Number of children in a household and child well-being

Cantidad de niños en el hogar y bienestar de los niños

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Abstract

The quantity/quality tradeoff argument in explaining fertility decline has focused on the association between more education among children and fewer siblings. Human capital formation is also related to other dimensions of well-being. The goal of this analysis is to perform cross-national comparisons on the association between the number of children in a household and three measures related to child well-being: being harshly disciplined, mildly disciplined and child labor. The analysis is based on logistic regressions estimated using the Multiple Indicators Cluster Survey (MICS) datasets of 24 nations grouped into four regions. At the micro level, there is a direct association between families having more children and both the odds of children working and the odds of children being harshly disciplined, but the association is weak for mild discipline. In general, the associations found at the micro level reflect the findings that countries with higher fertility have also higher proportions of children working or being harshly disciplined.

Keywords: Children. Fertility. Child labor. Child welfare.

Resumen

El argumento del intercambio entre cantidad y calidad para explicar el descenso de la fecundidad se ha enfocado en la asociación entre la educación de los niños y tener menos hermanos. La formación de capital humano también está relacionada a otras dimensiones del bienestar. El objetivo del análisis es efectuar comparaciones entre países acerca de la asociación entre el número de niños en el hogar y tres medidas de bienestar: disciplina dura, disciplina leve y trabajo infantil. El análisis se basa en regresiones logísticas estimadas con las las bases de datos de las encuestas Multiple Indicators Cluster Survey (MICS) de 24 naciones agrupadas en cuatro regiones. A nivel individual, hay una asociación entre la cantidad de niños que tienen las familias y los momios de trabajo infantil y de castigar fuertemente a los menores, pero la asociación es débil para disciplina leve. En general, las asociaciones encontradas a nivel individual reflejan el hallazgo de que países con mayor fecundidad tienen también proporciones más altas de niños trabajando y de menores castigados fuertemente.

Palabras clave: Niños. Fecundidad. Trabajo infantil. Bienestar en la niñez

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Introduction

Education is declared a child's right (United Nations General Assembly, 1989); therefore, school attendance is a well-known indicator of their well-being. Becker and colleagues (Becker & Lewis, 1974; Becker, 1992) have theoretically linked school attendance and fertility through their theory about the quantity/quality tradeoff: parents who want to invest more in their children's human capital on average have fewer children. These ideas have been influential in explaining the so-called fertility transition. Research aimed at testing this theory has focused on children's educational outcomes according to their number of siblings. Authors have generally found that a child with fewer siblings is less likely to drop out of formal education and hence has more years of schooling (Black, Devereux & Salvanes, 2005; Li, Dow & Rosero-Bixby, 2014; Lloyd & Gage-Brandon, 1994; Lu, 2009; Marteleto & de Souza, 2012 and 2013; Patrinos & Psacharopoulos, 1997; Ponczek & Souza, 2012). However, some results using complex econometric designs do not always support the hypothesis (Cáceres-Delpiano, 2006; Conley & Glauber, 2006).

Whereas educational attainment is the typical operationalization of human capital, it is not the only measure of child well-being. There is less research describing the relationship between other measures and the number of children in a family. The Multiple Indicator Cluster Surveys (MICS) have been conducted in developing countries to produce comparable statistics about child welfare (UNICEF, 2015). This article aims to analyze the association between the number of children in the household and three measures related to child well-being (or constraints to it) investigated by MICS: child labor, harsh discipline and mild discipline (UNICEF, 2015). This article aims to study whether there is an association between the number of children on the one hand and child labor and degrees of discipline on the other. The article stresses differences between regions as a way to approach differentiation across levels of socio-economic development and across cultural settings.

Literature Review

Well-being indicators

Human well-being is an abstract concept that has been operationalized in different ways depending on the discipline interested in the topic. Health sciences emphasize physical and mental well-being (UNDP, 2015; UN Sustainable Development Solutions Network and Earth Institute, 2016; WHO, 2012), while economics usually measures the concept based on having enough material resources to spend or invest in goods and services that maximize utility (Hayo & Seifert, 2003; Slottje, 1991). Recent literature on happiness highlights the link between well-being and satisfaction with life (Diener & Biswas-Diener, 2002; Kahneman & Krueger, 2006; Rojas, 2006).

Measuring child well-being has been linked with the United Nations Convention on the Rights of the Child (CRC) (Ben-Arieh, 2005). A child is faring well if a society provides him or her with the conditions to fulfill all their rights as a human being. Scholars agree that child well-being is a multifactorial construct. With aggregated data, Kristin Moore (1997) recommends a series of criteria to construct social indicators about the topic. Among those, it is worth highlighting the need to cover different areas (health, education, family life) and

different ages. The indicators should be clearly understood and include both positive and negative outcomes, and they should be reflective of social goals.

Education and 'sibship size'

Following Gary Becker and H. Gregg Lewis (1974), the quantity/quality tradeoff literature has focused on determining the causal relationship between the number of siblings (a.k.a. 'sibship size') and educational achievement. Econometric articles use quasi-experimental designs or instrumental variable methodologies to try to compute the magnitude of the association when controlling for other endogenous or confounding covariates. Joshua Angrist, Victor Lavy and Analia Schlosser (2010) use two instrumental variables in the same estimation equation – multiple births and same-sex siblings, in addition to several parity levels – to measure the relationship with educational attainment in Israel. In the two-stage estimation strategy, they find significant negative coefficients for the instrumental variable in the first stage, but these coefficients are no longer significant in the second stage. They conclude that there is no clear evidence in Israel for the quantity/quality tradeoff. Sandra Black, Paul Devereux and Kjell Salvanes (2005) in Norway and Li, Zhang and Zhu (2008) in China use similar results methods based on the birth of twins as an instrumental variable of exogenous increase in family size, and both find that sibship size significantly predicts fewer years of schooling. In Norway, however, the size of the association decreases when birth order is accounted for. Leticia Marteleto and Laeticia de Souza (2013) also use twins in Brazil as an instrumental artifact to control for the endogenous relationship between number of siblings and schooling; the birth of twins is considered an unplanned increase in the number of children that is independent of plans for educating children. They find that, in Brazil, the association has varied over the 1977-2009 period: the instrumental variable coefficient for increases in family size is negative during periods of high fertility and low educational aspirations, but it changes after Brazil reached low fertility and increased educational attainment. Based on census information and retrospective data from a longitudinal survey on the elderly – the CRELES project –, Jing Li, William H. Dow and Luis Rosero-Bixby (2014) operationalize sibship size using sex composition of the first two siblings as an instrumental variable. They find that the number of siblings reduces educational attainment (the probability of completing at least one year of secondary education), especially among girls, but – as per Marteleto & de Souza (2012) – the relationship almost disappears among children born more recently (after 1980). Dalton Conley and Rebecca Glauber (2006) use a similar approach defining sibling sex composition as an instrumental variable; they find evidence of the causal relationship for minorities (Asians, Blacks, Hispanics), but not for whites in the U.S.

Aside from methodological strategies to measure the causal relationship, other literature takes interest in the cultural settings that moderate or modify the association. In developing countries, the correlation between family size and education might also be conditioned by cultural differences. In South Africa (Lu, 2009), a significant association is found among White nuclear families, but not among Blacks; the author argues that the lack of statistical relationship among the latter might be related to the way extended families rely on support from kin to afford the costs of child rearing. In Ghana, because of traditional gender roles, older girls have unequal access to family resources when sibship size increases, thus reducing their chances of remaining in school (Lloyd & Gage-Brandon, 1994). In China (Lu & Treiman, 2008), the association between number of siblings and educational attainment

varies by place of residence (urban or rural) and by the historical period during which people started elementary school; during the Revolution and the Economic Reform, urban children have on average fewer years of schooling when they have more siblings. However, for rural children, the negative association is only observed during the early years after the transition to communism.

However, Jere Behrman (1987) questions whether schooling is a good proxy for child quality. According to him, quality and schooling are associated if there are financial transfers from parents to children aside from the investment in education. These transfers are related to parental concern over child inequality given differential endowments within the household. In a similar fashion, Naila Kabeer (2000) argues that the quality/quantity tradeoff arises from an inter-generational contract conditioned by the social environment. Parents can decide to invest in children's schooling when access to health and family planning allows greater infant survival; additionally, parents' decisions for improving their children's human capital may be partially motivated by their own social needs in old age. According to this researcher, exploitation and neglect of children during the Industrial Revolution was allowed with their parents' consent. In this sense, children's human capital – as measured by educational attainment – is just one among a wide set of factors that explain children's well-being.

Child labor and sibship size

Following the preceding assertion, this article intends to analyze the association between the number of children in a household and other measures of child well-being aside from educational attainment. Child labor is one of these indicators. Child labor is an indicator of the quantity/quality tradeoff. According to Gary Becker (1992), the "price" of children determines the "demand" for children. This price is established by the cost of rearing them and the rate of return produced by investing in them; assuming rational optimality, the quality of children is equivalent to the expenditure – especially on education and health – that parents make on them. In other words, the balance is made on whether education can be afforded after other expenditures, or – in consideration of all other consumption and savings/investment decisions – whether the cost of the education is worth it. Using rural farmers' families in the past as an example, this author argues that children who work (in a family business or elsewhere) or that do household chores contribute to family income. This reduces the net cost of rearing children, therefore, the demand for children increases. In this sense, the number of children in a household should be positively associated with the probability that one of these children would work. Nonetheless, Jean Marie Baland and James A. Robinson (2000) explain that keeping children working and out of school is inefficient for families and the economy, and also that in certain conditions a reduction in child labor may lead to reduced fertility.

The decision to send a child to school instead of to the market also depends on remaining family income. If the cost of education exceeds family income, parents might decide to make the child work in order to contribute to family income, or just make the child stay at home and dedicate time to family chores (Jensen & Nielsen, 1997). The family and community context mediates the relationship between the number of children and child labor; higher distance between the home and the education institution or bad infrastructure may hamper a child's possibilities to go to school in favor of market activities. On the contrary, the presence of more adults (and hence more income earners) in extended households may reduce the

need of child labor; patriarchal cultural norms may also increase parental preferences to send children to work instead of to school (Webbink, Smits & De Jong, 2012).

Several researchers have delved into the topic of the relationship between sibship size and child labor, most often simultaneously incorporating the effect of school attendance. In Brazil, Vladimir Ponczek and Andre Portela Souza (2012) also employ exogenous increases in family size due to twins – based on census data – to show that this increase is negatively related to educational outcomes, and directly related with labor force participation for both boys and girls and with more household chores for girls. In Peru, Harry Anthony Patrinos and George Psacharopoulos (1997) report that the number of younger siblings is associated with less schooling for the child, but this relationship might be conditioned by whether children must work to contribute to the household. In Brazil, Marteleto and de Souza (2013) do not find a significant association between family size and education, but they do show that male or older adolescents are more likely to work and contribute economically to the household when the number of younger siblings increases. In Indonesia, family size predicts higher number of hours spent in market activities, rather than more hours dedicated to academic activities (Hsin, 2007).

Parental discipline and number of children in the household

Parenting strategies are determined by characteristics of the child, the parent, and the social, economic and cultural context, and these characteristics often interact with each other (Belsky & Jaffe, 2006; Bradley & Corwyn, 2005). The proximate determinant of disciplining a child would often be the reaction of the parent to specific child behaviors; violent discipline might then be presumed to be a function of parents' stress due to these behaviors, in a context of other family and social stressors such as poverty, social isolation, work schedules, etc. (Belsky, 1980).

The number of children to be cared can be one of these stressors. Whereas in larger households there is more family socialization, a literature review article explains that in such households corporal punishment is more likely, because parental control is more authoritarian. The evidence suggests that having more children is associated with less differentiation in how parents treat them. Crowding might lead to tension among children and between parents and offspring (Wagner, Shubert & Schubert, 1985). This latter review was written in the 1980s, and there is no similar review found in later years. However, recent articles describe links between the number of children in the household and parental treatment of them. In the U.S., empirical evidence suggests that younger children are disciplined more often than older siblings (McHale *et al.*, 1995), although parental discipline might be related to past misbehavior by older children and may also be conditioned by the neighborhood's social context among African Americans (Brody *et al.*, 2003). The odds of parents disciplining children might not necessarily be related to household size *per se*, but to birth spacing; according to Rhonda Richardson *et al.* (1986), parents are stricter with adolescent children if the difference in ages among siblings is small. Other studies in the U.S. find that the association between birth order and parent-children relations is not clear (Suitor *et al.*, 2008). Joseph Hotz and Juan Pantano (2015) report that parents are stricter regarding older children's poor academic performance than with younger children, and also that the degree of discipline declines as the number of children increases. Choosing between mild or harsh discipline might also be related to parental involvement. In Great Britain, David Lawson and

Ruth Mace (2009) show that having more children is related to less time per child invested by parents in key care activities; younger offspring were more affected by this lower (average) investment. In the U.S., the first-born child receives more quality time from parents than later-born children, but this difference decreases as children get older (Price, 2008). In the same country, empirical evidence suggests that younger children are disciplined more often than older siblings (McHale *et al.*, 1995), although parental discipline might be related to past misbehavior by older children and conditioned by the neighborhood's social context among African Americans (Brody *et al.*, 2003). The odds of parents disciplining children might not be necessarily related to household size *per se*, but to birth spacing; according to Richardson *et al.* (1986), parents are stricter with adolescent children if the difference in ages among siblings is small. Other studies in the U.S. find that the association between birth order and parent-children relations is not clear (Suitor *et al.*, 2008). Hotz and Pantano (2015) report that parents are more stringent regarding older children's poor academic performance than with younger children, and the degree of discipline declines as the number of children increases. In general, the literature reviewed shows that there is a relationship between the number of children in a household and child well-being as operationalized with measures other than educational attainment.

This statistical association might also be mediated by individual attitudes about punishment, and by how cultural differences are linked to these attitudes. Using the Multiple Indicator Cluster Surveys (MICS) datasets of 2005-2006, Manas Akmatov (2010) shows that parental attitudes towards corporal punishment predict the likelihood of child abuse. The prevalence of such attitudes is highest in the African and Arabic countries covered by the MICS. Akmatov also reported that larger households are associated with a higher prevalence of harsh discipline. Similar cultural differences in attitudes and habits regarding child discipline are observed in the multi-country HOME study (Bradley & Corwyn, 2005).

It is important to acknowledge that I select child discipline as a dependent variable in the analysis because UNICEF (Akmatov, 2010; UNICEF, 2015) considers child abuse and harsh discipline as indicators of lack of well-being. There are no studies or theoretical texts that link child discipline with the "quantity/quality tradeoff" literature, which is the key explanation for the relationship between child labor and sibship size.

Methodology and data

I use data from the MICS conducted by national governments with support from UNICEF (UNICEF, 2015). The advantage of using such data is that it is based on a standardized questionnaire that allows cross-country comparisons. There are 24 countries grouped into four regions that are relatively different from the regional division used by the United Nations: East and Central Asia, Latin America & the Caribbean, Middle East and North Africa and Sub-Saharan Africa. I only use surveys with data collected between 2010 and 2014. I only select datasets that are representative of the total population of a given country, excluding those focused on a single region. The only exception is Palestine which is included to increase representation of Muslim nations on the Asian continent. The exclusion of certain countries – despite their importance regarding the prevalence of child labor or parenting styles, or in declines in household size or in fertility – is explained exclusively by data availability.

MICS surveys are conducted according to an agreement between national governments and UNICEF.

All surveys have a similar probabilistic three-stage sample design where geographical clusters of houses (census enumeration areas) are selected in the first stage, and households in the second stage. The selection of individuals in the third stage depends on the information that is sought. Household characteristics are recorded for the household as a unit, and hence the information refers to all household members. In most countries, the child labor module is asked regarding all children aged 5 to 14; the age range is extended from ages 5 to 17 in countries in Sub-Saharan Africa and in East and Central Asia; in Argentina, it is restricted to ages 5 to 13. In four countries (Mongolia, Sao Tomé, Sudan and Vietnam) only one minor is selected randomly from the complete set of children in the target age range. The child discipline questionnaire is recorded for children aged 1 to 14 in 11 countries and for children aged 2 to 14 for 13 countries; in Argentina, the target age ranges from 2 to 17. One child is selected randomly from all the children within the targeted age range. Given that the target population for the child labor questions is different than the target population for discipline, the children studied in the child labor analysis are not necessarily the same as the children studied in the discipline analysis.

When pooled together, the total sample size of the 24 countries is 96,549 children for child labor (see Table 4 for sample sizes of each region), and 163,415 children for harsh and mild discipline (see tables 7 and 9 for sample sizes of each region). The sample sizes range from 330 children in Palestine for the child labor analysis to 24,243 children in Iraq for the analysis related to discipline.

The main independent variable is the number of children aged 0 to 17 years old in the household. Information is computed from the household questionnaire. It is not possible to define this variable as the number of children ever born to a specific mother (which is consistent with Becker's theory) because there is not always information about the total number of siblings of the child selected for the discipline module, due to the way the questionnaire is constructed. The selected age range responds to the definition of children according to the Convention on the Rights of the Child (United Nations General Assembly, 1989), which stipulates that a child is a person below the age of 18. Given this definition, it is expected that most people within this age range and living in a household are dependent on the adults of the same household. Dependence is an important criterion for discipline because dependence assumes an asymmetrical relationship between adults and minors. Additionally, dependence might also define certain obligations from children to parents, especially when participating in the labor market. Although this assumption does not always hold, this is the most generalizable definition that could be applied uniformly to all the countries in the MICS project. In addition, cross-country comparisons show that, outside of Europe and North America, the mean age of multiple transitions to adulthood (leaving the educational system, having first child) occur between 17 and 20 (Bernard, Bell & Charles-Edwards, 2014). This pattern suggests that children's dependence on adults in their household generally applies under the age of 18.

Initially, I computed a variable that referred to birth order, i.e. whether the child was the first one to be born, the second, etc. However, this variable was excluded from the analysis because its high correlation with the number of children produced multicollinearity in most of the models. The high correlation was due to the fact that most households have less than

4 children, and therefore the birth order values were similar to the values of the number of children in the household. In order to control for the important effect of birth order (Lawson & Mace, 2009; Marteleto & de Souza, 2013; Patrinos & Psacharopoulos, 1997; Price, 2008), I create a dummy variable that is equal to 1 if the child that is analyzed is the eldest of all household children ages 5 to 17.

The first dependent variable is binary; it is equal to 1 if the respondent reports that the child works. The concept may include paid or unpaid labor but does not include domestic chores in the home. The question is included in the household questionnaire. Eight countries do not collect this information. The second dependent variable is harsh discipline; MICS's documentation calls it violent discipline. It is based on a battery of questions about methods of disciplining children below the age of 14, based on psychological aggression or physical punishment (UNICEF, 2015: 23). It is a binary variable that is equal to 1 if the selected child has been disciplined with at least one of a series of six harsh/violent methods:

- Shook (him/her).
- Spanked, hit or slapped (him/her) on the bottom with bare hand.
- Hit (him/her) on the bottom or elsewhere on the body with something like a belt, hairbrush, stick, or other hard object.
- Hit or slapped (him/her) on the face, head or ears.
- Hit or slapped (him/her) on the hand, arm, or leg.
- Beat (him/her) up, that is hit him/her over and over as hard as one could.

The third dependent variable is mild discipline and is also a binary variable equal to 1 if the selected child has been disciplined with at least one of two mild methods:

- Took away privileges, forbade something (name) liked or did not allow (him/her) to leave the house.
- Explained why (name)'s behavior was wrong.

These two latter variables can be considered as recodifications of scales. Cronbach's alpha for the harsh discipline scale and the mild discipline scale are 0.723 and 0.597, respectively. Principal component analyses show that both scales are unidimensional, using the largest eigenvalue criterion. Variables are binarized to facilitate the interpretation of the indicators as the odds of the prevalence of being harshly or mildly disciplined. Additionally, the harsh discipline scale is positively skewed with most of the values equal to 0. Cuba does not have information on mild discipline. It is important to clarify that mild discipline is considered beneficial to child well-being, while child labor or harsh discipline are considered deleterious to it.

The association between each dependent variable and the main independent variable is analyzed with logistic regressions. In order to control for spurious relationships, the equations are specified with other covariates that are associated with child labor or child discipline: sex and age of the child, education level of the household head and of the child's mother, and a wealth index that classifies the household by quintile. The wealth index is part of the standardized variables proposed by UNICEF for MICS and is created for each country using principal component analysis of a series of socioeconomic variables related to housing material quality (access to water and toilets; materials for floors, roofs and walls; number of rooms; energy for cooking; assets such as TVs, vehicles, computers, etc.; land ownership; livestock; etc.). I recode the wealth index into a binary variable, with households in the first two quintiles being assigned a value of 1 and those in the upper three quintiles a value of 0. I decided

to use this recoded variable in order to compute interactions between household wealth and the number of children because several authors state that the relationship between the number of children and child labor (Jensen & Nielsen, 1997; Patrinos & Psacharopoulos, 1997) or child discipline (Belsky & Jaffe, 2006; Bradley & Corwyn, 2005; Brody *et al.*, 2003) varies by socio-economic status. The interactions are useful to test whether there are differences in the odds ratios between poorer and wealthier households. The interactions also allow me to compute odds ratios for each wealth group while retaining the same sample size and, hence, not reducing statistical power for the country-level analysis.

In the final equation of a series of sequential models, I control for the Gini index in each country as a measure of income inequality, given that it is associated with child well-being (Pickett & Wilkinson, 2015). Theory suggests that higher income inequality is associated with lower social mobility, and therefore with lower chances of human capital investment (Corak, 2013). Income inequality also hinders the chances of children staying in the education system and thus incentivizes child labor. Additionally, in the U.S., there is evidence of a positive correlation between income inequality and child abuse (Eckenrode *et al.*, 2014). Some authors suggest that income inequality produces stress in lower income individuals because of social status comparisons and features of the social structure which are challenging for them (Wilkinson and Pickett, 2009). Therefore, the association between child discipline and the number of children in a household might be confounded by other stressors such as income inequality. Income inequality data are retrieved from The World Bank (2018), as well as from SALISES (2012) for Barbados and Brundenius (2009) for Cuba. I also control for the minimum legal age for a child to be allowed to work formally, because this variable might be explaining cross-country differences, using data from the ILO's website on the ratification of the Minimum Age Convention (ILO, 2018).

I estimate several specifications for the logistic regressions used to analyze the relationship between the number of children and the three indicators of child well-being. In the first set of equations for each country, the model can be represented by the following formula:

$$\widehat{log}\left(\frac{P(Y_i = 1)}{1 - P(Y_i = 1)}\right) = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + \beta_5 X_{5i} + \beta_6 X_{6i}$$

where:

- Y_i: any of the binary dependent variables for each child *i*: child labor, child harshly disciplined, or child moderately disciplined
- X_{1i}: main independent variable: number of children in the household
- X_{2i}: sex of child *i*.
- X_{3i}: age of child *i*
- X_{4i}: education level of household head
- X_{5i}: education level of child *i*'s mother
- X_{6i}: recoded household wealth index. It is equal to 1 if $X_{6i} \leq 2^{nd}$ *quintile* and it is equal to 0 if $X_{6i} > 2^{nd}$ *quintile*.

I also estimate a model with an interaction between the number of children in the household and the recoded version of the wealth index. Testing for this interaction term is important because the literature suggests that economic need – and subsequent stress – caused by a larger number of children affects low income families more than high income families (Belsky, 1980; Brody et al., 2003; Patrinos and Psacharopoulos, 1997). The specification of the new model with interactions is:

$$\widehat{log}\left(\frac{P(Y_i = 1)}{1 - P(Y_i = 1)}\right) = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + \beta_5 X_{5i} + \beta_6 X_{6i} + \beta_7 (X_{1i} * X_{6i})$$

Given this specification with an interaction, the odds ratio for the number of children is computed as $exp(\beta_1)$ for high-wealth households, and as $exp(\beta_1+\beta_7)$ for low-wealth households.

$$\widehat{log}\left(\frac{P(Y_i = 1)}{1 - P(Y_i = 1)}\right) = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + \beta_5 X_{5i} + \beta_6 X_{6i} + \beta_7 (X_{1i} * X_{6i}) + \sum_{k=1}^{K} (\gamma_{ki} D_{ki})$$

Additionally, in order to analyze country-level variables and to have higher statistical power, I construct pooled datasets, joining all country datasets into a single one for each region and for the whole set. The first models exclude the Gini index and the minimum legal working age; hence, I estimate a fixed-effects model that defines each country as part of a stratum. The model without an interaction can be expressed as:

$$\widehat{log}\left(\frac{P(Y_{ij} = 1)}{1 - P(Y_{ij} = 1)}\right) = \beta_0 + \beta_1 X_{1ij} + \beta_2 X_{2ij} + \beta_3 X_{3ij} + \beta_4 X_{4ij} + \beta_5 X_{5ij} + \beta_6 X_{6ij} + \beta_7 \left(X_{1ij} * X_{6ij}\right) + \beta_8 X_{8j} + \beta_9 X_{9j} + \varepsilon_j$$

where:

- K: number of countries pooled together
- D_{ki}: dummy variable that refers to the k^{th} country in the pooled set

Given the need to include the country-level variables, I estimate a multilevel random-intercept model to control for within-country variability. This model is more advantageous than the fixed effects model because it allows to correct for the standard error of the country-level variables, that are constant within each country. The equation of this multilevel model can be expressed as:

$$\widehat{log}\left(\frac{P(Y_i = 1)}{1 - P(Y_i = 1)}\right) = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + \beta_5 X_{5i} + \beta_6 X_{6i}$$

where:

- i: subscript indexing at the child level
- j: subscript indexing countries
- X_{8j}: Gini index at the country level
- X_{9j}: minimum legal working age. Only used in the models for child labor.
- ε_j: country-level error term

I also try to estimate ordinal logistic models where the dependent variables are the harsh and mild discipline scales, to analyze the relationship between the independent variables and varying degrees of harsh and mild discipline. The multilevel random-intercept models are not possible to estimate because of convergence limitations. Fixed effects ordinal models' results are very similar to the fixed effects binary logistic models, which means that it is sufficient to dichotomize the scales in order to study the association between the number of children and the rest of the covariates.

Table 1
Household head's mean number of children, and percentage of children working, harshly disciplined, or mildly disciplined, by region and country

Region	Country	Mean number of children	% Working	% Harshly disciplined	% Mildly disciplined
East and Central Asia	Laos	2.9		41.9	83.2
	Nepal	2.3	49.1	52.1	90.3
	Mongolia	1.8		27.1	80.7
	Vietnam	1.8	29.5	42.9	90.9
Latin America and Caribbean	Belize	2.7	16.0	55.2	89.5
	Panama	2.4		28.9	62.6
	Argentina	2.3	4.7	41.0	87.4
	Costa Rica	2.0	6.4	33.0	90.6
	Uruguay	2.0		26.8	87.8
	Jamaica	1.7	14.3	66.2	83.7
	St. Lucia	1.6	11.2	43.5	75.0
	Barbados	1.4	2.5	53.3	76.3
	Cuba	1.3		31.9	
Middle East and N. Africa	Iraq	4.7	8.4	60.6	88.3
	Palestine	4.3		70.8	93.4
	Sudan	4.3	32.1	46.7	74.7
	Mauritania	3.9	25.8	76.3	88.6
	Algeria	3.8	5.7	67.9	88.3
	Tunisia	2.9	3.5	72.1	92.1
Sub-Saharan Africa	Nigeria	4.3	63.5	79.8	87.4
	Ghana	3.3		71.2	88.4
	Malawi	2.8	46.4	44.2	84.0
	Sao Tome	2.4	40.5	68.9	70.3
	Zimbabwe	2.1		36.5	76.5

Source: MICS. UNICEF (2015).

Results

At the wake of the 21st century, most countries in the world are well advanced in their demographic transition. While Latin America and the Caribbean and Eastern Asia have fertility levels similar to the most industrialized regions, some African countries and especially most Muslim-culture countries still have relatively high fertility. Nations studied by MICS have varying fertility levels. Table 1 presents these differences clearly, although the mean number of children per household cannot be said to be identical to the total fertility rate (TFR). In the broader regions denoted as "East and Central Asia" and "Latin America and the Caribbean", the mean number of children is below 3. Fertility is lower in

the English-speaking countries of the Caribbean (except in Belize) than in the continental Spanish speaking countries, even though Panama, Argentina, Costa Rica and Uruguay are regional leaders in the Demographic Transition process. In the Middle East and North Africa, only Tunisia has an average that is below this threshold. In Sub-Saharan Africa, the mean number of children is highest in Nigeria and Ghana and lowest in Zimbabwe and Sao Tome. In the latter region, the greater the Muslim proportion of the population, the higher the mean number of children.

Table 1 also presents descriptive statistics for the main dependent variables in the analysis: the percentage of children that are working, and the percentages of children disciplined with harsh methods and with mild methods. As mentioned before, even though MICS's questionnaires are considerably standardized, there are certain topics that are not investigated by some countries. Table 1 shows this partial absence of questions. Children in the labor force seem more common in East and Central Asia and in Sub-Saharan Africa than in the other two regions, and this proportion is particularly high in Nigeria, Malawi and Sao Tome. In terms of methods for disciplining children, mild methods are more frequent than harsh methods. The proportion of children harshly disciplined is generally higher in Africa and the Middle East than in Latin America or Asia, although in Jamaica, 66% of children experience this kind of discipline. On the contrary, this proportion is relatively low in Zimbabwe. As for the percentage of children disciplined with mild methods, this is above 75% in most of the countries, with Panama, Sao Tome and Sudan being the only exceptions.

Does a cross-national comparison with aggregated figures support the notion that a larger number of children hinders child well-being? In general, regions with a higher mean number of children have higher percentages of child labor and harsh discipline. This is clearest in Sub-Saharan Africa and in East and Central Asia, especially for the child labor indicator. However, the pattern is not clear in the other regions. This result appears to support the literature referenced above. However, it is important to analyze individual-level data.

At the micro level, logistic regressions enable to inspect the relationship between the variables of interest, controlling for other covariates. Equations with interactions are estimated in order to analyze whether there are differences in the magnitude of the association between high- and low-wealth families. According to the figures in Table 2, there is a positive association between the number of children in the household and the odds of there being a child worker. This means that in families with more children, the odds that one of the minors is working is higher than in families with fewer children. Odds ratios range from 1.03 to 1.25 and are significantly different from 1 with the exceptions of Vietnam, Mongolia, Argentina and Barbados. In Nigeria, the odds ratio is indeed significant but in the unexpected direction: families with more children have smaller odds of being child workers.

Interestingly, the highest odds ratios are observed in the Latin America region, especially in Jamaica. The available evidence does not enable to infer that this association is different across wealth levels, although the descriptive figures suggest that the association is stronger in high wealth families than in low wealth families in Jamaica, St. Lucia and Tunisia, while odds ratios appear to be higher for low income households in Vietnam and Sao Tome.

Table 2
Logistic regression odds ratio (OR) of working, given household head's number of children: Simple equation and equation with interactions (95% confidence interval)

Region	Country	OR	OR High wealth	OR Low wealth
East and Central Asia	Nepal	1.06 (1.00; 1.12)	1.10 (1.01; 1.21)	1.09 (1.02; 1.16)
	Vietnam	1.04 (0.97; 1.13)	1.00 (0.88; 1.15)	1.07 (0.97; 1.18)
	Mongolia	0.98 (0.91; 1.06)	1.04 (0.90; 1.19)	0.98 (0.89; 1.07)
Latin America and Caribbean	Jamaica	1.25 (1.15; 1.35)	1.55 (1.31; 1.85)	1.22 (1.11; 1.33)
	St. Lucia	1.22 (1.00; 1.50)	1.38 (1.00; 1.90)	1.14 (0.88; 1.47)
	Costa Rica	1.16 (1.06; 1.27)	1.19 (0.95; 1.51)	1.18 (1.08; 1.30)
	Belize	1.13 (1.07; 1.19)	1.07 (0.95; 1.21)	1.17 (1.10; 1.23)
	Argentina	1.01 (0.97; 1.05)	1.06 (0.99; 1.14)	1.00 (0.96; 1.05)
	Barbados	0.83 (0.52; 1.33)	0.77 (0.34; 1.74)	0.83 (0.47; 1.46)
Middle East and N. Africa	Tunisia	1.11 (1.02; 1.21)	1.35 (1.11; 1.62)	1.08 (0.98; 1.19)
	Iraq	1.06 (1.05; 1.08)	1.07 (1.04; 1.10)	1.07 (1.06; 1.09)
	Algeria	1.06 (1.03; 1.09)	1.03 (0.98; 1.08)	1.07 (1.04; 1.11)
	Mauritania	1.05 (1.04; 1.07)	1.10 (1.07; 1.13)	1.02 (1.00; 1.05)
	Sudan	1.03 (1.01; 1.06)	1.04 (1.01; 1.08)	1.04 (1.01; 1.07)
Sub-Saharan Africa	Sao Tome	1.12 (1.03; 1.23)	1.08 (0.95; 1.22)	1.18 (1.04; 1.34)
	Malawi	1.10 (1.08; 1.11)	1.10 (1.08; 1.12)	1.09 (1.07; 1.12)
	Nigeria	0.98 (0.98; 0.99)	0.96 (0.95; 0.97)	1.00 (0.99; 1.01)

Source: MICS. UNICEF (2015).

Table 3
Logistic regression odds ratios (OR) of working, given household head's number of children and control variables, by model

Covariates	Model 1	Model 2	Model 31/
Number of children	1.038*	1.039*	1.039*
Interaction number of children X Lower wealth hh		0.992	0.992
Position of child in birth order (1=Eldest; 0=Otherwise)		0.967	0.966
Minimum legal working age (country-level)			0.343*
Gini coefficient (in %)			0.976
Female child (base=Male)	0.825*	0.824*	0.824*
Child's age	1.251*	1.252*	1.251*
Recoded wealth scale (1=wealth<=2nd quintile; 0=Otherwise)	2.000*	2.062*	2.062*
Household head education (base=Primary or less)			
Middle school	0.860*	0.859*	0.859*
High school	0.599*	0.599*	0.599*
Post-secondary education	0.843	0.845	0.845
Unknown	0.702*	0.704*	0.704*
Child's mother's education (base=Primary or less)			
Middle school	0.821*	0.82*	0.82*
High school	0.594*	0.596*	0.596*
Post-secondary education	0.566*	0.569*	0.569*
Unknown	0.365*	0.368*	0.368*

Source: MICS. UNICEF (2015).
Note: *: p<0.05; sample size=96,549; 1/ Multilevel random-intercept model.

The analyses with pooled datasets have higher statistical power to assess this difference (Table 3). Three models are estimated. The first model is equivalent to the basic models of Table 2. Across all countries in the dataset, the odds that a child works is 3.8% higher for each additional child in the household. After controlling for birth order (model 2) or for country-level characteristics (model 3), the value of the odds ratio remains similar. The interaction term for number of children and wealth shows that there are no differences between low-wealth and high-wealth households in the association under study. However, a child living in a poor household is twice as likely to be working than a child in a wealthy household. The minimum legal working age has an important effect: for each 1-year increment in the minimum legal working age, the odds of child labor decreases 66%. On the other hand, income inequality is not associated with child labor. Regarding the other covariates, the direction of the association is as expected. Girls and younger children are less likely to work. Also, the greater the wealth and the education of the household head and mother, the lower the odds of child labor.

Table 4
Logistic regression odds ratios (OR) of working, given household head's number of children and control variables, by region.
(All models are multi-level random-intercept models to account for the country-level variables:
Minimum legal working age and Gini coefficient)

Covariates	East and Central Asia	Latin America and Caribbean	Middle East and N. Africa	Sub-Saharan Africa	Sub-Saharan Africa (minus Nigeria)
Number of children	1.067	1.125*	1.052*	0.997	1.066*
Interaction # children X Low wealth hh	1.016	1.001	0.989	1.015	1.004
Position of child in birth order (1=Eldest; 0=Otherwise)	0.996	1.020	0.964	0.994	1.022
Minimum legal working age (country-level)	0.366*	0.566*	0.340*	3.134*	1.000
Gini coefficient (in %)	1.156*	1.025	0.992	1.022*	1.021*
Female child (base=Male)	0.916*	0.601*	0.701*	0.938*	0.758*
Child's age	1.223*	1.285*	1.198*	1.343*	1.369*
Wealth<=2nd quintile (0=Otherwise)	1.016	1.001	0.989	1.015	1.004
Household head education (base=Primary or less)					
Middle school	0.847*	0.821	0.944	0.746*	0.790*
High school	0.667*	0.501*	0.720*	0.614*	0.634*
Post-secondary education	0.800	-	1.418		
Unknown	0.601*	0.307*	1.088	1.217	1.306
Child's mother's education (base=Primary or less)					
Middle school	0.710*	0.730*	0.900*	0.742*	0.676*
High school	0.520*	0.722	0.842	0.460*	0.434*
Post-secondary education	0.572*	-	0.710	0.543	0.526
Unknown	0.393*	1.640	1.426	0.293	0.297
(n)	14714	15012	44680	22143	10168

Source: MICS. UNICEF (2015).
Note: *: p<0.05.

In a comparative analysis by region (Table 4), the association between the number of children in a household and the odds of a minor being in work is clearly observed in Latin America and the Caribbean and in the Middle East and North Africa. The odds ratio in East and Central Asia has similar magnitude to that in the preceding region but is not significantly different from 1. In Africa, when Nigeria is included in the analysis, the odds ratio of working does not differ significantly from 1 with increments in the number of children variable, but when this country is excluded, the odds ratio becomes significant. The effect of Nigeria on the estimates is large because the sample size of Nigeria is larger than the combined sample size of the other countries. Nigeria also affects the size of the coefficient linked to the Gini coefficient. In the other 3 regions, the greater the Gini coefficient (signaling more equality), the lower the odds that a child works. In Sub-Saharan Africa, the odds ratio is greater than 1, indicating that the association has the opposite sign; when Nigeria is excluded from the pooled data, the odds ratio becomes statistically indistinguishable from 1. It is also noteworthy that

income inequality is related to the incidence of child labor in East and Central Asia and in Sub-Saharan Africa, but not in Latin America & the Caribbean or in the Middle East and North Africa.

Table 5
Logistic regression odds ratios (OR) of harshly disciplined, given household head's number of children: Simple equation and equation with interactions (95% confidence interval)

Region	Country	OR	OR High wealth	OR Low wealth
East and Central Asia	Mongolia	1.12 (1.05; 1.19)	1.11 (1.02; 1.21)	1.13 (1.04; 1.23)
	Nepal	1.10 (1.05; 1.16)	1.02 (0.94; 1.11)	1.16 (1.10; 1.23)
	Laos	1.10 (1.07; 1.13)	1.11 (1.07; 1.16)	1.09 (1.05; 1.12)
	Vietnam	1.02 (0.94; 1.10)	1.00 (0.88; 1.14)	1.03 (0.93; 1.14)
Latin America and Caribbean	Jamaica	1.15 (1.05; 1.26)	1.16 (1.01; 1.32)	1.18 (1.04; 1.35)
	Argentina	1.11 (1.08; 1.14)	1.11 (1.06; 1.16)	1.12 (1.08; 1.16)
	Barbados	1.10 (0.91; 1.33)	1.00 (0.74; 1.34)	1.17 (0.91; 1.50)
	Cuba	1.09 (0.98; 1.22)	-	-
	Belize	1.09 (1.02; 1.15)	1.15 (1.05; 1.26)	1.07 (0.99; 1.16)
	St. Lucia	1.07 (0.89; 1.27)	1.17 (0.91; 1.51)	1.00 (0.78; 1.29)
	Panamá	1.06 (1.01; 1.11)	1.14 (1.02; 1.27)	1.05 (1.00; 1.10)
	Costa Rica	1.04 (0.96; 1.13)	1.21 (1.05; 1.40)	0.98 (0.89; 1.08)
	Uruguay	0.99 (0.90; 1.09)	0.99 (0.91; 1.09)	0.99 (0.91; 1.09)
Middle East and N. Africa	Mauritania	1.10 (1.07; 1.14)	1.10 (1.06; 1.14)	1.10 (1.05; 1.16)
	Iraq	1.07 (1.06; 1.09)	1.06 (1.04; 1.08)	1.09 (1.07; 1.11)
	Tunisia	1.06 (1.01; 1.13)	1.03 (0.94; 1.12)	1.09 (1.01; 1.18)
	Sudan	1.06 (1.03; 1.08)	1.03 (1.00; 1.06)	1.07 (1.04; 1.10)
	Palestine	1.04 (1.01; 1.07)	1.05 (1.01; 1.09)	1.04 (0.99; 1.09)
	Algeria	1.02 (1.00; 1.04)	1.03 (1.00; 1.06)	1.02 (0.99; 1.05)
Sub-Saharan Africa	Nigeria	1.06 (1.04; 1.08)	1.05 (1.02; 1.07)	1.07 (1.05; 1.10)
	Ghana	1.04 (1.01; 1.07)	1.08 (1.01; 1.15)	1.03 (1.00; 1.07)
	Malawi	1.03 (1.01; 1.06)	1.02 (0.99; 1.05)	1.05 (1.02; 1.09)
	Zimbabwe	1.02 (0.98; 1.06)	0.98 (0.93; 1.03)	1.04 (0.99; 1.10)
	Sao Tome	0.99 (0.90; 1.08)	0.98 (0.87; 1.10)	1.00 (0.89; 1.13)

Source: MICS. UNICEF (2015).

The number of children is also positively associated with harsh methods of disciplining children (Table 5). Significant odds ratios vary from 1.03 (in Malawi) to 1.15 (in Jamaica). Odds ratios are not significantly different from1 in Vietnam, St. Lucia, Algeria, Zimbabwe, Sao Tomé and Costa Rica. However, in the latter of these countries, the odds ratio is 1.21 among high income households (significant at 5% level) but not among low income households. In general, there are no statistically significant differences between odds ratios across income levels, but again descriptive statistics suggest that with larger sample sizes such differences might be observed in some countries. For example, higher odds ratios for high income

households in St. Lucia, Belize, Panama and Costa Rica, and higher odds ratios for low income households in Nepal, Barbados and Sudan.

This pattern is easier to analyze with pooled data (Table 6). In the three models, the odds ratio that links the number of children in the household and a child being disciplined with harsh methods is significantly different from 1. However, the interaction odds ratio is also significant and greater than 1; this indicates that the direct association that is being studied is stronger among children living in low-wealth households than among children in wealthy households. It is also worth noting that, controlling for the number of children, the eldest child is less likely to be disciplined harshly than his younger peers.

Table 6
Logistic regression odds ratios (OR) of harsh discipline, given household head's number of children and control variables, by model

Covariates	Model 1	Model 2	Model 3
Number of children	1.065*	1.026*	1.026*
Interaction number of children X Lower wealth hh		1.015*	1.015*
Position of child in birth order (1=Eldest; 0=Otherwise)		0.661*	0.661
Gini coefficient (in %)			0.972
Female child (base=Male)	0.829*	0.823*	0.823*
Child's age	0.932*	0.925*	0.925*
Recoded wealth scale (1=wealth<=2nd quintile; 0=Otherwise)	1.076*	0.983	0.983
Household head education (base=Primary or less)			
Middle school	0.977	0.960*	0.960*
High school	0.861*	0.842*	0.842*
Post-secondary education	0.811*	0.798*	0.798*
Unknown	0.992	0.986	0.985
Child's mother's education (base=Primary or less)			
Middle school	1.080*	1.060*	1.060*
High school	0.971	0.948*	0.947*
Post-secondary education	1.006	0.985	0.984
Unknown	1.020	0.988	0.985

Source: MICS. UNICEF (2015).
Note: *: p<0.05; sample size=163,415.

The other variables have the expected association with harsh discipline. Girls and older children are less likely to be disciplined, and the more educated the household head and the mother are, the lower the odds of disciplining the child harshly. Additionally, the only country-level variable included in the analysis is the Gini coefficient. The model shows that this index of income inequality is not associated with the odds of harsh discipline.

I estimated a model for each region to see whether these results hold for each group of countries, and the pattern is not uniform across them (Table 7). In East and Central Asia, the number of children is not associated with higher odds of harsh discipline. Initially, this

also happens for Sub-Saharan Africa. However, when Nigeria is excluded from the pooled dataset, the pattern differs by household wealth. Among wealthy African households, more children decreases the odds of harsh discipline, but among poor households, when the number of children is higher, it is more likely that a child will be disciplined harshly. Differences by household socio-economic status are also observed in the Middle East and North Africa, although in both household types the odds ratio is greater than 1. Finally, in Latin America, the odds ratio is greater than 1, signaling that in households with more children, the odds of harsh discipline increases. In this region, there are no differences by household wealth. In general, the differences across regions suggest that the relationship between the number of children and violent means of discipline is mediated by cultural characteristics that are common within regions, but different across them.

Table 7
Logistic regression odds ratios (OR) of harsh discipline, given household head's number of children and control variables, by region
(All models are fixed-effects models, where the fixed effects refer to countries)

Covariates	East and Central Asia	Latin America and Caribbean	Middle East and N. Africa	Sub-Saharan Africa	Sub-Saharan Africa (minus Nigeria)
Number of children	1.031	1.058**	1.027***	1.006	0.967**
Interaction number of children X Lower wealth hh	1.004	0.967	1.022**	1.018	1.034*
Position of child in birth order (1=Eldest; 0=Otherwise)	0.669***	0.692***	0.608***	0.731***	0.662***
Female child (base=Male)	0.775***	0.845***	0.793***	0.886***	0.876***
Child's age	0.896***	0.898***	0.930***	0.957***	0.944***
Wealth<=2nd quintile (0=Otherwise)	1.004	0.967	1.022**	1.018	1.034*
Household head education b(Base=Primary or less)					
Middle school	0.855***	0.939	0.953*	1.018	1.004
High school	0.852**	0.831**	0.800***	0.946	0.956
Post-secondary education	0.838*	-	0.728***	-	
Unknown	0.982	0.918	1.038	0.775	0.694
Child's mother's education (base=Primary or less)					
Middle school	0.995	0.999	1.028	1.124***	1.066
High school	0.867*	0.893	1.002	0.968	0.928
Post-secondary education	1.074	1.000	0.926	0.215	0.224
Unknown	0.938	0.640	0.954	1.330	1.280
(n)	26395	24672	65650	46697	29504

Source: MICS. UNICEF (2015).

Finally, there seems to be a weak association between the number of children and use of mild methods of discipline (Table 8). None of the logistic equations for countries in East and Central Asia has odds ratios significantly different from 1, and in Latin America, the odds ratio is only significant in Argentina (among both high and low-income households). On the contrary, in the Middle East and North Africa, there is a significant association between the two variables. The only exception is Tunisia, where the association seems to be negative, particularly among high income families. In Sub-Saharan Africa, there are also significant odds

ratios in Ghana, Malawi and Nigeria. It is also significant in Zimbabwe but only among low income households. In Sao Tome, the association is almost non-existent. The analysis with pooled data may clarify the form of the relationship.

Table 8
Logistic regression odds ratios (OR) of mild discipline, given household head's number of children: Simple equation and equation with interactions (95% confidence interval)

Region	Country	OR	OR High wealth	OR Low wealth
East and Central Asia	Mongolia	1.03 (0.97; 1.11)	1.00 (0.91; 1.11)	1.06 (0.97; 1.16)
	Laos	1.03 (0.99; 1.06)	1.00 (0.95; 1.06)	1.03 (0.99; 1.08)
	Nepal	1.02 (0.94; 1.12)	1.01 (0.88; 1.16)	1.04 (0.94; 1.16)
	Vietnam	0.90 (0.78; 1.03)	0.83 (0.65; 1.07)	0.92 (0.78; 1.09)
Latin America and Caribbean	Argentina	1.11 (1.06; 1.16)	1.08 (1.01; 1.16)	1.13 (1.07; 1.19)
	Belize	1.07 (0.97; 1.18)	1.03 (0.89; 1.20)	1.09 (0.97; 1.23)
	Jamaica	1.05 (0.94; 1.19)	1.01 (0.84; 1.22)	1.09 (0.93; 1.26)
	Panamá	1.02 (0.98; 1.07)	0.99 (0.89; 1.10)	1.03 (0.98; 1.08)
	Costa Rica	1.02 (0.90; 1.16)	0.99 (0.78; 1.25)	1.03 (0.89; 1.19)
	Barbados	0.98 (0.79; 1.22)	1.07 (0.74; 1.55)	0.93 (0.71; 1.21)
	Uruguay	0.97 (0.86; 1.08)	0.97 (0.87; 1.09)	0.97 (0.87; 1.09)
	St. Lucia	0.95 (0.78; 1.16)	0.95 (0.73; 1.24)	0.95 (0.71; 1.27)
Middle East and N. Africa	Algeria	1.06 (1.02; 1.09)	1.06 (1.01; 1.11)	1.06 (1.01; 1.10)
	Palestine	1.05 (0.99; 1.11)	1.07 (1.00; 1.15)	1.02 (0.94; 1.10)
	Mauritania	1.04 (1.00; 1.09)	1.05 (0.99; 1.11)	1.04 (0.98; 1.11)
	Sudan	1.04 (1.02; 1.06)	1.03 (1.00; 1.07)	1.04 (1.01; 1.07)
	Iraq	1.02 (1.00; 1.04)	1.03 (1.00; 1.06)	1.02 (0.99; 1.04)
	Tunisia	0.93 (0.85; 1.01)	0.83 (0.72; 0.96)	0.97 (0.87; 1.08)
Sub-Saharan Africa	Ghana	1.07 (1.03; 1.12)	1.09 (1.00; 1.19)	1.07 (1.02; 1.13)
	Malawi	1.06 (1.03; 1.10)	1.04 (1.00; 1.09)	1.09 (1.04; 1.14)
	Zimbabwe	1.04 (0.99; 1.09)	1.00 (0.94; 1.06)	1.07 (1.00; 1.13)
	Nigeria	1.03 (1.01; 1.05)	1.00 (0.97; 1.03)	1.06 (1.03; 1.08)
	Sao Tome	0.99 (0.91; 1.08)	0.94 (0.84; 1.07)	1.04 (0.93; 1.17)

Source: MICS. UNICEF (2015).

According to the set of models with the pooled dataset (Table 9), the increase in the odds of mild discipline per additional child in the household is significant, but small: barely 3.9% in the first model, and 1.6% in the model that controls for the position of the child in the birth order and the Gini coefficient. The most important finding is that the eldest child is less likely to be mildly disciplined than the other children. Additionally, in contrast with harsh discipline, poor households are less likely to use mild discipline than wealthier households, and the most educated households (according to education of household head and mother) are more likely to discipline the child mildly.

The patterns described above vary by region (Table 10). The association between the number of children and mild discipline is only clear in Middle East and North Africa, and in Sub-Saharan Africa among low-wealth households. These results agree with the country analysis shown in Table 8. Additionally, Table 10 has another unexpected result. The Gini coefficient is associated with mild discipline in Africa, but not in the Middle East and North Africa or East and Central Asia (the odds ratio could not be estimated for Latin America and the Caribbean because the model did not converge). In the Sub-Saharan countries where income inequality is higher, the odds of mild discipline are higher. I am not aware of any explanation for this pattern.

Table 9
Logistic regression odds ratios (OR) of mild discipline, given household head's number of children and control variables, by model

Covariates	Model 1	Model 2	Model 3
Number of children	1.039*	1.015*	1.016*
Interaction number of children X Lower wealth hh		1.005	1.005
Position of child in birth order (1=Eldest; 0=Otherwise)		0.756*	0.756*
Gini coefficient (in %)			0.985
Female child (base=Male)	0.949*	0.946*	0.946*
Child's age	1.069*	1.063*	1.063*
Recoded wealth scale (1=wealth<=2nd quintile; 0=Otherwise)	0.824*	0.789*	0.789*
Household head education (base=Primary or less)			
Middle school	1.070*	1.059*	1.058*
High school	1.152*	1.137*	1.138*
Post-secondary education	1.254*	1.249*	1.248*
Unknown	1.048	1.043	1.042
Child's mother's education (base=Primary or less)			
Middle school	1.201*	1.189*	1.188
High school	1.253*	1.239*	1.238
Post-secondary education	1.316*	1.315*	1.313
Unknown	1.560*	1.537*	1.533

Source: MICS. UNICEF (2015).
Note: *: p<0.05; sample size=163,415.

Table 10

Logistic regression odds ratios (OR) of mild discipline, given household head's number of children and control variables, by region (Models are multi-level random-intercept models to account for the country-level variable; the Latin American model is a fixed-effects model because the multi-level model does not converge, hence there is no odds ratio for the Gini coefficient)

Covariates	East and Central Asia	Latin America and Caribbean	Middle East and N. Africa	Sub-Saharan Africa	Sub-Saharan Africa (minus Nigeria)
Number of children	0.980	1.012	1.020*	1.002	0.995
Interaction number of children X Lower wealth hh	1.023	1.015	1.005	1.028*	1.050*
Position of child in birth order (1=Eldest; 0=Otherwise)	0.847*	0.796*	0.790*	0.710*	0.659*
Gini coefficient (in %)	1.037	-	0.996	1.053*	1.049*
Female child (base=Male)	0.961	0.858*	0.940*	0.996	1.050*
Child's age	1.061*	1.008	1.045*	1.127*	0.726*
Wealth<=2nd quintile (0=Otherwise)	0.877	0.790*	0.767*	0.712*	1.036
Household head education (base=Primary or less)					
Middle school	1.150*	1.068	1.061*	1.049	1.036
High school	1.106	1.181*	1.112*	1.306*	1.351*
Post-secondary education	1.371*	-	1.238	-	-
Unknown	1.351*	0.809	0.747*	0.663	0.785
Child's mother's education (base=Primary or less)					
Middle school	1.149*	1.207*	1.210*	1.153*	1.147*
High school	0.995	1.429*	1.203*	1.027	1.043
Post-secondary education	1.249*	1.000	1.168	0.881	0.835
Unknown	1.404*	0.997	0.605	2.888	2.341
(n)	26395	24672	65650	46697	29504

Source: MICS. UNICEF (2015).
Note: *: $p<0.05$.

Conclusions

The world as a whole – and developing countries in particular – experienced fast fertility declines during the second half of the 20th century (Bongaarts, 1994), and the family planning programs of the era were inspired by the idea that smaller families would improve the well-being of families, and in particular the well-being of women and children (Birdsall & Griffin, 1988). Human capital theory stressed the importance of education to enhance the development of a society. In this sense, Becker's theory of the quantity/quality tradeoff is useful for describing social processes in the context of fertility decline, and for promoting the universalization of education. This article has tried to estimate the size of the association between the number of children in a household – as a proxy of household fertility – and three indicators of child well-being in 24 countries across four different regions. The aim of this analysis has been to perform cross-country and cross-regional comparisons of these

statistical associations to understand if households with fewer children are more likely to provide their children a beneficial environment.

On average, the most general models indeed show that more children in a household increases the odds that any particular one of these children works, and the odds of being disciplined with harsh methods. However, the result is not uniform in all regions. The association between the number of children and child labor is clear in the Latin America and the Caribbean region, as well as in the Middle East and North Africa. In Sub-Saharan Africa, the odds ratios for child labor increase substantially with each additional child in the household in Sao Tome and Malawi, but not in Nigeria. In East and Central Asia, the pattern is not clear, and the magnitude of the association is not different between wealthier and poorer households. These results suggest that the association under study might not necessarily be constrained by economic need, but instead by unobserved cultural characteristics. Nonetheless, in general, socio-economic status predicts child labor independently of the number of children, because households in the lowest two quintiles of the index are twice as likely to have a child working than wealthier households. The odds increase if the household head and the child's mother are poorly educated. The results show that Becker's predictions (Baland & Robinson, 2000; Becker, 1992) that state that in developing societies, larger households are more likely to induce their children to work, do hold in several countries, but the relationship is not universal, providing support to Baland and Robinson's (2000) assertions that a reduction in child labor might also be linked to a reduction in fertility. In countries where the association is observed, it holds after controlling for confounding variables such as household socioeconomic status, mother's education, children's age and sex, and especially controlling for minimum legal working age and the country's income inequality. The association with the number of children is not found in Vietnam, Mongolia, Barbados or Nigeria. This is not due to differences in minimum working age legislation, but because multilevel models control for this variable. It would be interesting to employ qualitative methods to better understand similarities among these four apparently different countries.

The association between the number of children and harsh discipline is relatively small. It is observed clearly in Latin America, regardless of household wealth. In the Middle East, in Africa and in three East Asian countries (Mongolia, Nepal and Laos) the association is observed in low-wealth households. In these two regions, the stress produced by economic need might mediate the relationship between the number of children and violent means of discipline. This result provides evidence for the mechanisms posed above that suggest that the number of children in a household might augment the stress of the adults, increasing the odds of harsh discipline towards children. However, in Latin America, the mediating role of stress might be not necessarily be linked to economic hardships, but to stress in general. In most regions, the education level of the household head seems to be the most important predictor of harsh discipline, but it is not clear whether this is the case in Africa. Using MICS data from previous years, Akmatov (2011) also found an association between household size and violent discipline; he and argues that this pattern might be produced by overcrowding. The present article can be used to argue that the presence of numerous children might be more important than the presence of adults in explaining the statistical association described by this author.

Akmatov (2010) also explains that the differences that he found across countries might be explained by cultural perceptions towards the benefits of harsh discipline, especially in

Africa. Bradley and Corwyn (2005) make a similar argument for Africa, as well as for some Caribbean and Arabic countries, based on the HOME study findings. The present analysis suggests that cultural differences are important in explaining differential levels of punishment and physical disciplining of children, although the demographic process of fertility decline might help explain a part of these differences: In countries with lower fertility, harsh discipline is less frequent. Akmatov (2010) mentions this relationship when he highlights his findings for "transitional countries".

As for the association between the number of children and mild discipline, it is very small, especially after controlling for the position of the child in the birth order, given that the eldest child is usually disciplined less frequently than younger children. There are no clear regional patterns in the association, which suggests that culture is not as relevant in mediating the relationship with mild discipline as with harsh discipline. The highest odds ratios are observed for low-wealth households in most Sub-Saharan countries, as well as in Argentina, Belize and Jamaica. The most interesting finding in the mild discipline analysis is that the odds increase with more years of schooling of the household head and the child's mother. Given that there is an inverse association between parents' education and the likelihood of harsh discipline, the results indicate that more educated parents across the world are preferring to use mild rather than harsh methods of discipline. In other words, I could propose the hypothesis that there is a difference in the extent to which parents in different countries are aware of the potential to use mild discipline instead of harsh discipline as a means for improving their children's well-being. The HOME study shows the importance of parental education in child rearing beliefs and reliance on punishment, independently from cultural differences (Bradley & Corwyn, 2011). MICS data cannot be used to delve into this hypothesis, which could be studied with qualitative methods, too.

As a summary, the number of children in a household is negatively associated with indicators of well-being, and socio-economic status might play a mediating effect on this association. Other household characteristics (especially adults' education) predict larger differences in these child well-being indicators. Although low fertility is increasingly perceived as a future problem in sustaining social security benefits, the reduction in the number of children in a household seems to have improved the children's well-being in developing countries.

However, it is important to understand the main limitation of the analysis. The data do not allow to establish causal relationships between the number of children in a household and their well-being. The number of variables in MICS questionnaires limits the suitability of causal analysis. It can be reiterated, however, that the main strength of the methodological approach is the ability to compare countries from different regions with the standardized and closely comparable questionnaire that all the MICS use.

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