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# Intra-household inequalities in child rights and well-being

## A barrier to progress?

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**Abstract:** This paper attempts to measure the extent of inequality within households and its contribution to overall levels of inequality in child well-being. The paper analyses the distribution of resources (outcomes) between girls and boys for four indicators: nutrition, birth registration, school attendance, and time spent doing work and chores (working hours), with data obtained from the Multiple Indicator Cluster Surveys. It assesses total inequality and its within-household component for two periods for each of the 20 developing countries in the sample.

An L-Theil index is used to measure the extent of inequality and break it down into between-household and within-household components. Overall inequality tends to be higher in nutrition (stunting) and working hours and relatively lower in school attendance, where average outcomes tend to be higher. Nevertheless, the share of gender inequality that occurs within households is largest for this last indicator, accounting for more than half of the total inequality. Intra-household inequality is an issue in countries even when, on average, there is progress towards child well-being. Across the four indicators of child well-being, intra-household inequalities can represent a significant proportion of total inequality. They range from a minimum of 9 per cent for working hours, and can go up to 63 per cent for school attendance, on average, but with great variability across countries.

**Keywords:** inequality, intra-household, child, well-being, multidimensionality
**JEL classification:** D39, I3, D13

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## 1 Introduction

Until recently, most measures of well-being have treated households as if their members enjoy an equal share of all household resources. For analytical convenience, most policy analysis assumes that, within households, resources are assigned according to need, treating individual well-being as the adult-equivalent average of the household to which the individual belongs (Haddad and Kanbur 1990). However, when household resources—whether money, consumption goods, or investments—are not equally distributed among household members, particular individuals may be worse off than others, and could effectively be in poverty, even when household averages indicate the contrary. Consequently, the neglect of intra-household inequalities conceals the outcomes for those children who fare below their household average, affecting the assessment of the levels and trends of child poverty. This paper attempts to measure the extent of inequality within households and to show how it contributes to overall inequality.

There is now much better data to look at progress towards improving child well-being. International household survey programmes such as the Demographic and Health Surveys (DHS) and especially the Multiple Indicator Cluster Surveys (MICS) have made it possible to conduct an exhaustive review of progress towards the responsibilities adopted in 1989 in the Convention on the Rights of the Child (CRC), especially the targets defined in the 1990 World Summit for Children, and to monitor progress towards the child-focused Millennium Development Goals (MDGs). Nevertheless, little is yet known about the distribution of this progress, in particular the distribution within households, an important aspect of which is gender differences within households.[1]

Examining unequal household investments in children is important because they tend to carry over into adulthood. Although other factors can still affect well-being over an individual's life-course, systematic biases against boys or girls during childhood are linked to poverty traps and to the intergenerational transmission of poverty.

> Poverty is not transferred as a 'package', but as a complex set of positive and negative factors that affect an individual's chances of experiencing poverty, either in the present or at a future point in their life-course […] The factors influencing an individual's likelihood of being poor include both the 'private' transmission (or lack of transmission) of capital and the 'public' transfer (or lack of transfer) of resources from one generation to the next. These can be positive or negative (Bird 2010: 8).

Preferential treatment of sons is evident in many societies, 'whereby the needs of girls, and resulting allocation of resources, are secondary to those of boys' (Bolt and Bird 2003: 20), resulting in unequal outcomes in child development with life-long implications.[2] Patterns of bias in favour of boys or girls, however, differ across well-being indicators and countries. Biases in land and productive asset inheritance have been found to favour boys (Bird 2011; Cooper 2011; Doss et al. 2011; Estudillo et al. 2001), while girls have relatively lower survival rates in Asia (Klasen 2008; Sen 1992)[3] and lower education achievements, and are subject to lower parental aspirations in India

[1] Group-based differences on the basis of ethnicity, location, and wealth can also influence this partial view of progress.

[2] Inheritance practices, for example, reflect these preferences (e.g. see Bird 2011; Cooper 2011; Doss et al. 2011; Estudillo et al. 2001).

[3] Even if these are aggregate differences, rather than differences captured within households, they can be indicative of the type of parental preference for one gender over the other.

and Ethiopia (Dercon and Singh 2013). However, this last study also found that in the other two countries analysed, Peru and Vietnam, the bias ran in the opposite direction. Similarly, nutrition indicators show a bias against boys, especially for younger children in Sub-Saharan Africa (Sahn and Stifel 2002; Svedberd 1988), and also in India (Andhra Pradesh), Ethiopia, Peru, and Vietnam (Dercon and Singh 2013). However, nutrition indicators have also been found to be biased against girls in some South Asian countries (e.g. for India, see Deaton 1989; Sen 1984; Sen and Sengupta 1983; for Bangladesh, see Chen et al. 1981), highlighting that the direction of the bias can vary across different countries. Sometimes, inequalities in different dimensions may balance out each other. For example, Estudillo et al. (2001) found that, in the Philippines, parents compensate lower inheritance transfers of land with higher investments in schooling for girls, resulting in very little difference in lifetime incomes between sons and daughters. A multidimensional approach to the measurement of inequalities in child well-being is then necessary to gain a full understanding of these biases and to identify areas in which some children are being left behind.

Institutions and norms surrounding gender roles, patterns of inheritance, marriage, and divorce, all matter to understand the varying degree and direction of intra-household inequality bias. Yet these are likely to differ across countries. For example, where matrilineal systems are present, women may have more autonomy (Soto Bermant 2008) and thus biases against girls could be less strong. Other institutions such as dowry and marriage practices may also play a role. In Sub-Saharan Africa daughters have been found to be favoured because a bride price is paid upon marriage (Bird 2010), but in South Asia marriage practices interact with household income status in determining child preference; discrimination against daughters is more common in upper strata households than in lower strata ones, because investments in sons are more efficient in property-owning households than in poorer ones (Bird 2010).

The age of the children, on its own or combined with their gender, may be more important in some societies than in others. While children with higher birth order are often preferred in the allocation of family resources, there can be important variations. In China female children with older siblings have higher mortality rates, whereas in North India and Bangladesh excess female mortality is noted among girls with higher birth order (Soto Bermant 2008). In Nepal, by contrast, girls tend to work more than boys, irrespective of their birth order (Edmons 2003). Parental assumptions about the benefits of investing in education may be reinforced by labour market functioning. In countries where gender discrimination in the labour market is high, parents may invest more in their boys' education foreseeing future financial help and higher future returns to education, as found for example by Buchmann (2000) in Kenya.

Family structure is also important. Where polygamy is an accepted cultural practice, discrimination is based not only on gender but also on family structure. For example, in northern Ghana, children of first wives have been found to have better nutrition outcomes (in terms of height and food diversity) than those of second wives in polygamous households (Leroy et al. 2008). Similarly, where extended families lived together, evidence suggests that children of the most 'powerful' male or the head of the household have been favoured: in rural Pakistan, Fafchamps and Quisumbing (2003), for example, found daughters-in-law tend to work more than daughters.

In sum, different institutions may explain different patterns in gender inequality within households. Identifying where these inequalities are salient and determining whether they systematically occur across different dimensions of child well-being are important aspects of diagnosing the barriers to progress.

It is not enough to measure and compare average outcomes of girls and boys in a country. Although they can indicate some preference for a particular gender, measures of average outcomes of boys and girls may hide other disparities, in particular those that occur inside households.

Empirically, the extent of intra-household inequality is difficult to assess. With few exceptions, measures derived from household surveys often provide little information for children at the individual level. The aim of this paper is to add to this body of literature by shedding light on unequal investments in the well-being of different children within the household. Inequality in four key indicators of child well-being is analysed: stunting, birth registration, school attendance, and time spent on work and chores (working hours). Section 2 briefly reviews some approaches to measuring intra-household inequalities and child well-being and situates the current work in this literature. Section 3 presents the results for the four indicators. The final section discusses some of the implications of these results.

## 2 Measurement issues and methodology

### 2.1 Intra-household inequalities

The lack of data for individual children is the main impediment to measuring inequalities inside households. Even detailed consumption surveys may lack this information. Deaton (1989) has pointed to some of the empirical difficulties of directly analysing individual allocations of resources: for instance, budget surveys record consumption at the household level rather than at the individual level; direct observation of allocations such as meals can be intrusive and affect the behaviour of those being observed; and determining the equal/unequal enjoyment of public goods or jointly consumed goods within the household (e.g. housing, sanitation, and water supply) is problematic, even if they are privately provided. This focus can mask differences in the well-being of household members, in particular between men and women, children and adults, and across children.

Even when such detailed information exists, most inequality measures (such as the Gini coefficient or the General Entropy (GE) measures) require cardinal data for their computation, but most information we have on child well-being is either ordinal or binary, for example indicating whether a child is undernourished or not, attends school or not, or has been vaccinated or not. Perhaps for this reason, inequality analysis between groups is often done by comparing average outcomes for different groups (i.e. the percentage of girls and boys in a country who are undernourished), using a regression-based approach in which the different outcomes are regressed on a gender dummy, or using expenditure or nutrition indicators (using Z-scores) which are cardinal (see Box 1).

Box 1: Measuring gender intra-household inequalities

Different approaches have tried to measure the unequal distribution of resources or outcomes within households. A first approach is to **compare the gender distribution of resources to track differences between boys and girls**. Deaton (1989) approximated individual budget allocations to boys and girls using non-child expenditures (i.e. tobacco, alcohol, and adult clothing). Compared to childless households, one would expect a reduction in the income available for non-child expenditures in households with children. If this reduction were systematically larger in households with male children than in those with female children, it would suggest that households were diverting more resources to the male children. Similarly, the Gender Parity Index used in the Women's Empowerment in Agriculture Index (Alkire et al. 2013a) computes the gap between outcomes for women and men in each household to get a sense of the shortfall between genders.

A second approach is to **measure differences in average outcomes between boys and girls**. Dercon and Singh (2013) used longitudinal data to measure inequalities in child nutrition, educational achievements, educational aspirations, subjective well-being, and psychological competencies. First, they compared the average achievements between girls and boys at various ages to assess gender inequalities. Second, they used a regression-based approach in which the different outcomes were regressed on a gender dummy and some household characteristics (i.e. total consumption expenditure, education of the mother, household size, ethnicity/caste, and location (urban/rural)). The significance and direction of the gender dummy indicated the presence of gender inequality. Quisumbing (1994) followed a similar approach to analyse parental decisions about inheritance and education investments in their children, adding family fixed-effects as an attempt to capture differences in siblings within the same family. Her analysis reveals that in the Philippines education investments are gender neutral within the household, although daughters receive more total inheritance, but less land inheritance than sons.

Another approach is to **measure overall inequality using an aggregate inequality index and break it down into two components: within-household and between-household inequality**. Sahn and Younger (2009) used this to measure gender differences in the standard of living. Using Body Mass Index of adults as an individual measure of the standard of living, they constructed a household-specific L-Theil Index and measured within- and between-household inequality using the decomposability property of the General Entropy (GE) indices. Their findings show that at least 55 per cent of overall inequality in the seven countries examined can be attributed to the within-household component. This paper follows a similar approach.

Intra-household inequality is presented in two ways. The first is the share of households with a gender bias: that is, households that display higher outcomes in either boys or girls. This is derived from household ratios of the achievement of girls to that of boys in each of the indicators. A ratio of one indicates complete parity; ratios greater than one indicate that girls' achievements are higher than boys' achievements, and vice versa for ratios lower than one. A bias for girls is evident when girls have more favourable outcomes than boys (i.e. a lower share of them are stunted or work less hours, or a higher share of them are registered at birth or attend school).[4] This, however, only shows gender differences in each household, or the average gender differences across the country; it does not show the extent of intra-household inequalities in total inequalities. Here, an aggregate measure of inequality—the Theil index—is used to capture these magnitudes.

To provide evidence of within-household inequalities, this paper trials an innovative approach to the measurement of inequality. It follows Sahn and Younger's (2009) approach to measuring inequality by breaking up a total inequality index into its within- and between-group components, using households as the defining groups (see Box 1). The innovation consists of adapting the methodology for a greater number of indicators, ordinal as well as cardinal, and thus allowing for a broader understanding of inequality in different areas of child well-being.

The method used is to obtain two cardinal values for each household out of the original binary indicators, so that an inequality index can be constructed and then de-constructed to assess the contribution of its components, particularly to capture the share of within-household inequality.

[4] Variables are recoded to match this interpretation.

Binary variables are recalculated as the share of girls and boys within a household above a certain threshold.[5] Thresholds are defined following international standards set by UNICEF's guidance on Indicators for Global Reporting (Appendix 1). In the case of non-binary variables (work time), the reconstructed household variables express averages for girls and boys in each household. In the case of stunting, for example, two observations are noted for each household: one corresponding to the share of girls who are stunted and the other to the share of boys who are stunted (Box 2). The unit of analysis are the girls or boys *within a household*, so the objective is to have a household level variable separately representing the outcomes of girls and boys *in each household*. Only households that have at least one boy and one girl are kept in the sample for analysis.[6]

The main limitations of this approach are that the final variable can be discontinuous—especially, but not exclusively, for smaller households—and that the inequality measure does not control for the original size of the groups, in this case households. This may limit the comparability of the measure across countries, where the average household size varies.[7] Although the implications for the measurement of inequality require further investigation, this still bypasses the main problem of measuring inequality using non-cardinal indicators and allows for the examination of inequality in multiple dimensions of well-being.[8]

[5] This method is only able to capture whether some differences exist between boys and girls. Other methods (e.g. Alkire et al. 2013a) can be used to estimate the gap between both genders, but they make sense only for cardinal indicators (or composite multidimensional poverty measures).

[6] This means that the sample of households is reduced. On average, for all countries, the share of households kept in the analysis is 18 per cent for stunting, 19 per cent for birth registration, 17 per cent for learning support, 38 per cent for school attendance, and 20 per cent for work time.

[7] The average household size varies from 5.8 to 8.0 in the sample of countries in this study. The discontinuity could be problematic if it were to affect the inequality measure, that is, if inequality were bigger in smaller households. To test whether it is likely that the household size, in particular the number of children in the household, had an impact on inequality, a simple OLS regression of the standardized household ratios of achievements of girls to that of boys (which are the first measure of intra-household inequality used) on the number of children in the household was carried out. The coefficients were found to be significant, but of very small magnitudes (the highest being 0.025), and the overall R2 was very small (below 0.003), indicating that its contribution to intra-household inequality is small. Moreover, even if there was an impact, the direction of the bias was not consistent; the coefficients were found to be positive in two cases and negative in the other. When adding country dummies to this simple regression, the coefficients and R2 increased, but the variable lost significance in one case (birth registration). This may indicate that the effect of the number of children on intra-household inequality may be influenced by the context of a country. Finally, it is impossible to know whether this significance responds to the discontinuity or rather to the fact that certain types of households (i.e. bigger or smaller ones) distribute their resources more (un)equally than others. The coefficient indicating the relationship between the number of children and intra-household inequality was also significant (and negative) for the work-hours indicator, which did not seem to be affected by the discontinuity problem.

[8] The final variable is truly cardinal, although discontinuous, and thus differs from the common approach of assigning ordered numerical values to an ordinal variable (say 1, 2, 3 representing points in a happiness scale), which is sensitive to the scale used (e.g. see Allison and Foster 2004; Dutta and Foster 2013; Kobus and Piotr 2012). The discontinuity of the variable is unlikely to affect the mean value for each household, and thus the inequality measure.

Box 2: Household level variable: Stunting

$$Stunting = \begin{cases} Stunting\ Girls_h = \frac{number\ of\ girls\ stunted_h}{total\ number\ of\ girls_h} \\ Stunting\ Boys_h = \frac{number\ of\ boys\ stunted_h}{total\ number\ of\ boys_h} \end{cases} \quad \text{for each household } h$$

With the household level recalculated variables, a GE index can be computed for each indicator. This study uses an L-Theil index (mean log deviation), which is a summary measure of the difference between the (natural logarithm of the) shares of the well-being measure and the shares of population. It reflects the extent to which the distribution of well-being between groups differs from the distribution of the population in those groups. When all the groups have a share of well-being equal to their population share, the distribution is completely equal (the overall Theil index is zero). It also gives a higher weight to the lower end of the distribution, giving higher relevance to those who are more deprived, and is sub-group decomposable. Because the Theil index is unbounded and depends on the unit of measurement, it is difficult to interpret in absolute terms and to make meaningful comparisons of inequality levels across variables measured in different units. On the other hand, a Gini coefficient, which ranges from zero to one, gives an indication of the extent of overall levels of inequality, placing equal weight on all parts of the distribution. However, unlike the Theil index, the Gini coefficient is not perfectly decomposable (Bellù and Liberati 2006),[9] impeding the assessment of the share of inequality that takes place within households. For this reason the Theil index, rather than the Gini coefficient, is the main measure of inequality used in this study, although the latter is presented to give a sense of the scale of overall inequality.

In the decomposition of the Theil index, the within-group component reveals how much of the inequality could be attributed to inequalities inside the household. When there is no such inequality across household members, the contribution of the within-group component is null. Households with no inequality within can still contribute to the between-group component if their mean outcomes differ from the mean outcome of the country as a whole. The share of inequality that can be attributed to differences within households is presented for two periods in time. Inequality measures and corresponding standard errors are computed taking into account sample design, using the sample weights designed and incorporated into each survey by MICS. Computations are made with the Distributive Analysis Stata Package (DASP) (Araar and Duclos 2013) in Stata/SE V.12, which allows the sample design to be included in the estimation of standard errors. A

[9] Apart from the within and between components, the Gini coefficient has a non-zero residual term and is not sub-group consistent; that is, if inequality declines in one sub-group (region, ethnic group, etc.) and remains unchanged in the rest of population, then the overall inequality does not decline. The following equation shows the decomposition of the L-Theil index. The first term corresponds to the within-group component and the last to the between-group component.

$$GE(0) = \frac{1}{N}\sum_{i-1}^{N} ln\frac{\bar{y}}{Y_i}$$
$$= \sum_j \frac{N_j}{N} L_j + \sum_j \frac{N_j}{N} \ln\left(\frac{\bar{y}}{y_j}\right),$$

where $N$ is the entire sample size, $N_j$ is the sample size in the household, $\bar{y} = Y/N$ is the average score of the variable for the entire sample, $y_j$ is the average for household $j$, and $L_j$ is the inequality (mean log deviation) of each household $j$.

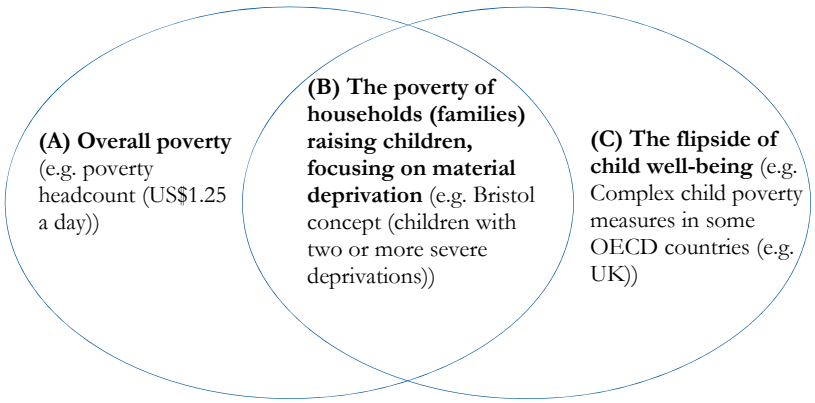
standard *t*-test is used to assess the statistical significance of the changes in inequality and its components across the two periods.

## 2.2 Child well-being and multidimensional inequality

This study, as its point of departure, takes an interest in measuring child well-being from a multidimensional perspective, but it seeks to expand this multidimensional lens to the analysis of inequality. New ground was broken in the measurement of child poverty and well-being with UNICEF's 'Global Study on Child Poverty and Disparities' (UNICEF 2007), which combined the household income poverty measure with the multidimensional Bristol deprivations approach (Gordon et al. 2003), the methodology used to produce the first internationally comparable estimates of child poverty across a large number of developing countries.[10] Although it captured the multidimensionality of poverty and was useful for analysing disparities across countries, it could mask child disparities within the household, affecting the assessment of poverty levels and excluding less-well-off children.

The way in which child poverty is measured has an impact on policy responses. There is a considerable shortage of data analysis on children per se, and often assessments of child well-being are made on the basis of information about their household or carers (Gordon et al. 2003). The use of household level data not only conceals differences between household members, particularly children, but also poses an additional problem. If child poverty is made equivalent to overall household poverty—'(A)' in Figure 1—policy responses may address the main underlying causes of poverty but fail to account for child-specific concerns and experiences as well as for intra-household inequalities. A stronger focus on child outcomes and non-material aspects of deprivation—'(C)' in Figure 1—would be more appropriate for capturing disparities in child poverty and more useful for addressing the protection of child rights (Fajth and Holland 2007). Lack of data, however, may restrict this type of analysis (UNICEF 2007).

Figure 1: Three models of child poverty approachess




Source: Based on Fajth and Holland (2007).

The dimensions relevant to measuring child well-being in this study are defined drawing from the CRC. The core set of dimensions that are essential to any child's development can be classified in three groups: survival, development, and protection and participation. Due to data limitations, the dimensions analysed are restricted to those that can be measured at the individual level and for boys and girls separately. Some indicators are measured at the individual level, but only for one

[10] Developed by a research team from the Townsend Centre for International Poverty Research at the University of Bristol. It examined child deprivations in seven dimensions of well-being: shelter, sanitation, safe drinking water, information, food, education, and health.

child in the household, rendering them insufficient for analysis. This exacerbates the data shortcomings: of the 17 dimensions of child well-being in the CRC, data constraints restrict this study's analysis to only four of them: nutrition, education, birth registration/nationality, and some components of leisure and child labour. Appendix 1 shows the operational definition of the indicators. Table 1 expands the table presented by Neuborg et al. (2012: 9) with information relevant to this study.

Data is obtained from MICS. The two latest surveys available for each country are used, corresponding roughly to a five-year distance between surveys (2000 and 2005–06 or 2005–06 and 2010–11). The actual period depends on the specific surveys available for each country. A total of 20 countries are available to be analysed (see Appendix 2 for details) but some countries chose to omit certain questions or add modules to the survey. Consequently, not all indicators are available for all countries or years. For each country, indicators are analysed only if present in both periods (Table 1).

Table 1: Child well-being dimensions, indicators, and data availability

| Categories | Dimensions | CRC article no. | Indicators available | No. countries analysed |
|---|---|---|---|---|
| Survival | Food nutrition | 24 | Stunting and underweight | 15 |
| | Water | 24 | No* | |
| | Health care | 24 | Immunization (DPT)**** | |
| | Shelter, housing | 27 | No* | |
| | Environment, pollution | 24 | No | |
| Development | Education | 28 | School attendance and support for learning*** | 18 |
| | Leisure | 31 | House work and chores | 11 |
| | Cultural activities | 31 | No | |
| | Information | 13, 17 | No* | |
| Protection | Exploitation, child labour | 32 | House work and chores | |
| | Other forms of exploitation | 33–36 | Female genital mutilation*** | |
| | Cruelty, violence | 19, 37 | Child discipline*** | |
| | Violence at school | 28 | No | |
| | Social security | 16, 26, 27 | No | |
| Participation | Birth registration/ nationality | 7, 8 | Birth registration | 19 |
| | Information | 13, 17 | No* | |
| | Freedom of expression, views, opinion; being heard; freedom of association | 12–15 | No | |

Notes: *Indicators for water and sanitation, information, and shelter are measured at the household level; ***Indicator available in the Multiple Indicator Cluster Surveys (MICS) for some countries but not suited for the current analysis; ****Indicator available in MICS but excluded from this analysis due to different immunization schedules in different countries, which makes it difficult to use for comparative purposes.

Source: Adapted from Neuborg et al. (2012: 9) and author's assessment.

Children can be deprived in one or many of the dimensions of well-being. This paper analyses the distribution of each dimension separately, opting for a dashboard approach to the measurement of inequality (see the first approach in Box 3). In addition, it aims to analyse the joint distribution of inequalities (see the third approach in Box 3). For each indicator, using the household ratios of achievement of girls to boys it is possible to create a discrete variable showing whether there is a bias against boys or girls or none in each household. This in turn is used to compute a measure of association for each combination of indicators (e.g. stunting–birth registration, stunting–school

attendance, etc.) to see whether there is a systematic gender bias.[11] (This will be further explained in Sub-section 3.6.)

Box 3: Measuring inequality in multidimensional poverty

When measuring inequality across multiple dimensions, three approaches are generally used. The first measures vertical inequality analysing **each of the individual distributions** of the dimensions of well-being, without regard to its correlation with other dimensions. This approach is widely used by studies focused on non-income inequalities, particularly health and education. An example of the latter is found in the studies conducted by Thomas et al. (2001) and Checchi (2000), who constructed a Gini concentration index of educational achievement measured by the average years of education. With regard to health, Gakidou and King (2002) measured inequalities in expected child survival to age two, while the 2000 World Health Organization report (WHO 2000) used a similar approach by measuring inequalities in life expectancy at birth. Sahn and Younger (2006) also used this approach to measure changes in inequality in both health and education in Latin America. These inequality measures can be computed using individual level variables, but can also be used to see differences in sub-group outcomes. For example, Thomas et al. (2001) used sub-groups defined by educational levels (i.e. higher education, secondary education, primary education, and no education) to construct a Gini index, measuring inequality as the difference between sub-group averages.

A second approach aggregates the various dimensions into a **uni-dimensional index of deprivation and then analyses its distribution for different sub-groups**. For example, the Alkire–Foster method (Alkire and Foster 2011), used in the Oxford Poverty and Human Development Initiative's (OPHI) Multidimensional Poverty Index, aggregates multiple deprivations at the individual and household level to measure poverty. Roche's (2013) study applied this methodology to the measurement of child poverty in Bangladesh using six dimensions corresponding to those in the Bristol approach. The index can be de-constructed to analyse how many children experience overlapping deprivations (incidence) and how many deprivations they face on average (intensity). UNICEF's Multiple Overlapping Deprivation Analysis (MODA), and its cross-country version (CC-MODA), combines the Bristol approach with the Alkire–Foster method and analyses deprivations in six dimensions*used to construct an aggregate deprivation index.**Although these indices were developed to measure poverty, the resulting aggregate index can be used to measure disparities, using a traditional GE measure, for example, or analysing how the index is distributed across regions or population sub-groups.

A third approach takes into consideration possible correlations between the various dimensions of welfare by considering **joint distributions of the dimensions** of well-being, but without integrating them into a single index. Wagstaff (2002), for example, measured mortality, malnutrition, and disease prevalence across socioeconomic status quintiles defined by a measure of household wealth. In analogy to a Lorenz curve, he defined a concentration curve ranked across socioeconomic quintiles. If the curve coincided with the diagonal or line of equality, it was concluded that all children irrespective of their socioeconomic status enjoyed the same health outcomes. As pointed out by Sahn and Younger (2006), the problem of this approach is that it gives primacy to income above the other dimensions of well-being by ordering the distribution by socioeconomic categories; inequalities in other dimensions are only relevant if they are correlated with socioeconomic inequality. A way to avoid the income primacy is to compute distributional measures across the full set of pairwise combinations of dimensions. For example, Justino et al. (2004) used this approach in Brazil, constructing GE measures of income, health, and political participation for each education quintile and repeating the exercise for all other pairwise combinations (i.e. for health, political participation, and income categories).

Notes: *Water, sanitation, housing, and protection against domestic violence are used for all children (0–17 years old); nutrition and health are also used for children under 5 years old, and education and information for children 5–17 years old; **It also outlines the construction of a multidimensional Gini coefficient (Decanq and Lugo 2009; Tsui 1995, 1999) to analyse the distribution of the deprivation index, although to date that analysis is undergoing and yet unpublished.

[11] Other possibilities—for example, measuring multidimensional inequality using the count vector in the Alkire–Foster method (see Alkire and Foster 2011)—would render a different picture of inequality. This would be indicative of how multiple outcomes are unequally distributed (i.e. whether one child suffers from more deprivations than other children), as opposed to indicating how deprivations themselves are distributed across children and how much of that occurs within their households.

## 3 Results

This section presents the results by indicator and looks at patterns in the findings across countries. Given that the sample of countries and indicators relies on data availability, these results are illustrative and not representative of the world or any country grouping. The group averages presented should be treated as such, recalling that the range of results can vary considerably. Moreover, comparisons across countries are not straightforward: differences in average household sizes in particular may affect the assessment of inequality; and the definition and measurement of indicators, although mostly standardized by UNICEF, are not always kept, especially in earlier rounds of the surveys, leading to differences in the way the information is captured for some countries. The results for individual countries can be found in Tables 2–6. Summary statistics can be found in Appendix 3. This section concludes by analysing the degree to which gender biases are jointly distributed within households.

Total inequalities between girls and boys across indicators of child well-being are of varying magnitude. On average, across all countries and years the Gini coefficient for stunting is 0.76, showing a large degree of inequality. Inequality in working hours is similarly high: on average, the Gini coefficient is 0.71 for this indicator. The Gini coefficient for birth registration is 0.42, while total inequality in school attendance is particularly low with a Gini coefficient of only 0.18. Intra-household inequalities are also quite different across indicators and countries. Sub-sections 3.1–3.4 examine how much of this overall inequality can be explained by differences within households.

### 3.1 Nutrition (stunting)

A strong body of evidence shows the detrimental effects of undernutrition. It is a risk factor for poor motor and cognitive child development (Black et al. 2013), which in turn lowers educational attainment and carries into adulthood, directly affecting labour productivity and life-long earnings. The harmful effects of malnutrition also carry over from mothers to children, compromise maternal health, and increase the risk of transmission of diseases such as HIV and tuberculosis (World Bank 2006).

Different indicators can be used to determine whether a child is malnourished. Although the MDG indicator is underweight prevalence, stunting reflects better the cumulative effects of nutrition deprivation and thus is a better indicator of chronic malnutrition (Black et al. 2013; WHO 2010).[12]

On average, for all 15 countries and periods in the sample, 24 per cent of boys and 23 per cent of girls are stunted (summary statistics for all indicators are available in Appendix 3), figures that are consistent with previous evidence showing that differences in nutrition between girls and boys are not generally very large (UNICEF 2011). At the country level, stunting rates for boys range from

[12] There are also differences in the standards for measuring nutrition indicators, which largely depend on the underlying population reference. Patterns differ substantially depending on whether the old National Center for Health Statistics (NCHS)/World Health Organization (WHO) standards or the more recent 2006 WHO standards are used: in particular, stunting is likely to be higher when using the new standards (de Onis et al. 2006). For example, in an experiment using the Demographic and Health Survey (DHS) for Bangladesh, both underweight and stunting rates are about 10 per cent higher with the WHO standards (de Onis et al. 2006). Even though the WHO standards are probably better for capturing the extent of malnutrition in a given country, because their base population reference is a sample of breast-fed children selected from a wide geographical distribution, the old NCHS/WHO population reference standards have been used in this study to compute stunting rates and the respective inequality indicators. This was done to ensure comparability over time, because MICS from round 2 and most of round 3 were conducted when this was the standard in place.

5 (Serbia, 2010) to 41 (Lao and Albania, 2000) per cent, and for girls between 3 (Serbia, 2010) and 46 (Albania, 2000) per cent.

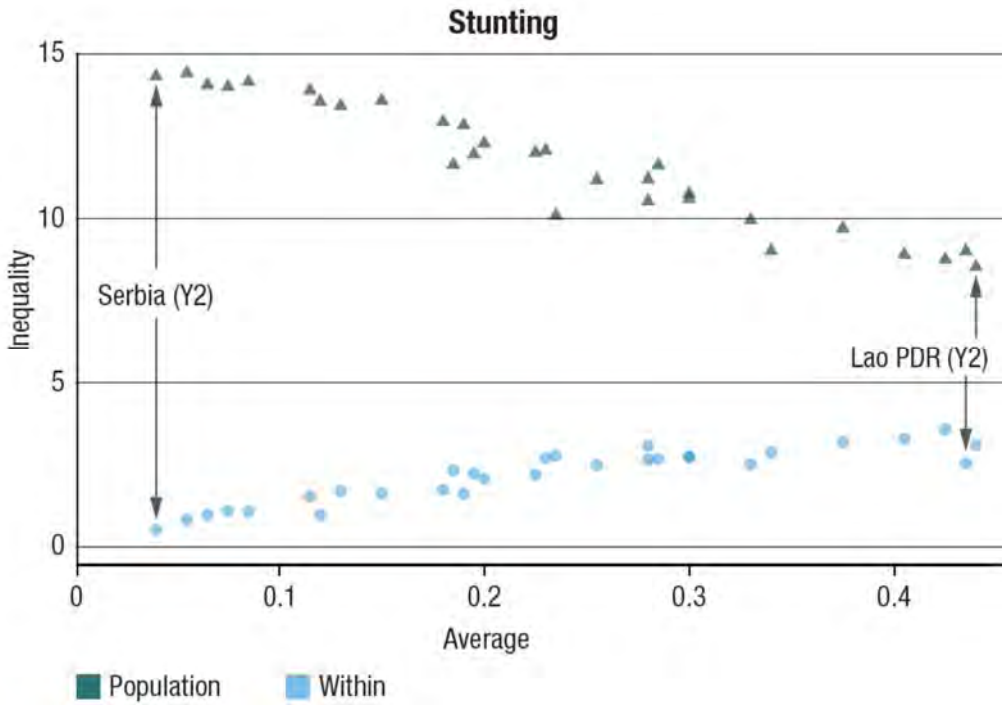
Even if, on aggregate, girls are as likely to be undernourished as boys, this could still hide other inequalities. When looking at the ratio of stunting prevalence of girls to boys within households, the analysis here shows that on average for all countries about 15 per cent of households have a bias for boys and 16 per cent a bias for girls, and these biases can be cancelled out through aggregation. About 69 per cent of households have no bias in favour of children of either gender (see Appendix 4 for all countries and indicators). The percentages of households with and without biases differ, but the pattern is similar across countries: in some cases the biases favour boys while in others, girls. In most cases, these aggregate differences are small, so this results in an insignificant difference between the share of households favouring boys or girls[13] (see also Figure 3).

The position of inequality in countries at different levels of well-being can be illustrative of how intra-household inequality varies across levels of well-being and in relation to total inequality. Pooling all country-year observations,[14] Figure 2 shows that where average stunting levels are higher, total inequality is lower. However, the opposite occurs with within-household inequality, which is higher where average stunting is higher in absolute and relative terms. For instance, in Lao People's Democratic Republic (Lao PDR), a country with high levels of stunting, close to 40 per cent of inequality occurs within households. The opposite occurs in countries like Serbia. This suggests that for nutritional outcomes, intra-household inequality should be a stronger concern in countries with higher levels of deprivation. This pattern, as discussed later, differs from the other indicators of child well-being.

[13] The significance is calculated using a test of proportions (*F*-test with a 95 per cent significance level).

[14] In Figures 2–5, average levels are computed as the mean value for girls and boys in the sample. Total and within-household inequalities refer to the L-Theil index results in each country.

Figure 2: Average levels and inequality in stunting

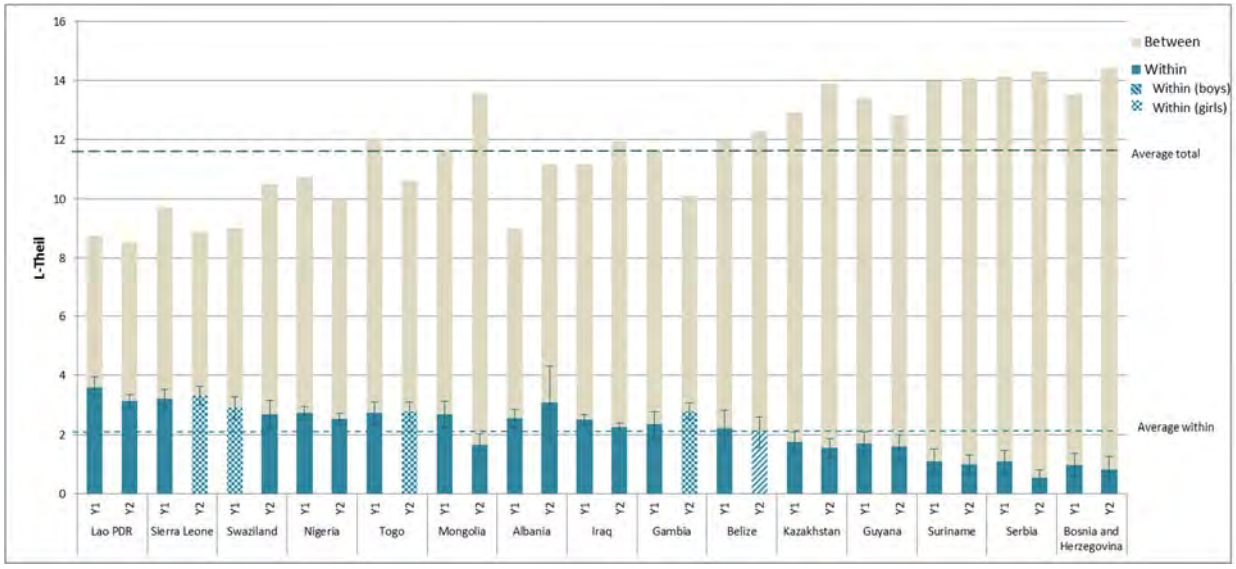



Source: Author's calculation based on Multiple Indicator Cluster Survey (MICS) data.

According to the inequality decomposition of the Theil index, on average 80 per cent of the inequality in stunting rates can be attributed to inequality across households, whereas 20 per cent occurs within households. However, in seven countries (Nigeria, Albania, Togo, Lao PDR, Sierra Leone, Swaziland, and Gambia) in both periods, the within-household component contributes to more than 20 per cent of the total inequality, reaching 41 per cent in Lao PDR.

In six of the 15 countries with stunting data, overall inequality measured by the Theil index increases between the two periods; in four countries, it decreases; and in five countries, it remains virtually unchanged. But overall, as seen in Figure 3, there is little change in stunting inequality and its relative components from the first to the second period. Within-household inequality falls only in one country (Mongolia), which is consistent with the increase in parity observed in this country when looking at the household descriptive statistics. Yet, Mongolia did not manage to reduce total inequality because of a rise in between-household differences, and total inequality remained high (the Gini coefficient for Mongolia rose from 0.71 to 0.85). For the rest of the countries, the change in the within-household component of inequality is not statistically significant and thus changes in total inequality are driven by the between-household component.

Figure 3: Inequality decomposition of stunting




Source: Author's calculation based on MICS data.

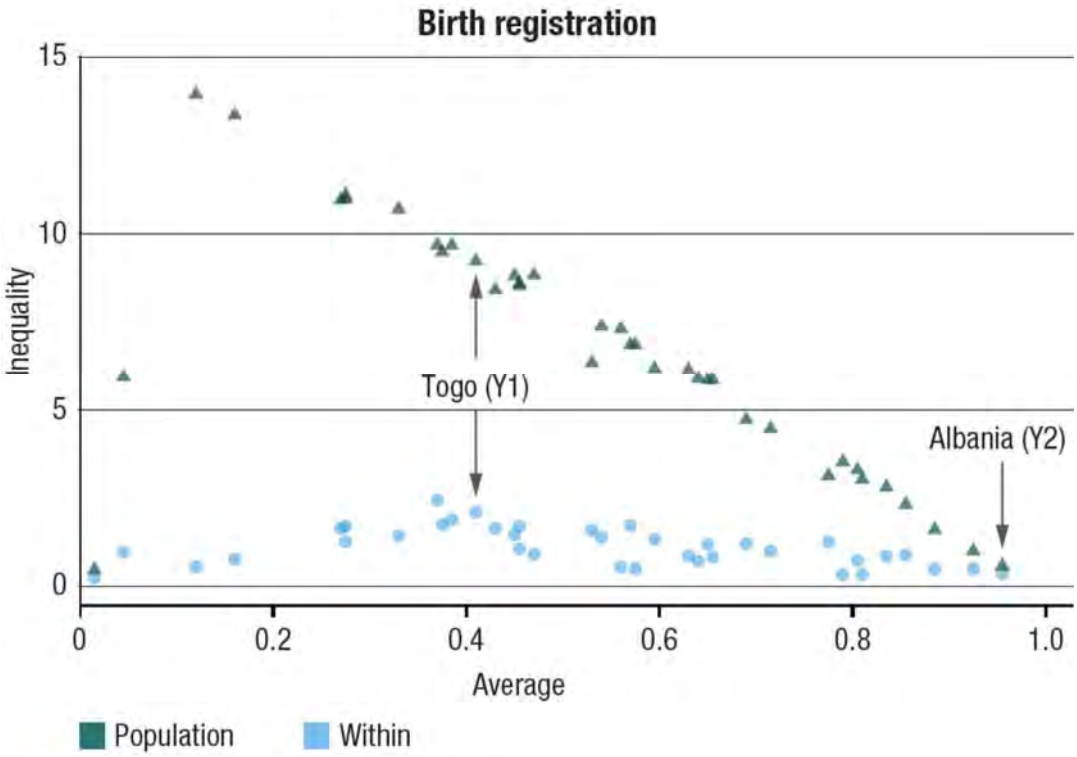
## 3.2 Birth registration

Unregistered children are deprived of their right to have an identity and may not be able to claim services and protections on an equal basis with other children (UNICEF 2014). Birth registration is costly and difficult for some families. In some countries, parents need to pay a fee to register their children; in others, late registration carries a sanction that can place a heavy economic burden on the family, or may involve other external costs incurred through travel or accommodation and loss of earnings and work time. Sometimes the barriers are not monetary. For example, in Bhutan, children whose father is unknown cannot be registered, and in Indonesia, a marriage certificate is required to register a child's birth (UNICEF 2014). It is possible that given these difficulties, parents may not always be willing or able to register all their children. They may choose to register only one child, who may be either randomly selected by chance or circumstances or more instrumentally chosen to allow them access to services which could help them to support their family in the future.

On average, for the 19 countries analysed, 53 per cent of girls and 54 per cent of boys are registered, but with large differences across countries, ranging from 2 per cent in Trinidad and Tobago (2006) to 90 per cent in Guyana (2006–07). On average, the percentage of children registered increases for girls and boys alike, from 50 per cent in the first year in which registration was measured, to about 57 per cent in the second. Again the actual rates differ in each country, but the similar trend for boys and girls is common. Disparities inside the household in terms of ratios of registration for girls and boys occur in about 18 per cent of households, and in most countries a similar proportion of households (close to 9 per cent) have a bias for either boys or girls. Again, this suggests that these differences cancel out each other in the aggregate, and in most countries the difference in the share of households favouring boys and girls is statistically insignificant.

Figure 4 shows that the higher the average birth registration in the country, the lower the total inequality in absolute terms (e.g. Albania). The relationship with within-household inequality is less clear; if anything, within-household inequality is also slightly higher for countries in the middle of the distribution (e.g. Togo).

Figure 4: Average levels and inequality in birth registration

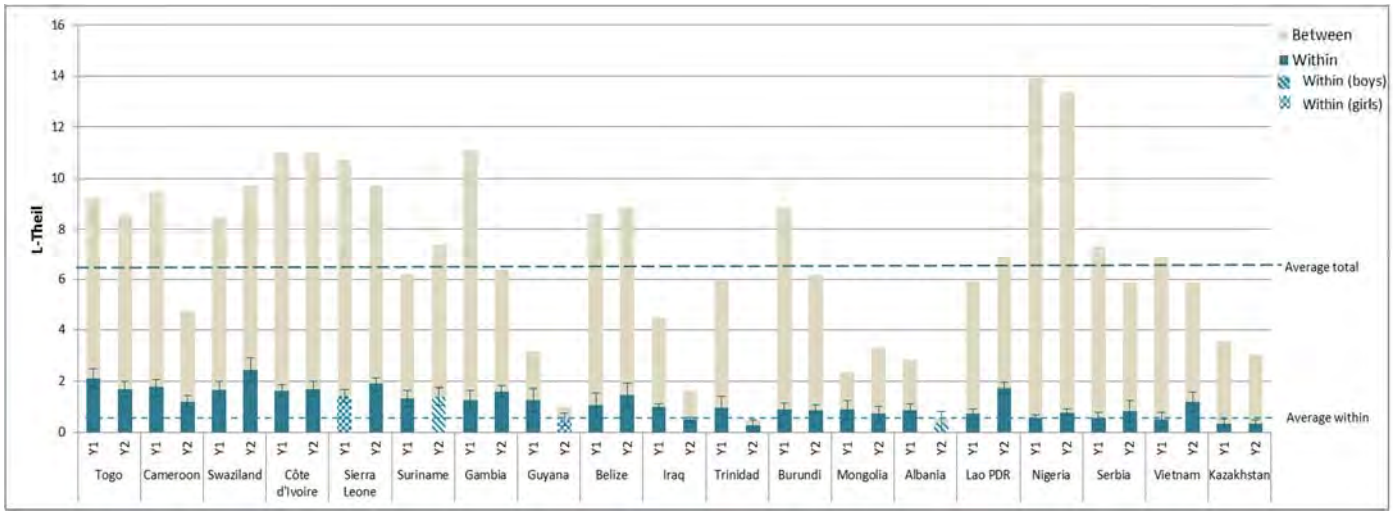



Source: Author's calculation based on MICS data.

The between-household component accounts for 78 per cent of total inequality, whereas the remaining 22 per cent corresponds to inequality within households. The ratio of between- to within-household inequality is below four (which roughly corresponds to a 20 per cent or higher share of within-household inequality) in both periods in Albania, Togo, Iraq, Mongolia, and Guyana. The ratio also decreases to below four in another six countries (Cameroon, Vietnam, Trinidad and Tobago, Lao PDR, Swaziland, and Gambia). For the remaining eight countries, the ratio is above four in both periods.

With the general increase in birth registration rates, overall inequality falls over the two periods. Of the 19 countries with birth registration data, overall inequality between the two periods decreases in seven countries but increases in two (Lao PDR and Swaziland) (Figure 5). In the remaining ten countries, inequality remains virtually unchanged. The within-group component rises sharply, from 17 per cent of total inequality in the first period to 25 per cent in the second. This is mainly explained by a more rapid decrease in the absolute levels of the between-household inequality for most countries, rather than by an increase in within-household inequality. Within-household inequality only increases in two countries (Swaziland and Lao PDR) and total inequality accompanies that upward trend. In a further three countries (Trinidad and Tobago, Iraq, and Guyana), within-household inequality decreases between the two periods; that reduction is accompanied by a reduction in total inequality.

Figure 5: Inequality decomposition of birth registration




Source: Author's calculation based on MICS data.

### 3.3 School attendance

Education is critical to strengthening people's capabilities and freedoms. Greater equity in access to education has critical effects on advances in human development (Jespersen 2011). Education can also be a route to greater social mobility and a way out of poverty (UNESCO 2010). An extra year of schooling can increase a person's earnings, lead to better employment, and reduce the chances of falling back into poverty. For instance, in Pakistan literate working women earn 95 per cent more than women with weak literacy skills, whereas in rural Indonesia literacy has been linked to a 25 per cent decrease in the chance of falling back into poverty (UNESCO 2013). Education is also linked to better health and is conducive to full participation in society. Educated mothers are less likely to be pregnant when they are teenagers and more likely to have a say in the number of children they want; they are also less likely to die during childbirth because they are better informed about specific diseases and can take measures to prevent them (UNESCO 2013).

The school attendance indicator refers to the number of children reported going to school during the year of the survey (preschool, primary, or secondary). It is a gross attendance rate, because it includes all children regardless of whether they are attending the appropriate level of education for their age. It does not control for attrition levels or the quality of education, which can vary substantially. Further indicators would be needed to incorporate these important aspects of children's right to education, where starker inequalities could be present.

Several factors can restrict access to education for some children. The affordability of education, social and cultural barriers, social stigmatization, and disability are among the most salient (UNESCO 2010). Physical barriers and lack of infrastructure may also limit access to education for some. For example, as a consequence of the Syrian crisis, two million children had to leave school because of bombing or displacement (Watkins 2013). Even in more stable situations, physical barriers can still play a role. Reducing distance to school, for example, had a significant effect in increasing girls' attendance in secondary schools in rural Tanzania, although it had less of an impact for boys (Burke and Beegle 2004). In fact, inequalities in education have a strong relationship with differences between groups (by wealth, ethnicity, or location) and gender, which often overlap.[15] Commonly cited barriers to school attendance, such as disability and distance to

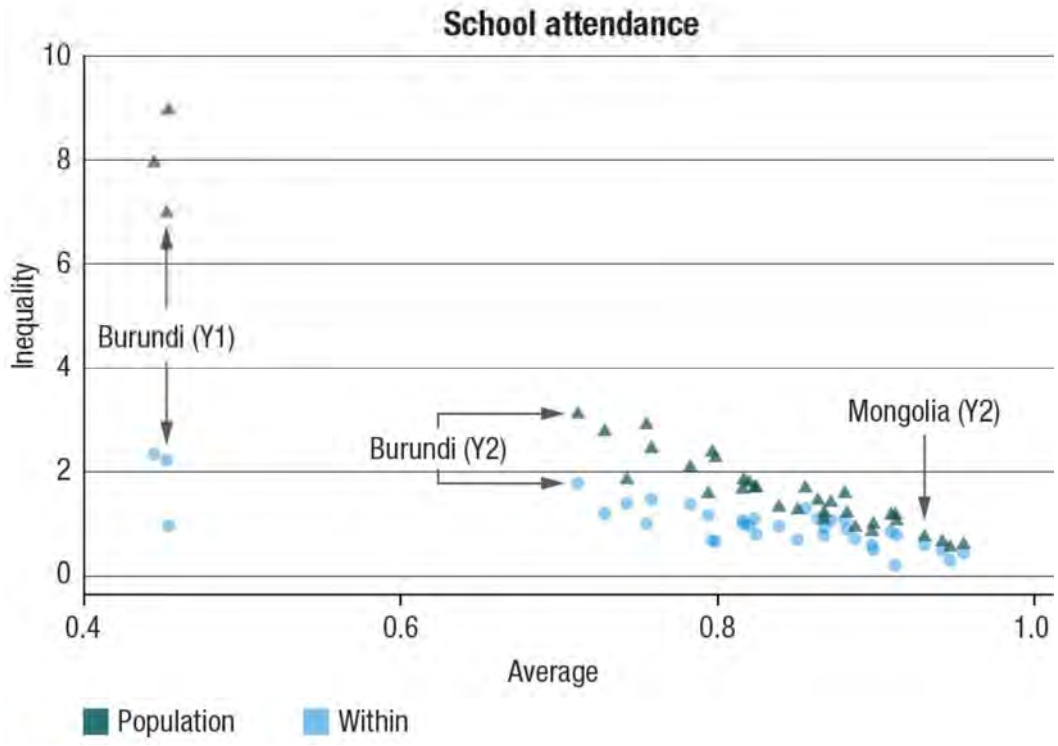
[15] For data on this type of inequality, see the World Inequality Database on Education (UNESCO 2014).

school, are more relevant for some groups than for others. For example, Rousso (2003) found that in terms of school attendance, disabilities tend to be less important for boys than for girls—a result of the way they interact with perceptions about gender roles and the lower value that parents place on their girls' education.

On average, school attendance exceeds 80 per cent for both boys and girls for the 18 countries with data, but again the range is wide across the sample. For boys, the range is from 44 per cent in Gambia to 96 per cent in Cameroon, while for girls the range is from 45 to 94 per cent for the same two countries, respectively. In half the number of countries school attendance rates increase between the two periods for girls and boys alike. Just over one-third of the households have some bias in the distribution of schooling and, interestingly, in nearly all countries most households favour girls (see Figure 7).

When there is less deprivation (i.e. higher school attendance), total and within-household inequality are lower in absolute terms (the case of Mongolia in Figure 6). In countries with lower average rates of school attendance, such as Burundi, within-household inequality is more of a problem. However when deprivations are low, intra-household inequality accounts for a greater share of total inequality, even if its absolute magnitude is smaller. This suggests that even if average deprivation is low, within-household inequality can be the main barrier to closing the gap and ensuring schooling for all children.

Figure 6: Average levels and inequality in school attendance

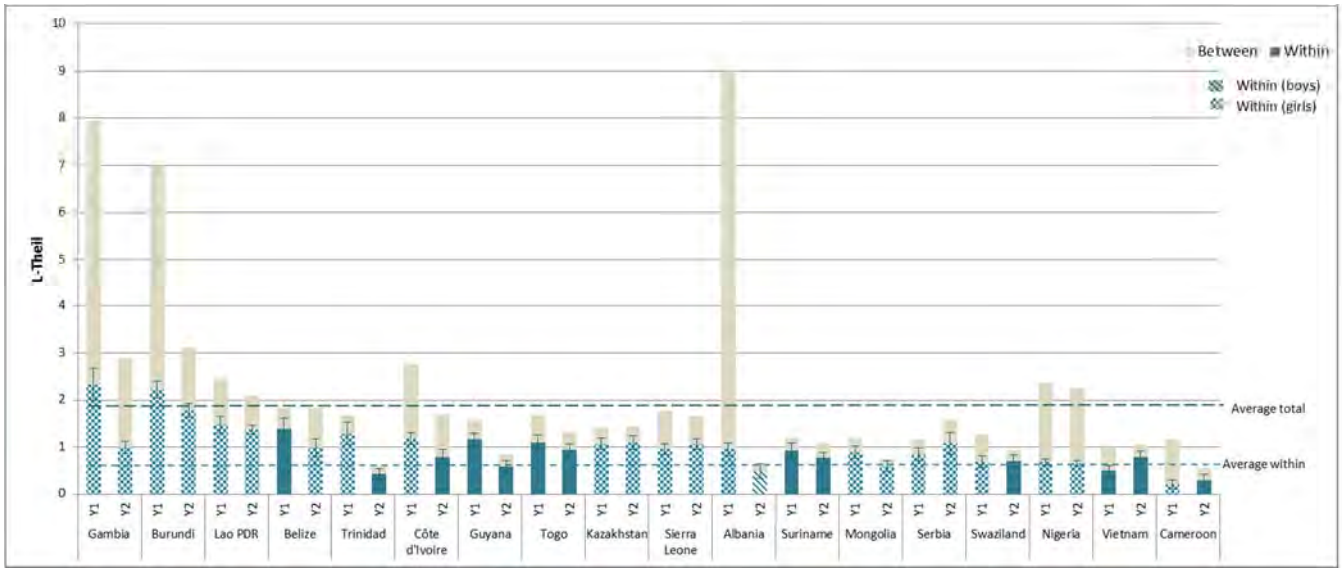



Source: Author's calculation based on MICS data.

In fact, for this indicator, the ratio of between- to within-household inequality is 0.70, meaning that the within-household component accounts for a greater share of the total inequality (59 per cent on average). For all but three countries (Nigeria, Burundi, and Gambia), the within-household component is the largest contribution to inequality in at least one period.

On average, total inequality falls over the two periods. In 11 of the 18 countries with schooling data, overall inequality decreases (Figure 7).[16] In one country (Serbia) inequality rises between the two periods of time, while for the remaining countries the change is not statistically significant. Thus, the distribution of inequality changes with the general increases in school attendance across the countries. Within-household inequality falls in seven countries (Albania, Burundi, Côte d'Ivoire, Trinidad and Tobago, Mongolia, Guyana, and Gambia), all of which also show reduced overall inequality, but significantly increases in one country (Vietnam), where the ratio of between- to within-household inequality is higher in the first period and falls in the second period as the within-household contribution increases from 54 to 63 per cent. The changes in within-household inequality are statistically insignificant in the remaining ten countries.

Figure 7: Inequality decomposition of school attendance




Source: Author's calculation based on MICS data.

### 3.4 Working hours (economic, domestic, and chores)

Many children engage in work activities. Some work to 'help their families in ways that are neither harmful nor exploitative, but others are put to work in ways that interfere with their education, drain their childhood of joy and crush their right to normal physical and mental development' (UNICEF 2014). Education and leisure form part of children's fundamental rights: regardless of whether or not the activity produces economic value, both paid and unpaid work and household chores such as cooking, cleaning, or caring for other children are a drain on the time children have to learn and play. The term 'work' is used hereafter to refer to the sum of the time spent doing economic work, domestic work, and chores.

Child labour is typically measured in terms of the number of hours a child is engaged in economic activity, and the thresholds to classify work as child labour vary with children's age. However, such cut-offs can be arbitrary. They carry assumptions about an ideal minimum age of work as well as the amount of time children should have free for education and leisure. For this reason, this study

[16] The large jumps in between-household inequality in Albania, Gambia, and Burundi can be explained by the behaviour of extreme cases—that is, cases where no children are in school. In the second year, there is a large reduction in these cases, which can be a result of either progress in the dimension or measurement error at the time of collecting the survey.

does not use this definition of child labour to measure whether there is inequality in this respect, preferring instead to measure it by the total number of hours that children spend on these activities.

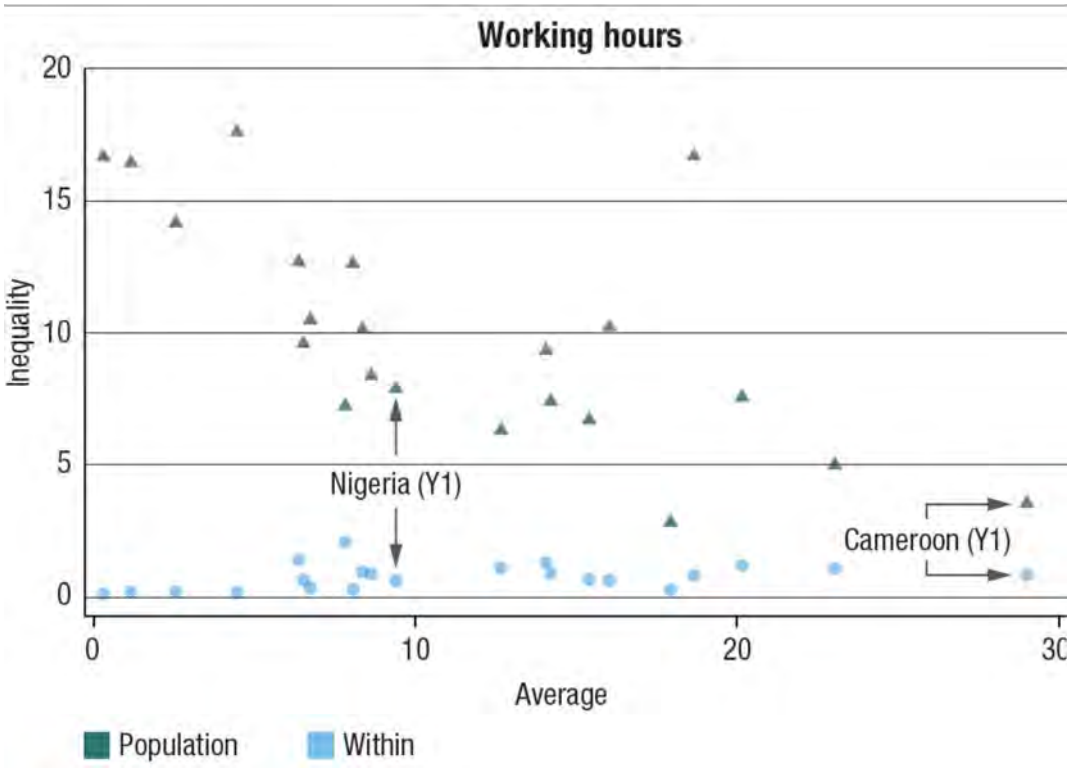
On average, across all 11 countries girls spend more hours a week (12.2 hours) working and doing chores compared to boys (10.7 hours),[17] but this includes countries like Suriname, where boys and girls alike work only 0.31 hours a week, and Cameroon, where boys spend more than 26 hours and girls more than 31 hours each week working.

In Togo and Côte d'Ivoire there is a bias against girls, who work more hours than boys in both periods. In Nigeria and Gambia, there is no difference in the time girls and boys spend working in the first period, but there is a bias against girls in the second period. In more than half the number of the countries, the time that children (both girls and boys) spend working reduces in both periods. In Nigeria the reduction is only significant for boys, while in Gambia there is an increase in the average number of hours that girls work (more than three hours per week). For this indicator the parity levels inside the households are the lowest. Just over one-third (34 per cent) of households have parity in the time boys and girls spend working. In all countries in the sample, the largest share of households favour boys (see Figure 9). On average, across all countries and periods, girls spend less time working or doing chores in only 14 per cent of the households, while boys spend less time in 52 per cent of households.

Working hours follow a similar pattern to stunting. The higher the average number of hours worked by children, the lower the total inequality, but within-household inequality is of a fairly similar magnitude across countries (Figure 8). For example, while total inequality is much lower in Cameroon than in Nigeria, intra-household inequality is of a similar absolute magnitude in both countries. In relative terms, the share of intra-household inequality seems to be large in countries where children work more hours.

[17] These averages include girls and boys who do not engage in work or chores at all (zero hours a week). The average number of working hours is 19.8 for boys and 20.5 for girls.

Figure 8: Average levels and inequality in working hours



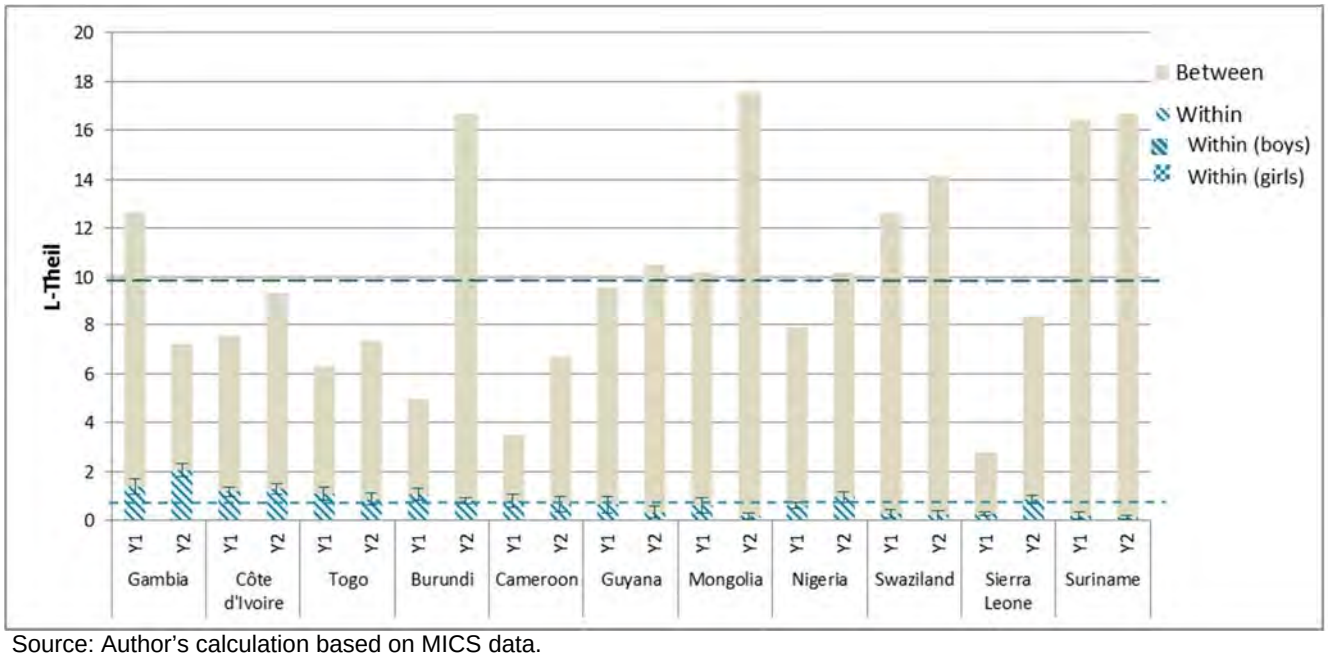

Source: Author's calculation based on MICS data.

Despite the low level of parity—a large share of households show a bias in the time boys and girls spend working—most of the inequality in working hours is accounted for by inequality across households; only 10 per cent of inequality occurs within them. For this indicator, other group-based inequalities, such as location (urban/rural) and poverty levels may be more important in explaining inequalities. This difference between the bias indicator and the decomposition of the index is because the latter captures not only whether households favour certain children but also the number of hours by which one group works more than the other. The ratio of between- to within-household inequality is above one for all countries and periods.

Although the number of working hours decreases over the two periods, inequality increases slightly. The Theil index on average is 8.6 in the first year and 11.3 in the second. In fact, total inequality increases in seven of the 11 countries and decreases only in one (Gambia). Within-household inequality does not change significantly in most countries: it increases in Sierra Leone and Gambia and decreases in Mongolia (Figure 9).[18] In Burundi and Cameroon, the ratios are below for in the first period but increase substantially in the second, indicating a fall in the within-household component of inequality. In contrast, in Gambia, the within-household component of inequality relatively increases and the ratio falls from 8 to 2.5. This could be due to measurement problems (see note 18).

[18] The large jumps in between-household inequality in Burundi and Mongolia can be explained by the behaviour of extreme cases, that is, cases where children work zero hours. In the second year, there is a large increase in these cases, which can be a result of either progress in the dimension or measurement error at the time of collecting the survey.

Figure 9: Inequality decomposition of working hours




Source: Author's calculation based on MICS data.

Table 2: Inequality in stunting (15 countries)

| | Kazakhstan | | | Nigeria | | | Albania | | | Bosnia and Herzegovina | | | Togo | | | Suriname | | Belize | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Absolute* | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2^ | | Y1 | Y2^ | | Y1 | Y2 | | Y1 | Y2 | Y1 | Y2 |
| Within | 1.76 | 1.56 | | 2.74 | 2.53 | | 2.55 | 3.09 | | 1.00 | 0.85 | | 2.72 | 2.77 | | 1.12 | 1.00 | 2.21 | 2.09 |
| Population | 12.93 | 13.89 | * | 10.77 | 9.97 | * | 9.02 | 11.20 | * | 13.55 | 14.42 | * | 12.06 | 10.62 | * | 14.00 | 14.06 | 12.00 | 12.28 |
| *Relative* | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2^ | | Y1 | Y2^ | | Y1 | Y2 | | Y1 | Y2 | Y1 | Y2 |
| Share of within | 0.14 | 0.11 | | 0.25 | 0.25 | | 0.28 | 0.28 | | 0.07 | 0.06 | | 0.23 | 0.26 | | 0.08 | 0.07 | 0.18 | 0.17 |

| | Iraq | | | Lao | | Mongolia | | | Serbia | | Sierra Leone | | | Swaziland | | | Guyana | | Gambia | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Absolute* | Y1 | Y2 | | Y1 | Y2 | Y1^ | Y2 | | Y1 | Y2 | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | Y1 | Y2 | |
| Within | 2.50 | 2.25 | | 3.59 | 3.12 | 2.69 | 1.66 | * | 1.10 | 0.55 | 3.20 | 3.30 | | 2.90 | 2.68 | | 1.72 | 1.63 | 2.35 | 2.79 | |
| Population | 11.18 | 11.95 | * | 8.77 | 8.55 | 11.62 | 13.58 | * | 14.15 | 14.32 | 9.72 | 8.92 | * | 9.03 | 10.54 | * | 13.42 | 12.84 | 11.63 | 10.11 | * |
| *Relative* | Y1 | Y2 | | Y1 | Y2 | Y1^ | Y2 | | Y1 | Y2 | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | Y1 | Y2 | |
| Share of within | 0.22 | 0.19 | | 0.41 | 0.37 | 0.23 | 0.12 | | 0.08 | 0.04 | 0.33 | 0.37 | | 0.32 | 0.25 | | 0.13 | 0.13 | 0.20 | 0.28 | |

| Stunting | All | Y1 | Y2 |
|---|---|---|---|
| *Absolute* | | | |
| Within | 2.20 | 2.28 | 2.13 |
| Population | 11.70 | 11.59 | 11.82 |
| *Relative* | | | |
| Within (%) | 0.20 | 0.21 | 0.20 |
| Between (%) | 0.80 | 0.79 | 0.80 |

Notes: *Indicates that the difference between boys and girls in each year is statistically significant (5%). ^ Indicates that less than 10% of the original survey observations were kept for the analysis.

Source: Author's calculation based on MICS data.

Table 3: Inequality in birth registration (19 countries)

| | Kazakhstan | | Nigeria | | | Albania | | | Burundi | | | Cameroon | | | Vietnam | | | Togo | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Absolute* | Y1 | Y2 | Y1 | Y2 | | Y1 | Y2^ | | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 |
| Within | 0.35 | 0.36 | 0.58 | 0.78 | | 0.87 | 0.38 | | 0.92 | 0.88 | | 1.76 | 1.22 | | 0.52 | 1.20 | * | 2.11 | 1.72 |
| Population | 3.54 | 3.04 | 13.96 | 13.37 | * | 2.82 | 0.59 | * | 8.86 | 6.16 | * | 9.51 | 4.74 | * | 6.88 | 5.87 | | 9.26 | 8.56 |
| *Relative* | Y1 | Y2 | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 |
| Share of within | 0.10 | 0.12 | 0.04 | 0.06 | | 0.31 | 0.65 | | 0.10 | 0.14 | | 0.18 | 0.26 | | 0.08 | 0.20 | | 0.23 | 0.20 |

| | Côte d'Ivoire | | Suriname | | Belize | | Trinidad and Tobago | | | Iraq | | | Lao | | | Mongolia | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Absolute* | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | | Y1^ | Y2 |
| Within | 1.65 | 1.72 | 1.34 | 1.40 | 1.08 | 1.47 | 0.98 | 0.27 | * | 1.01 | 0.51 | * | 0.73 | 1.74 | * | 0.90 | 0.74 |
| Population | 10.99 | 11.01 | 6.20 | 7.41 | 8.61 | 8.84 | 5.95 | 0.49 | * | 4.48 | 1.62 | * | 5.91 | 6.89 | * | 2.33 | 3.31 |
| *Relative* | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 |
| Share of within | 0.15 | 0.16 | 0.22 | 0.19 | 0.13 | 0.17 | 0.16 | 0.55 | | 0.23 | 0.31 | | 0.12 | 0.25 | | 0.38 | 0.22 |

| | Serbia | | Sierra Leone | | | Swaziland | | | Guyana | | | Gambia | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Absolute* | Y1 | Y2 | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | |
| Within | 0.57 | 0.84 | 1.44 | 1.90 | | 1.65 | 2.45 | * | 1.27 | 0.52 | * | 1.28 | 1.60 | |
| Population | 7.34 | 5.87 | 10.73 | 9.70 | * | 8.44 | 9.70 | * | 3.15 | 1.01 | * | 11.11 | 6.37 | * |
| *Relative* | Y1 | Y2 | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | |
| Share of within | 0.08 | 0.14 | 0.13 | 0.20 | | 0.20 | 0.25 | | 0.40 | 0.51 | | 0.11 | 0.25 | |

| Birth registration | All | Y1 | Y2 |
|---|---|---|---|
| *Absolute* | | | |
| Within | 1.12 | 1.11 | 1.14 |
| Population | 6.70 | 7.37 | 6.03 |
| *Relative* | | | |
| Within (%) | 0.22 | 0.17 | 0.25 |
| Between (%) | 0.78 | 0.83 | 0.75 |

Notes: *Indicates that the difference between boys and girls in each year is statistically significant (5%). ^ Indicates that less than 10% of the original survey observations were kept for the analysis.

Source: Author's calculation based on MICS data.

Table 4: Inequality in school attendance (18 countries)

| | Kazakhstan | | Nigeria | | Albania | | | Burundi | | | Cameroon | | | Vietnam | | | Togo | | | Côte d'Ivoire | | | Suriname | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Absolute* | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 |
| Within | 1.07 | 1.09 | 0.68 | 0.65 | 0.96 | 0.49 | * | 2.22 | 1.77 | * | 0.2 | 0.3 | | 0.49 | 0.78 | * | 1.1 | 0.95 | | 1.18 | 0.79 | * | 0.93 | 0.77 |
| Population | 1.4 | 1.44 | 2.37 | 2.26 | 8.97 | 0.64 | * | 6.99 | 3.10 | * | 1.17 | 0.54 | * | 0.98 | 1.04 | | 1.68 | 1.31 | * | 2.76 | 1.69 | * | 1.2 | 1.08 |
| *Relative* | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 |
| Share of within | 0.76 | 0.76 | 0.29 | 0.29 | 0.11 | 0.76 | | 0.32 | 0.57 | | 0.17 | 0.55 | | 0.50 | 0.75 | | 0.65 | 0.72 | | 0.43 | 0.47 | | 0.77 | 0.71 |

| | Belize | | Trinidad and Tobago | | | Lao | | | Mongolia | | | Serbia | | | Sierra Leone | | | Swaziland | | | Guyana | | | Gambia | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Absolute* | Y1 | Y2 | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | |
| Within | 1.38 | 0.98 | 1.29 | 0.43 | * | 1.47 | 1.37 | | 0.88 | 0.59 | * | 0.84 | 1.08 | | 0.96 | 1.06 | | 0.68 | 0.71 | | 1.16 | 0.58 | * | 2.33 | 0.99 | * |
| Population | 1.84 | 1.83 | 1.68 | 0.59 | * | 2.44 | 2.08 | * | 1.19 | 0.74 | * | 1.16 | 1.57 | * | 1.78 | 1.66 | | 1.26 | 0.92 | * | 1.57 | 0.84 | * | 7.95 | 2.89 | * |
| *Relative* | Y1 | Y2 | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | |
| Share of within | 0.75 | 0.54 | 0.77 | 0.72 | | 0.60 | 0.66 | | 0.74 | 0.79 | | 0.73 | 0.68 | | 0.54 | 0.64 | | 0.54 | 0.76 | | 0.74 | 0.69 | | 0.29 | 0.34 | |

| School attendance | All | Y1 | Y2 |
|---|---|---|---|
| *Absolute* | | | |
| Within | 0.98 | 1.10 | 0.85 |
| Population | 2.07 | 2.69 | 1.46 |
| *Relative* | | | |
| Within (%) | 0.59 | 0.54 | 0.63 |
| Between (%) | 0.41 | 0.46 | 0.37 |

Notes: *Indicates that the difference between boys and girls in each year is statistically significant (5%).

Source: Author's calculation based on MICS data.

Table 5: Inequality in economic or domestic working hours (11 countries)

| | Nigeria | | | Burundi | | | Cameroon | | | Togo | | | Côte d'Ivoire | | | Suriname | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Absolute* | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | | Y1^ | Y2^ |
| Within | 0.61 | 0.93 | | 1.07 | 0.81 | | 0.82 | 0.66 | | 1.10 | 0.88 | | 1.18 | 1.28 | | 0.20 | 0.13 |
| Population | 7.88 | 10.14 | * | 4.97 | 16.68 | * | 3.53 | 6.69 | * | 6.29 | 7.38 | * | 7.54 | 9.35 | * | 16.43 | 16.66 |
| *Relative* | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | | Y1^ | Y2^ |
| Share of within | 0.08 | 0.09 | | 0.22 | 0.05 | | 0.23 | 0.10 | | 0.17 | 0.12 | | 0.16 | 0.14 | | 0.01 | 0.01 |

| | Mongolia | | | Sierra Leone | | | Swaziland | | Guyana | | Gambia | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Absolute* | Y1^ | Y2^ | | Y1 | Y2 | | Y1^ | Y2^ | Y1 | Y2 | Y1 | Y2 | |
| Within | 0.63 | 0.17 | * | 0.28 | 0.86 | * | 0.28 | 0.21 | 0.65 | 0.34 | 1.40 | 2.06 | * |
| Population | 10.23 | 17.59 | * | 2.81 | 8.39 | * | 12.62 | 14.16 | 9.60 | 10.50 | 12.69 | 7.21 | * |
| *Relative* | Y1^ | Y2^ | | Y1 | Y2 | | Y1^ | Y2^ | Y1 | Y2 | Y1 | Y2 | |
| Share of within | 0.06 | 0.01 | | 0.10 | 0.10 | | 0.02 | 0.02 | 0.07 | 0.03 | 0.11 | 0.29 | |

| Working hours | All | Y1 | Y2 |
|---|---|---|---|
| Absolute | | | |
| Within | 0.75 | 0.75 | 0.76 |
| Population | 9.97 | 8.60 | 11.34 |
| Relative | | | |
| Within (%) | 0.10 | 0.11 | 0.09 |
| Between (%) | 0.90 | 0.89 | 0.91 |

Notes: *Indicates that the difference between boys and girls in each year is statistically significant (5%).

^ Indicates that less than 10% of the original survey observations were kept for the analysis.

Source: Author's calculation based on MICS data.

## 3.5 Intra-household inequality as a barrier to 'get to zero'

Although the sample of countries and indicators is limited in many respects, the analysis of household survey data for 20 countries is illustrative of the presence of inequalities in four dimensions of child rights and well-being. Analysing when such differences exist within households in the realization of children rights is an important aspect of identifying the barriers to 'getting to zero' and eliminating child poverty.

The analysis of the four variables of child well-being used here shows that small aggregate differences between girls and boys obscure other inequalities. In the aggregate, inequality is particularly high for stunting and working hours and lowest for school attendance. The decomposition of the inequality index (L-Theil) shows that a large amount of inequality occurs within households, but with significant variation by country and indicator. In some areas, mainly work time, inequality occurs mostly between households. In contrast, inequalities inside households are particularly high for school attendance. They account for more than half of total inequality in 11 out 18 of countries, and in a further four countries for more than half of total inequality in at least one of the periods. Within-household inequality in stunting and birth registration accounts for around one-fifth of total inequality on average for both periods.

The results show that intra-household inequality represents between 9 and 63 per cent of total inequality across the four indicators when looking at averages across all countries. The variability by countries and years is high: the contribution of intra-household inequality is lowest in Suriname and Mongolia (1 per cent in the distribution of work time), and highest in Albania (89 per cent in the distribution of school attendance in the first period).

Table 6 shows a summary of how the levels of total and within-household inequality evolve with higher levels of well-being. Intra-household inequality is an issue for countries even when total inequality is low. Moreover, even where progress raises average levels of child well-being considerably, within-household inequalities are increasingly important in relative terms, accounting for a greater share of total inequality in birth registration and school attendance. For example, in schooling, where deprivations are relatively low, the residual gaps are mainly within households rather than across them, highlighting once again the relevance of addressing this type of inequality. This means it is not possible to eliminate child poverty and secure the rights of all children unless disparities within households are addressed. For stunting and especially for working hours, within-household inequalities are less important in both absolute and relative terms when deprivations are low.

Table 6: Direction of inequality with higher levels of well-being

| Indicator | Total inequality | Within-household inequality (absolute) | Share of within-household inequality (relative) |
|---|---|---|---|
| Stunting | ↑ | ↓ | ↓ |
| Birth registration | ↓ | ↔ | ↑ |
| School attendance | ↓ | ↓ | ↑ |
| Working hours | ↑ | ↔ | ↓ |

Source: Author's interpretation based on observations and analysis.

## 3.6 Is there evidence of systematic bias against boys or girls? When is intra-household inequality higher?

Sub-sections 3.1–3.4 presented a detailed analysis of inequality for each indicator separately. As this study further aims to show whether intra-household inequalities are systematically present, it is important to also analyse their joint distribution: in other words, to see whether households tend

to favour girls (or boys) in all areas of well-being, or rather to compensate underinvestment in one area with overinvestment in another, for example, as Estudillo et al. (2001) found in the Philippines.

The previous analysis by indicator shows that for most countries some households tend to favour girls and others, boys, and that the share of households in each country that does one or the other is similar. Thus, at the country level, there is little evidence of a systematic bias against either gender. However, it is still possible that the households that have a bias for boys in nutrition, for example, are also the same households that favour boys in birth registration, schooling, and working hours: that is, within households there is a systematic bias towards one gender. The share of households that favour girls or boys is used in this section to investigate these patterns.

A measure of association for each pairing of indicators (*P* statistic) is calculated. Given that the sample size is reduced with each additional indicator,[19] it is not possible to analyse joint distributions for combinations of three or all four indicators at the same time.

Table 7 shows the cross-tabulation used to compute association measures between stunting and birth registration for the whole sample of countries. All other cross-tabulations are presented in Appendix 5. Out of all 27,394 households, 420 (1.5 per cent) have a bias for girls in both stunting and birth registration. This may be a low proportion of the total possible cases, but it is a bigger proportion (20.1 per cent) of the total possible 'match' cases—that is, the cases where there is a bias for girls (2090 households in this example). The *P* statistic captures this relationship. In contrast, a more commonly used indicator to measure the intercorrelation of two discrete variables—Cramer's *V*—uses all the information in the matrix, the 'matches' and the 'mismatches'. This indicates (1) whether a bias for boys in stunting is matched with a bias for boys in working hours, (2) whether the bias for girls in stunting is matched with a bias for girls in working hours, (3) whether the non-bias for any gender in stunting matches with a non-bias in working hours, and (4) the cases where there is no match at all.[20] This is why the *P* statistic tends to be higher than Cramer's *V* and is more useful for the subsequent analysis. Because some of the indicators are only relevant and/or available for children of certain age ranges, only the information for those households with observations for each pairwise combination of indicators is used.

Table 7: Cross-tabulation of stunting and birth registration

| Stunting / Birth registration | None | Bias for boys | Bias for girls | Total |
|---|---|---|---|---|
| None | 15,099 (55.12) | 1233 (4.5) | 1200 (4.38) | 17,532 (64) |
| Bias for boys | 3854 (14.07) | 384 (1.4) | 470 (1.72) | 4708 (17.19) |
| Bias for girls | 4268 (15.58) | 466 (1.7) | 420 (1.53) | 5154 (18.81) |
| Total | 23,221 (84.77) | 2083 (7.6) | 2090 (7.63) | 27,394 (100) |

Note: Figures in parentheses are percentages.

Source: Author's calculation based on MICS data.

Table 8 shows the results of this exercise. Starting with the households that have a bias for boys, 48 per cent of households that tend to favour boys over girls in terms of nutrition (stunting) also favour them in terms of school attendance. For both birth registration and school attendance, 37 per cent of households favour boys. The proportion of households that favour boys in stunting and working hours, school attendance and working hours, and stunting and birth registration is in

[19] For example, to analyse the joint distribution of stunting and birth registration, only households with data on both indicators are used. Given that some indicators are only relevant or collected for children in certain age ranges, this can considerably reduce the sample size with an increasing number of indicators.

[20] For a more detailed explanation, see Alkire et al. (2013b).

the range of 20–30 per cent of households. The lowest degree of association is found in households that favour boys in birth registration and working hours (17 per cent).

On the other hand, a large proportion of households (over half the number in each case) favour girls in nutrition and working hours, work time and school attendance, and birth registration and working hours. Of households that favour girls, 32 per cent favour them in nutrition and school attendance, 24 per cent favour girls in birth registration and school attendance, and 18 per cent in nutrition and birth registration.

In summary, in three of the six possible combinations of indicators, households show a preference for boys, and in the other three cases they show a preference for girls. The average across indicators shows that fewer households favour boys over girls in two indicators at the time. However, these results vary widely across countries (Appendix 6). For example, take the case of the positive bias for boys in stunting and school attendance. With the pool of observations from all countries, the *P* statistic is 0.48, but this ranges from 0.27 in Swaziland to 0.70 in Albania. Similarly, the bias for girls in nutrition and work time ranges from 0.37 in Guyana to a very high 0.83 in Suriname. In Kazakhstan, Albania, Belize, Lao PDR, Trinidad, Vietnam, and Iraq most pairings favour boys, while in Burundi, Cameroon, Côte d'Ivoire, Gambia, Mongolia, and Togo most favour girls. In Guyana, Nigeria, Serbia, Sierra Leone, Suriname, and Swaziland the same number of pairings favour girls and boys.

Table 8: Measures of association

| Variables | Cramer's *V* | *P* statistic for boys | P statistic for girls |
|---|---|---|---|
| Stunting / birth registration | 0.039 | 0.201 | 0.184 |
| Stunting / school attendance | 0.070 | 0.481 | 0.322 |
| Stunting / working hours | 0.041 | 0.275 | 0.556 |
| Birth registration / school attendance | 0.021 | 0.366 | 0.240 |
| Birth registration / working hours | 0.018 | 0.168 | 0.515 |
| School attendance / working hours | 0.067 | 0.231 | 0.543 |
| Average | | 0.287 | 0.393 |

Note: Underlined values show whether the P statistic is higher for boys or girls.

Source: Author's calculation based on MICS data.

As mentioned in the Introduction, previous studies have produced varying evidence on intra-household distributions and the directions of biases, and this study seems to confirm the evidence. In particular, it is possible that some household characteristics are systematically associated with a more unequal distribution of resources between boys and girls. For example, there is some evidence that female-headed households prioritize investments in children to a greater extent than households headed by men (Chant 2007), and that mothers' education increases equal outcomes in children's education (Dercon and Singh 2013). However, it is likely that these patterns vary across countries and indicators of child well-being. The variability in intra-household inequality across countries indicators found in this study suggests that biases may respond to different aspects in different countries.

The household characteristics associated with more intra-household inequality depend on the country context and may relate to different social gender norms and household institutions.[21] A

[21] In addition, as an exploratory exercise the observations for all countries with available data in this study were pooled and a simple OLS regression was carried out with country fixed effects to see whether some types of households would be more prone to certain intra-household inequalities (as measured by the ratios of girl-to-boy achievements as the dependent variable). Unfortunately, the limited availability of comparable information across surveys constrained the selection of explanatory variables, which included the number of children in the household, the gender of the head of the household, a household wealth index, and the household's location in a rural or urban area. The explanatory power of these regressions was generally very low, indicating that many unexplained factors influence

more in-depth analysis would be needed to uncover the specific characteristics that drive intra-household inequalities in each of the dimensions of child well-being presented in this study.

## 4 Discussion and conclusions

Progress in improving child well-being has occurred across the globe and in many dimensions (UNICEF 2014). However, the way in which progress happens may not be equitable and the patterns of inequality vary across dimensions of well-being. This working paper provides an innovative methodological approach to measuring the extent of intra-household inequalities, presenting a broader picture of child well-being and its distribution. In all indicators of child well-being there have been improvements, but the patterns of distribution that emerge from these improvements are very different. Overall, the paper advances five main findings.

First, assessing inequality, and in particular that which occurs within households, is important, even in the context of country progress towards the realization of child rights and well-being. When comparing averages between girls and boys, while small differences are noted in many areas of well-being, some important disparities remain. Across the sampled countries (11–19 depending on the indicator), the average Gini coefficient for school attendance is 0.18; it is 0.42 for birth registration, 0.71 for working hours, and 0.76 for stunting. To close the gap between girls and boys, it is important to know where these disparities are located.

Second, by using a decomposable measure of inequality (i.e. the Theil index) it is shown that significant inequalities occur within households. Between-household inequality in malnutrition, birth registration, and working hours is relatively large and contributes to an increase in total inequality. For these indicators, addressing barriers across households appears to be a priority for closing the gap in child well-being.

Third, intra-household inequalities, however, might still be considered a priority, even when they are smaller in absolute terms. Although the relatively small timeframe (around five years) and country samples are perhaps insufficient to capture long-term global trends in inequality, looking at how inequality stands for countries at different levels of well-being can be illustrative of trends. Where average levels of child well-being increase and total inequality falls, within-household inequalities are more important in relative terms, accounting for a larger share of the total inequality. For example, the analysis shows that intra-household inequality in birth registration and school attendance tends to be higher in countries where total inequality is lower, suggesting that the gaps more difficult to address may be located inside households. For school attendance, more than half of the existing inequality between boys and girls occurs inside the household, even though there has been impressive progress in increasing schooling. These results indicate that it is not possible to eliminate child poverty and secure the rights of all children unless disparities within households are addressed.

Fourth, it is striking that, contrary to popular belief, disparities inside households do not show a clear bias towards one or the other gender and the direction of the bias is not the same across indicators of well-being. For example, in stunting and birth registration, a similar proportion of households have a bias for girls or boys; in school attendance, most households tend to favour girls; and in working hours, most favour boys. Moreover, when looking at pairs of indicators, in

inequalities at the household level, and that, even when controlling for country-specific characteristics, there is little at the cross-country level that can comprehensively explain intra-household inequalities.

three of the possible combinations the majority of households show a preference for girls, and in the remaining three combinations a preference for boys.

Fifth, the gender bias is varied across countries. This pattern has been found elsewhere (e.g. Dercon and Singh 2013) and suggests that biases respond to different social norms and household institutions in different countries. Additional data, which allows for distributional analysis at the household level, is needed to examine how these patterns behave for additional dimensions of well-being. The varying and sometimes large amount of intra-household inequality found in most countries poses difficulties for policy-making. Interventions may need to be targeted more specifically at individuals or sub-groups within households rather than at households in general (Haddad and Kanbur 1992; Roemling and Qiam 2012; Sahn and Younger 2009).

For all areas of well-being, focusing on those children who are most disadvantaged seems key to closing the gap and addressing inequalities. However, to understand the causes of these patterns of discrimination inside households, it may be necessary to complement this research with qualitative explorations on a country basis to examine the social values and norms, as well as the economic logic that underpin these inequality patterns. Institutions and norms surrounding gender roles—patterns of inheritance, marriage, divorce, and family structure—may be behind the varying degree and direction of some of the intra-household inequality biases. Yet, these are likely to differ across countries. A more in-depth analysis is needed to uncover the specific characteristics that drive intra-household inequalities in each of the countries analysed for this study. Quantitative analysis to examine what drives intra-household inequality on a cross-country basis could contribute to future research.

Progress in improving child well-being has occurred across the globe in many dimensions, but the neglect of intra-household inequalities affects the assessment of the levels of poverty, and could lead to a skewed view of the patterns of progress. This paper provides an innovative methodological approach to measuring the extent of intra-household inequalities, presenting a broader picture of child well-being and its distribution. Examining and tackling the differences that occur within households is important for ensuring children's well-being and the realization of their rights. Interventions to address inequalities in child well-being may need to be targeted at individual children as well as at the household level, but the appropriate response will vary depending on the country context.

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## Appendices

### Appendix 1: Indicators

The indicators and definitions follow as closely as possible those used by UNICEF for global reporting.[22]

- Stunting: Children under five years of age whose height-for-age is below minus two standard deviations (moderate and severe) from the median height-for-age of the reference population.
- Birth registration: Children less than five years of age (0–59 months) whose births were registered; that is, whose birth certificate was seen by the interviewer or whose mother or caretaker says the birth has been registered.
- School attendance: Children of primary and secondary school age attending primary school, secondary school, or a higher level[23] plus children 36-59 months (3 to 5 years) that attend some form of early childhood education programme.
- Working hours: Number of hours per week of economic work (paid or unpaid work outside the household), of domestic work (work in the family farm or business and/or inside the household), and of chores.

[22] See www.childinfo.org/mics4_questionnaire.html.

[23] The standard definition of the primary attendance rate would exclude children in secondary school and thus slightly underestimate the actual level of participation in the education system. The modified definitions have been applied in the 2006 WHO standards and a later edition of UNICEF's 'State of the World's Children' (2014).

## Appendix 2: Country sample

| Country | Year of fieldwork |
|---|---|
| Albania | 2000 / 2005 |
| Bosnia and Herzegovina | 2006 / 2011 |
| Belize | 2006 / 2011 |
| Burundi | 2000 / 2005 |
| Cameroon | 2000 / 2006 |
| Côte d'Ivoire | 2000 / 2006 |
| Gambia | 2000 / 2005–06 |
| Guyana | 2000 / 2006–07 |
| Iraq | 2006 / 2011 |
| Kazakhstan | 2006 / 2010–11 |
| Lao People's Democratic Republic (PDR) | 2000 / 2006 |
| Mongolia | 2000 / 2005 |
| Nigeria | 2007 / 2011 |
| Serbia | 2005–06 / 2010 |
| Sierra Leone | 2005 / 2010 |
| Suriname | 2006 / 2010 |
| Swaziland | 2000 / 2010 |
| Togo | 2000 / 2006 |
| Trinidad and Tobago | 2000 / 2006 |
| Vietnam | 2006 / 2010–11 |

## Appendix 3: Direction of the bias within households

Table A1: Share of households by favoured gender

(a) Stunting (% of households)

| Bias | Kazakhstan | | Albania | | Belize | | Bosnia and Herzegovina | | Gambia | | Guyana | | Lao PDR | | Mongolia | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 |
| None | 76.9 | 81.1 | 63.7 | 62.9 | 68.2 | 71.9 | 80.3 | 90.0 | 67.3 | 57.2 | 77.2 | 77.8 | 50.2 | 55.7 | 66.5 | 79.1 |
| Boys | 10.6 | 10.7 | 20.4 | 16.6 | 15.3 | 18.1 | 8.9 | 4.2 | 14.9 | 19.0 | 12.0 | 10.1 | 27.0 | 22.2 | 17.0 | 11.2 |
| Girls | 12.5 | 8.3 | 15.9 | 20.6 | 16.5 | 9.9 | 10.8 | 5.8 | 17.8 | 23.8 | 10.9 | 12.1 | 22.9 | 22.1 | 16.5 | 9.7 |
| Probability > *F* | 0.4 | 0.2 | 0.4 | 0.6 | 0.8 | 0.0 | 0.6 | 0.5 | 0.3 | 0.0 | 0.7 | 0.5 | 0.2 | 1.0 | 0.9 | 0.6 |

| Bias | Nigeria | | Serbia | | Sierra Leone | | Suriname | | Swaziland | | Togo | | Iraq | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 |
| None | 61.7 | 61.6 | 86.6 | 93.2 | 52.0 | 52.5 | 85.1 | 87.9 | 51.5 | 58.8 | 65.2 | 61.6 | 63.5 | 68.0 |
| Boys | 18.0 | 18.5 | 6.3 | 2.5 | 24.5 | 20.7 | 6.4 | 4.7 | 21.1 | 20.1 | 17.0 | 16.9 | 17.2 | 15.7 |
| Girls | 20.3 | 19.9 | 7.1 | 4.3 | 23.6 | 26.8 | 8.5 | 7.4 | 27.4 | 21.1 | 17.7 | 21.5 | 19.3 | 16.3 |
| Probability > *F* | 0.2 | 0.3 | 0.7 | 0.3 | 0.7 | 0.0 | 0.4 | 0.2 | 0.0 | 0.8 | 0.8 | 0.1 | 0.2 | 0.6 |

| Bias | All | Y1 | Y2 |
|---|---|---|---|
| None | 69.2 | 66.9 | 70.3 |
| Boys | 14.9 | 16.0 | 14.3 |
| Girls | 15.9 | 17.0 | 15.5 |

(b) Birth registration (% of households)

| Bias | Kazakhstan | | Albania | | Belize | | Burundi | | Cameroon | | Côte d'Ivoire | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 |
| None | 94.3 | 95.0 | 90.0 | 92.9 | 82.9 | 79.8 | 87.1 | 87.7 | 71.3 | 81.0 | 74.5 | 72.8 |
| Boys | 3.4 | 2.6 | 3.5 | 7.1 | 6.3 | 8.3 | 7.1 | 6.4 | 13.0 | 10.1 | 12.0 | 13.4 |
| Girls | 2.4 | 2.4 | 6.5 | 0.0 | 10.8 | 11.9 | 5.8 | 5.8 | 15.7 | 8.9 | 13.4 | 13.8 |
| Probability > *F* | 0.4155 | 0.8823 | 0.3224 | 0 | 0.2375 | 0.2508 | 0.4466 | 0.6324 | 0.2606 | 0.4546 | 0.3486 | 0.8273 |

| Bias | Gambia | | Guyana | | Lao PDR | | Mongolia | | Nigeria | | Serbia | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 |
| None | 77.4 | 67.7 | 77.5 | 89.6 | 88.1 | 75.1 | 88.2 | 90.9 | 91.9 | 88.8 | 90.9 | 88.9 |
| Boys | 13.1 | 15.8 | 9.0 | 2.5 | 5.2 | 12.2 | 6.3 | 4.4 | 4.0 | 5.3 | 2.8 | 4.3 |
| Girls | 9.5 | 16.5 | 13.5 | 7.8 | 6.7 | 12.6 | 5.5 | 4.6 | 4.1 | 6.0 | 6.3 | 6.8 |
| Probability > *F* | 0.1795 | 0.6732 | 0.1819 | 0.0076 | 0.3733 | 0.8 | 0.7087 | 0.9082 | 0.8805 | 0.4412 | 0.0447 | 0.3967 |

| Bias | Sierra Leone | | Suriname | | Swaziland | | Togo | | Trinidad and Tobago | | Vietnam | | Iraq | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 |
| None | 74.9 | 73.0 | 78.8 | 80.3 | 69.1 | 63.8 | 69.7 | 75.2 | 81.6 | 90.7 | 71.9 | 84.5 | 83.1 | 89.3 |
| Boys | 9.9 | 14.2 | 10.1 | 13.3 | 17.0 | 18.0 | 16.5 | 11.1 | 7.0 | 3.3 | 14.5 | 7.0 | 9.0 | 5.4 |
| Girls | 15.3 | 12.8 | 11.0 | 6.4 | 13.9 | 18.2 | 13.8 | 13.8 | 11.4 | 6.0 | 13.6 | 8.5 | 7.9 | 5.3 |
| Probability > *F* | 0.0054 | 0.4732 | 0.7524 | 0.01 | 0.2028 | 0.9503 | 0.3354 | 0.2059 | 0.2772 | 0.2799 | 0.7685 | 0.5743 | 0.2492 | 0.7952 |

| Bias | All | Y1 | Y2 |
|---|---|---|---|
| None | 81.9 | 80.9 | 82.5 |
| Boys | 8.8 | 9.2 | 8.6 |
| Girls | 9.3 | 10.0 | 8.8 |

(c) School attendance (% of households)

| Bias | Kazakhstan | | Albania | | Belize | | Burundi | | Cameroon | | Côte d'Ivoire | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 |
| None | 71.0 | 70.9 | 71.0 | 84.2 | 45.8 | 63.4 | 37.3 | 36.2 | 84.9 | 88.7 | 43.3 | 62.3 |
| Boys | 12.0 | 11.3 | 8.6 | 10.2 | 25.9 | 16.1 | 26.3 | 28.9 | 4.7 | 5.8 | 26.3 | 18.9 |
| Girls | 17.0 | 17.8 | 20.4 | 5.6 | 28.4 | 20.5 | 36.4 | 34.9 | 10.4 | 5.6 | 30.4 | 18.8 |
| Probability > *F* | 0.0002 | 0 | 0 | 0.0123 | 0.4283 | 0.0448 | 0 | 0.0016 | 0.0001 | 0.8177 | 0.009 | 0.987 |

| Bias | Gambia | | Guyana | | Lao PDR | | Mongolia | | Nigeria | | Serbia | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 |
| None | 19.5 | 56.6 | 55.3 | 74.0 | 52.0 | 57.8 | 73.2 | 83.2 | 63.5 | 66.5 | 81.2 | 76.8 |
| Boys | 18.4 | 16.7 | 21.4 | 12.2 | 22.0 | 19.5 | 8.8 | 5.6 | 13.6 | 12.6 | 7.5 | 8.7 |
| Girls | 62.1 | 26.7 | 23.3 | 13.9 | 26.0 | 22.7 | 18.0 | 11.2 | 22.9 | 20.8 | 11.4 | 14.4 |
| Probability > *F* | 0 | 0 | 0.3519 | 0.2934 | 0.0179 | 0.001 | 0 | 0 | 0 | 0 | 0 | 0.0008 |

| Bias | Sierra Leone | | Suriname | | Swaziland | | Togo | | Trinidad and Tobago | | Vietnam | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 |
| None | 59.6 | 54.6 | 68.8 | 70.2 | 63.7 | 69.5 | 58.9 | 60.0 | 69.3 | 90.3 | 80.4 | 83.2 |
| Boys | 18.6 | 19.8 | 14.6 | 14.3 | 16.4 | 14.8 | 19.4 | 19.2 | 12.0 | 4.9 | 9.4 | 7.8 |
| Girls | 21.8 | 25.5 | 16.6 | 15.5 | 19.9 | 15.8 | 21.7 | 20.7 | 18.7 | 4.8 | 10.2 | 8.9 |
| Probability > *F* | 0.0163 | 0 | 0.2396 | 0.4582 | 0.0256 | 0.5332 | 0.1658 | 0.3446 | 0 | 0.8245 | 0.1495 | 0.3382 |

| Bias | All | Y1 | Y2 |
|---|---|---|---|
| None | 65.2 | 61.0 | 69.4 |
| Boys | 14.8 | 15.9 | 13.7 |
| Girls | 20.0 | 23.1 | 16.9 |

(d) Working hour (% of households)

| Bias | Burundi | | Cameroon | | Côte d'Ivoire | | Gambia | | Guyana | | Mongolia | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 |
| None | 15.9 | 65.2 | 12.8 | 23.4 | 23.3 | 30.7 | 43.3 | 23.3 | 44.3 | 49.6 | 24.1 | 34.0 |
| Boys | 61.7 | 27.5 | 56.0 | 56.0 | 61.3 | 53.4 | 42.8 | 62.0 | 42.1 | 42.3 | 60.1 | 63.7 |
| Girls | 22.4 | 7.3 | 31.2 | 20.6 | 15.4 | 15.9 | 13.9 | 14.7 | 13.5 | 8.0 | 15.8 | 2.3 |
| Probability > *F* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| Bias | Nigeria | | Sierra Leone | | Suriname | | Swaziland | | Togo | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 |
| None | 43.7 | 30.8 | 55.7 | 27.9 | 45.6 | 47.8 | 37.4 | 34.6 | 23.9 | 17.5 |
| Boys | 38.4 | 55.6 | 28.3 | 55.8 | 51.8 | 51.6 | 52.5 | 62.4 | 55.6 | 67.2 |
| Girls | 17.9 | 13.6 | 16.0 | 16.3 | 2.6 | 0.6 | 10.1 | 3.0 | 20.5 | 15.4 |
| Probability > *F* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| Bias | All | Y1 | Y2 |
|---|---|---|---|
| None | 34.3 | 33.9 | 35.1 |
| Boys | 52.2 | 50.0 | 54.1 |
| Girls | 13.5 | 16.1 | 10.8 |

Source: Author's calculation based on Multiple Indicator Cluster Survey (MICS) data.

## Appendix 4: Summary statistics

Table A2: Average by indicators

(a) Stunting (average %)

| Bias | Kazakhstan | | | Nigeria | | Albania | | | Bosnia and Herzegovina | | Togo | | | Suriname | | Belize | | Iraq | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y1 | Y2 | ** | Y1 | Y2 | Y1 | Y2 | | Y1 | Y2 | Y1 | Y2 | | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | |
| Boys | 0.19 | 0.10 | * | 0.31 | 0.33 | 0.41 | 0.30 | | 0.12 | 0.06 | 0.24 | 0.32 | * | 0.08 | 0.07 | 0.23 | 0.17 | 0.26 | 0.20 | * |
| Girls | 0.17 | 0.13 | | 0.29 | 0.33 | 0.46 | 0.26 | * | 0.12 | 0.05 | 0.22 | 0.28 | | 0.07 | 0.06 | 0.22 | 0.23 | 0.25 | 0.19 | * |
| ++ | | | | | | | | | | | | | | | | | | | | |
| *N* | 1006 | 1248 | | 5357 | 10,247 | 288 | 158 | | 714 | 403 | 1301 | 1873 | | 612 | 1053 | 254 | 522 | 6979 | 16,968 | |

| Bias | Lao | | | Mongolia | | | Serbia | | Sierra Leone | | Swaziland | | Guyana | | Gambia | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y1 | Y2 | ** | Y1 | Y2 | | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 |
| Boys | 0.41 | 0.44 | | 0.28 | 0.14 | * | 0.09 | 0.05 | 0.38 | 0.43 | 0.38 | 0.29 | 0.13 | 0.19 | 0.21 | 0.25 |
| Girls | 0.44 | 0.44 | | 0.29 | 0.16 | * | 0.08 | 0.03 | 0.37 | 0.38 | 0.30 | 0.27 | 0.13 | 0.19 | 0.16 | 0.22 |
| ++ | | | | | | | | | | | + | | | | | |
| *N* | 1250 | 3113 | | 568 | 754 | | 1053 | 693 | 1637 | 2441 | 1435 | 853 | 878 | 790 | 1546 | 3259 |

| Bias | All | Y1 | Y2 |
|---|---|---|---|
| Boys | 0.24 | 0.25 | 0.22 |
| Girls | 0.23 | 0.24 | 0.21 |

(b) Birth registration (average %)

| Bias | Kazakhstan | | | Nigeria | | | Albania | | | Burundi | | | Cameroon | | | Vietnam | | Togo | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y1 | Y2 | ** | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | Y1 | Y2 |
| Boys | 0.79 | 0.82 | | 0.13 | 0.16 | | 0.83 | 0.92 | | 0.48 | 0.63 | * | 0.38 | 0.69 | * | 0.56 | 0.63 | 0.42 | 0.44 |
| Girls | 0.79 | 0.80 | | 0.11 | 0.16 | * | 0.84 | 0.99 | * | 0.46 | 0.63 | * | 0.37 | 0.69 | * | 0.59 | 0.67 | 0.40 | 0.47 |
| ++ | | | | | | | | | | | | | | | | | | | |
| *N* | 1006 | 1248 | | 5257 | 10,224 | | 288 | 158 | | 1017 | 2193 | | 1463 | 2545 | | 706 | 547 | 1294 | 1866 |

| Bias | Côte d'Ivoire | | Suriname | | Belize | | Trinidad and Tobago | | Iraq | | | Lao | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | | Y1 | Y2 |
| Boys | 0.27 | 0.27 | 0.59 | 0.57 | 0.44 | 0.44 | 0.04 | 0.02 | 0.72 | 0.89 | * | 0.64 | 0.57 |
| Girls | 0.27 | 0.28 | 0.60 | 0.51 | 0.47 | 0.46 | 0.05 | 0.01 | 0.71 | 0.88 | * | 0.64 | 0.57 |
| ++ | | | | | | | | | | | | | |
| *N* | 3188 | 3535 | 608 | 1053 | 252 | 522 | | | 6979 | 16,968 | | 1257 | 3105 |

| Bias | Mongolia | | Serbia | | Sierra Leone | | Swaziland | | Guyana | | | Gambia | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | | Y1 | Y2 | |
| Boys | 0.85 | 0.80 | 0.55 | 0.64 | 0.33 | 0.40 | 0.44 | 0.38 | 0.76 | 0.90 | * | 0.28 | 0.53 | * |
| Girls | 0.86 | 0.81 | 0.57 | 0.67 | 0.33 | 0.37 | 0.42 | 0.36 | 0.79 | 0.95 | * | 0.27 | 0.53 | * |
| ++ | | | | | | | | | | | | | | |
| *N* | 568 | 754 | 1051 | 691 | 1625 | 2439 | 1415 | 842 | 880 | 788 | | 1536 | 3251 | |

| Bias | All | Y1 | Y2 |
|---|---|---|---|
| Boys | 0.53 | 0.50 | 0.56 |
| Girls | 0.54 | 0.50 | 0.57 |

(c) School attendance (average %)

| Bias | Kazakhstan | | | Nigeria | | | Albania | | | Burundi | | | Cameroon | | | Vietnam | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y1 | Y2 | ** | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | |
| Boys | 0.87 | 0.85 | | 0.80 | 0.80 | | 0.46 | 0.96 | * | 0.47 | 0.73 | * | 0.91 | 0.96 | * | 0.90 | 0.91 | |
| Girls | 0.87 | 0.87 | | 0.79 | 0.80 | | 0.45 | 0.92 | * | 0.43 | 0.70 | * | 0.91 | 0.94 | | 0.90 | 0.92 | |
| ++ | | | | | | | | | | | | | | | | | | |
| *N* | 5814 | 5594 | | 29,016 | 42,679 | | 2598 | 1656 | | 6417 | 12,066 | | 4903 | 11,089 | | 8097 | 4429 | |

| Bias | Togo | | | Côte d'Ivoire | | | Suriname | | | Belize | | | Trinidad and Tobago | | | Lao | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | |
| Boys | 0.84 | 0.85 | | 0.77 | 0.85 | * | 0.86 | 0.87 | | 0.73 | 0.83 | * | 0.83 | 0.96 | * | 0.78 | 0.79 | |
| Girls | 0.81 | 0.82 | | 0.69 | 0.80 | * | 0.87 | 0.87 | | 0.75 | 0.80 | * | 0.88 | 0.96 | * | 0.74 | 0.77 | * |
| ++ | | | | + | + | | | | | | | | | | | | | |
| *N* | 8802 | 9769 | | 15,725 | 13,401 | | 3751 | 5626 | | 2065 | 3371 | | 2296 | 2625 | | 8264 | 22,243 | |

| Bias | Mongolia | | | Serbia | | | Sierra Leone | | | Swaziland | | | Guyana | | | Gambia | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | |
| Boys | 0.87 | 0.92 | * | 0.92 | 0.89 | | 0.83 | 0.81 | | 0.86 | 0.89 | * | 0.79 | 0.90 | * | 0.44 | 0.75 | * |
| Girls | 0.90 | 0.94 | * | 0.90 | 0.87 | | 0.81 | 0.82 | | 0.84 | 0.88 | * | 0.80 | 0.90 | * | 0.45 | 0.76 | * |
| ++ | | | | | | | | | | | | | | | | | | |
| *N* | 4283 | 4497 | | 3193 | 1821 | | 11,304 | 17669 | | 8652 | 5652 | | 5551 | 5619 | | 7579 | 13,438 | |

| Bias | All | Y1 | Y2 |
|---|---|---|---|
| Boys | 0.82 | 0.77 | 0.86 |
| Girls | 0.81 | 0.77 | 0.85 |

(d) Work time (economic or domestic; average number of hours per week)

| Bias | Nigeria | | | Burundi | | | Cameroon | | | Togo | | Côte d'Ivoire | | | Suriname | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y1 | Y2 | ** | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | Y1 | Y2 | | Y1 | Y2 |
| Boys | 9.35 | 7.34 | * | 23.0 | 19.3 | * | 26.80 | 15.11 | * | 11.04 | 11.75 | 15.61 | 11.62 | * | 1.03 | 0.31 |
| Girls | 9.45 | 9.38 | | 23.5 | 17.3 | * | 31.22 | 15.69 | * | 14.30 | 16.68 | 24.71 | 16.49 | * | 1.30 | 0.31 |
| ++ | | + | | | | | | | | + | + | + | + | | | |
| *N* | 21,482 | 19,296 | | 2864 | 11,727 | | 3923 | 4183 | | 4913 | 4018 | 10,142 | 12,380 | | 1041 | 1734 |

| Bias | Mongolia | | | Sierra Leone | | | Swaziland | | | Guyana | | Gambia | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | | Y1 | Y2 | Y1 | Y2 | |
| Boys | 16.41 | 5.27 | * | 17.76 | 8.35 | * | 8.18 | 2.30 | * | 6.74 | 6.95 | 6.33 | 5.68 | |
| Girls | 15.64 | 3.65 | * | 18.11 | 8.90 | * | 7.93 | 2.81 | * | 6.32 | 6.53 | 6.43 | 9.97 | * |
| ++ | | | | | | | | | | | | | + | |
| *N* | 905 | 1083 | | 6594 | 7425 | | 1713 | 1108 | | 1749 | 2272 | 6705 | 11,284 | |

| Bias | All | Y1 | Y2 |
|---|---|---|---|
| Boys | 10.75 | 12.91 | 8.59 |
| Girls | 12.12 | 14.43 | 9.82 |

+ Indicates that the difference between boys and girls *in each year* is statistically significant; ++ refers to significance between rows.

*Indicates that the difference *across periods* is statistically significant for boys or girls, respectively; **refers to significance between columns.

Source: Author's calculation based on MICS data.

## Appendix 5: Cross-tabulations

Table A3: Cross-tabulation for all indicators

(a) Stunting and school attendance

| | None | Bias for boys | Bias for girls | Total |
|---|---|---|---|---|
| None | 2089 (20.55) | 1382 (13.59) | 2556 (25.14) | 6027 (59.28) |
| Bias for boys | 555 (5.46) | 613 (6.03) | 736 (7.24) | 1904 (18.73) |
| Bias for girls | 666 (6.55) | 495 (4.87) | 1075 (10.57) | 2236 (21.99) |
| Total | 3310 (32.56) | 2490 (24.49) | 4367 (42.95) | 10,167 (100) |

(b) Stunting and working hours

| | None | Bias for boys | Bias for girls | Total |
|---|---|---|---|---|
| None | 588 (18.26) | 1010 (31.37) | 249 (7.73) | 1847 (57.36) |
| Bias for boys | 171 (5.31) | 340 (10.56) | 101 (3.14) | 612 (19.01) |
| Bias for girls | 241 (7.48) | 387 (12.02) | 133 (4.13) | 761 (23.63) |
| Total | 1000 (31.06) | 1737 (53.94) | 483 (15) | 3220 (100) |

(c) Birth registration and school attendance

| | None | Bias for boys | Bias for girls | Total |
|---|---|---|---|---|
| None | 3849 (28.66) | 2604 (19.39) | 4387 (32.66) | 10,840 (80.7) |
| Bias for boys | 472 (3.51) | 309 (2.3) | 509 (3.79) | 1290 (9.6) |
| Bias for girls | 464 (3.45) | 361 (2.69) | 477 (3.55) | 1302 (9.69) |
| Total | 4785 (35.62) | 3274 (24.37) | 5373 (40) | 13,432 (100) |

(d) Birth registration and working hours

| | None | Bias for boys | Bias for girls | Total |
|---|---|---|---|---|
| None | 1232 (25.02) | 2076 (42.15) | 567 (11.51) | 3875 (78.68) |
| Bias for boys | 164 (3.33) | 262 (5.32) | 83 (1.69) | 509 (10.34) |
| Bias for girls | 160 (3.25) | 290 (5.89) | 91 (1.85) | 541 (10.98) |
| Total | 1,556 (31.59) | 2628 (53.36) | 741 (15.05) | 4925 (100) |

(e) School attendance and working hours

| | None | Bias for boys | Bias for girls | Total |
|---|---|---|---|---|
| None | 4569 (24.97) | 4,855 (26.53) | 1729 (9.45) | 11,153 (60.95) |
| Bias for boys | 1186 (6.48) | 1932(10.56) | 441 (2.41) | 3559(19.45) |
| Bias for girls | 1454 (7.95) | 1479 (8.08) | 653 (3.57) | 3586 (19.6) |
| Total | 7209 (39.4) | 8266 (45.17) | 2823 (15.43) | 18,298 (100) |

Note: All figures in parentheses are percentages.

Source: Author's calculation based on MICS data.

## Appendix 6: Measures of association by country

Table A4: Cross-tabulation for all indicators by country

| | Kazakhstan | Albania | Belize | Bosnia and Herzegovina | Burundi | Cameroon | Côte d'Ivoire | Gambia | Guyana | Lao PDR |
|---|---|---|---|---|---|---|---|---|---|---|
| Cramer's *V* | | | | | | | | | | |
| Stunting / birth registration | 0.070 | 0.159 | 0.094 | . | . | . | . | 0.053 | 0.091 | 0.062 |
| Stunting / school attendance | 0.058 | 0.198 | 0.100 | . | . | . | . | 0.068 | 0.027 | 0.152 |
| Stunting / working hours | . | | . | . | . | . | . | 0.114 | 0.071 | . |
| Birth registration / school attendance | 0.076 | 0.161 | 0.046 | . | 0.065 | 0.072 | 0.052 | 0.047 | 0.041 | 0.098 |
| Birth registration / working hours | . | | . | . | 0.035 | 0.057 | 0.048 | 0.035 | 0.137 | . |
| School attendance / working hours | . | | . | . | 0.145 | 0.068 | 0.072 | 0.084 | 0.128 | . |
| *P* statistic for boys | | | | | | | | | | |
| Stunting / birth registration. | 0.261 | 0.182 | 0.143 | . | . | . | . | 0.216 | 0.092 | 0.201 |
| Stunting / school attendance | 0.457 | 0.700 | 0.536 | . | . | . | . | 0.433 | 0.455 | 0.592 |
| Stunting / working hours | . | | . | . | . | . | . | 0.307 | 0.294 | . |
| Birth registration / school attendance | 0.636 | 0.600 | 0.393 | . | 0.351 | 0.190 | 0.327 | 0.347 | 0.471 | 0.347 |
| Birth registration / working hours | . | | . | . | 0.067 | 0.182 | 0.137 | 0.179 | 0.250 | . |
| School attendance / working hours | . | | . | . | 0.332 | 0.293 | 0.205 | 0.367 | 0.250 | . |
| *P* statistic for girls | | | | | | | | | | |
| Stunting / birth registration | 0.176 | 0.200 | 0.280 | . | . | . | . | 0.211 | 0.153 | 0.219 |
| Stunting / school attendance | 0.161 | 0.667 | 0.410 | . | . | . | . | 0.325 | 0.286 | 0.467 |
| Stunting / working hours | . | . | . | . | . | . | . | 0.636 | 0.375 | . |
| Birth registration / school attendance | 0.267 | 0.000 | 0.222 | . | 0.167 | 0.036 | 0.303 | 0.205 | 0.236 | 0.220 |
| Birth registration / working hours | . | . | . | . | 0.415 | 0.595 | 0.532 | 0.615 | 0.200 | . |
| School attendance / working hours | . | . | . | . | 0.485 | 0.656 | 0.595 | 0.661 | 0.555 | . |

| | Mongolia | Nigeria | Serbia | Sierra Leone | Suriname | Swaziland | Togo | Trinidad and Tobago | Vietnam | Iraq |
|---|---|---|---|---|---|---|---|---|---|---|
| Cramer's *V* | | | | | | | | | | |
| Stunting / birth registration | 0.028 | 0.023 | 0.052 | 0.064 | 0.069 | 0.025 | 0.047 | . | . | 0.043 |
| Stunting / school attendance | 0.172 | 0.100 | 0.082 | 0.093 | 0.083 | 0.058 | 0.078 | . | . | . |
| Stunting / working hours | 0.289 | 0.024 | . | 0.070 | 0.106 | 0.099 | 0.033 | . | . | . |
| Birth registration / school attendance | 0.056 | 0.036 | 0.044 | 0.038 | 0.062 | 0.035 | 0.072 | 0.127 | 0.060 | . |
| Birth registration / working hours | 0.336 | 0.036 | . | 0.054 | 0.125 | 0.215 | 0.093 | . | . | . |
| School attendance / working hours | 0.187 | 0.064 | . | 0.092 | 0.174 | 0.071 | 0.091 | . | . | . |
| *P* statistic for boys | | | | | | | | | | |
| Stunting / birth registration. | 0.125 | 0.181 | 0.118 | 0.284 | 0.052 | 0.218 | 0.190 | . | . | 0.218 |
| Stunting / school attendance | 0.615 | 0.457 | 0.458 | 0.560 | 0.500 | 0.270 | 0.507 | . | . | . |
| Stunting / working hours | 0.500 | 0.265 | . | 0.306 | 0.200 | 0.308 | 0.250 | . | . | . |
| Birth registration / school attendance | 0.556 | 0.325 | 0.688 | 0.514 | 0.538 | 0.290 | 0.375 | 0.438 | 0.260 | . |
| Birth registration / working hours | 0.500 | 0.172 | . | 0.255 | 0.000 | 0.077 | 0.237 | . | . | . |
| School attendance / working hours | 0.328 | 0.211 | . | 0.229 | 0.250 | 0.250 | 0.245 | . | . | . |
| *P* statistic for girls | | | | | | | | | | |
| Stunting / birth registration | 0.135 | 0.154 | 0.135 | 0.178 | 0.184 | 0.214 | 0.181 | . | . | 0.192 |
| Stunting / school attendance | 0.276 | 0.311 | 0.067 | 0.320 | 0.333 | 0.269 | 0.359 | . | . | . |
| Stunting / working hours | 0.571 | 0.523 | . | 0.478 | 0.833 | 0.500 | 0.629 | . | . | . |
| Birth registration / school attendance | 0.091 | 0.182 | 0.077 | 0.308 | 0.310 | 0.221 | 0.420 | 0.000 | 0.222 | . |
| Birth registration / working hours | . | 0.407 | . | 0.465 | 0.364 | 0.412 | 0.586 | . | . | . |
| School attendance / working hours | 0.649 | 0.544 | . | 0.510 | 0.715 | 0.619 | 0.696 | . | . | . |

Source: Author’s calculation based on MICS data.