*
	(0.00765)	(0.00762)	(0.00743)	(0.00761)	(0.00737)
4.treated#1.post	-0.00279	-0.000281	-0.00884	-0.00105	-0.00990
	(0.0104)	(0.0103)	(0.0101)	(0.0103)	(0.00999)
type of place of residence		0.0787***			0.0272***
		(0.00291)			(0.00390)
region = 2, oriental		0.00640			0.0171***
		(0.00433)			(0.00430)
region = 3, central		-0.0147***			-0.00122
		(0.00387)			(0.00388)
region = 4, pacífica		-0.00179			0.00299
		(0.00438)			(0.00430)
region = 5, bogotá		0.0213***			0.0501***
		(0.00619)			(0.00624)
region = 6, territorios nacionales		0.0477***			0.0295***
		(0.00441)			(0.00433)
is a female			0.125***		0.125***
			(0.00262)		(0.00260)
age			0.0658***		0.0674***
			(0.00105)		(0.00105)

attendance at school			0.0715***		0.107***
			(0.00462)		(0.00468)
number of household members				-0.00800***	-0.00844***
				(0.000748)	(0.000726)
number of children 5 and under				0.0123***	0.0183***
				(0.00199)	(0.00193)
age of head of household				-0.000799***	-0.00111***
				(0.000124)	(0.000121)
wealth index = 2, poorer				-0.0528***	-0.0455***
				(0.00375)	(0.00406)
wealth index = 3, middle				-0.0753***	-0.0639***
				(0.00413)	(0.00498)
wealth index = 4, richer				-0.0978***	-0.0892***
				(0.00463)	(0.00554)
wealth index = 5, richest				-0.141***	-0.139***
				(0.00535)	(0.00625)
highest educational level of the head of the household = 1, primary				0.0118**	0.00184
				(0.00484)	(0.00471)
highest educational level of the head of the household = 2, secondary				0.00449	-0.00636
				(0.00547)	(0.00533)
highest educational level of the head of the household = 3, higher				-0.0489***	-0.0620***
				(0.00684)	(0.00666)
number of parent who worked last week				0.00684***	0.000527
				(0.00250)	(0.00243)
number of parent the child has				0.0151***	0.0186***
				(0.00345)	(0.00336)
Constant	0.587***	0.480***	-0.229***	0.687***	-0.205***
	(0.00267)	(0.00516)	(0.0109)	(0.0102)	(0.0158)
Observations	104,241	104,241	104,226	103,486	103,472
R-squared	0.049	0.057	0.105	0.065	0.126
ll	-61153	-60693	-57985	-59822	-56299

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1