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# Inequality-Measurement, trends, impacts, and policies 

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# Intrahousehold inequalities in child rights and wellbeing. A barrier to progress? 

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This paper attempts to measure the extent of inequality within households and its contribution to overall levels of inequality in child wellbeing. It analyses the distribution of outcomes between girls and boys for four indicators: nutrition, birth registration, school attendance and time spent doing work and chores, with data from the Multiple Indicators Cluster Surveys (MICS) for 20 developing countries.

An L-Theil index is used to decompose inequality into the between and within-household components. We find that intrahousehold inequality is an issue in countries even when on the average there is progress towards child wellbeing. Across the four indicators of child wellbeing, intra-household inequality represents a significant proportion of total inequality, but with great variability across countries. The neglect of intra-household inequalities conceals the outcomes of those children who fare below their household average leading to a skewed view of the patterns of progress towards eliminating child poverty and the effective realization of their rights.

JEL classifications

D39; I3; D13

Keywords

Inequality; intrahousehold; child; wellbeing; multidimensional

## Key Messages

- Inequality within households is rarely measured despite its analytical importance. A new methodology allows for its measurement between girls and boys in four indicators of child wellbeing: nutrition, birth registration, schooling and work hours.
- Some disparities in child wellbeing are of important magnitude. Across 11 to 19 countries, 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.
- Inequalities between boys and girls within households can be pronounced, ranging between nine and 63 percent of total gender based inequality, varying depending on the indicator, the country and the period.
- It is not possible to eliminate child poverty without addressing disparities within households. Even when total and within-household inequalities are not large in absolute terms, or when average child wellbeing is high, intrahousehold inequalities are larger in relative terms and constitute the harder gaps to address to realise progress in child wellbeing.
- 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 wellbeing. In school attendance more households tend to favour girls, while in work time, they tend to disadvantage them. In some countries, girls are typically more disadvantaged within households, while in other cases boys are relatively more deprived.


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## 1. Introduction

Until recently, most measures of wellbeing have treated households as if their members enjoyed 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 wellbeing as the average, adult-equivalent, of the household to which they belong (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 the household averages indicate the contrary. Consequently, the neglect of intra-household inequalities conceals the outcomes of 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.

We now have much better data to examine progress towards improving child wellbeing at the global level. ${ }^{1}$ 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 Child (CRC), specially the targets defined in the 1990 World Summit for Children, as well as to monitor progress towards the child focused MDGs. ${ }^{2}$ Nevertheless, little is known still about the distribution of this progress, in particular the distribution within households, an important aspect being gender differences. ${ }^{3}$

Systematic biases against boys or girls in several areas of their wellbeing increase the chance of lifetime underachievement and poverty, although other factors can still operate to affect wellbeing over the life course. Preference for sons is evident in many societies, 'whereby the needs of girls, and resulting allocation of resources, are secondary to those of boys' (Choe et al. 1995 in Bolt and Bird 2003), resulting in unequal outcomes in child development with life-long implications. ${ }^{4}$ Examining unequal intrahousehold investments in children is important because they tend to carry over into adulthood, linking them to poverty traps and to the intergenerational transmission of poverty (Bird 2010: 8):

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

[^0]at a future point in their lifecourse (Bird, 2007). 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 (ibid.).

That said, the bias between boys and girls could differ across wellbeing indicators and countries. Biases in land and asset inheritance have been found to favour boys (Estudillo et al. 2001; Cooper 2011; Doss et al. 2011; Bird 2011), and relatively lower survival rates have been found for girls in Asia (Sen 1992; Klasen 2008 among others) ${ }^{5}$ and in education achievements and parental aspirations in India and Ethiopia (Dercon and Sigh 2013). However, this last study also found 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 (Svedberd 1988; Sahn and Stifel 2002), and also in India (Andhra Pradesh), Ethiopia, Peru and Vietnam (Dercon and Sighn 2013). However, nutrition has also been found to be biased against girls in some South Asian countries (e.g. Sen 1984 and Sen and Sengupta 1983 (in Deaton 1989) in India and Chen, Huq and D'Sousa 1981 in Bangladesh), highlighting that the direction of the bias can vary in different countries. Sometimes, inequalities in different dimensions may balance each other out. For example in the Philippines, Estudillo et al. (2001) found that parents compensate lower inheritance transfers of land with higher investments in schooling for girls, which result in very little difference in life-time incomes between sons and daughters. A multidimensional approach to the measurement of inequalities in child wellbeing 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 the some of the intrahousehold 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 subSaharan Africa daughters are favoured because a bride price is paid upon marriage (Miller 1997 in Bird) 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 others. Indian, African, and Mexican societies have been found to prioritise elderly males, while in other countries parents may prioritize elderly children of both sexes (Soto Bermant 2008). In Nepal in 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 the labour market functioning. In countries where gender discrimination in the labour market is high, parents may also invest more on their boys' education foreseeing future financial help and higher future returns to education, for example as found by Buchmann (2000) in Kenya.

[^1]Family structure is also important. Where polygamy is an accepted cultural practice, discrimination is not only based on gender but also family structure. For example, in Northern Ghana, children of first wives were 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, when extended families live together, evidence also suggests that children of the most 'powerful' male or the head of household was favoured. Leroy et al. (2008) find again that this was the case in Ghana and Fafchamps and Quisimbing (2003) find a similar story in rural Pakistan where 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 whether they are systematically occurring across different dimensions of child wellbeing is an important aspect of diagnosing the barriers to progress.

It is not enough to measure average outcomes of girls and boys in a country and compare them. Although they can indicate of 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 wellbeing of different children within the household. Inequality in four key indicators of child wellbeing is analysed: stunting, birth registration, school attendance and time spent on work and chores. In the following section we review briefly some approaches to measuring intra-household inequalities and child wellbeing and situate the current work in this literature. The third section presents the results for the four indicators. Finally, we discuss some of the implications of these results and conclude.

## 2. Measurement issues and methodology

### 2.1 Intra-household inequalities

The lack of data for individual children is the main limitation to measuring inequalities inside households. Even detailed consumption surveys may lack this information. Deaton (1989) pointed out to some of the empirical difficulties of directly analysing individual allocations of resources: for instance, budget surveys record consumption at the household 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 it is problematic to determine the equal/unequal enjoyment of public goods or jointly consumed goods within the household (e.g. housing, sanitation and water supply), even if they are privately provided. This focus can mask differences in the wellbeing of household members, in particular between men and women, children and adults, and between individual 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 children wellbeing 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 that 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 intrahousehold inequalities
There is often a lack of disaggregated information that permits measuring the unequal distribution of resources or outcomes within households. Different approaches have tried to fill this gap. A first approach is to compare the gender distribution of resources to track differences in expenditure in boys or 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 was systematically larger in households with male children than female children, this would suggest that households were diverting more resources to the former.

A second approach is to measure differences in average outcomes between boys and girls. Dercon and Singh (2013) use longitudinal data to measure inequalities in child nutrition, educational achievements, educational aspirations, subjective well-being and psychological competencies. Firstly, they compare the average achievements between girls and boys at various ages to assess gender inequalities. Secondly, they use a regression based approach in which the different outcomes are regressed on a gender dummy and some household characteristics ${ }^{6}$. The significance and direction of the gender dummy would indicate the presence of gender inequality. Quisumbing (1994) follows 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, while daughters receive more total inheritance, but less land-inheritance than sons.

Another approach is to measure overall inequality using an aggregate inequality index and decompose it into two components, the within household and between household inequality. Sahn and Younger (2009) use this to measure gender differences in standard of living. Using adult's Body Mass Index (BMI) as an individual measure of standard of living they construct a householdspecific L-Theil Index and measure within and between household inequality using the decomposability property of the GE indices.. They find that at least 55\% of overall inequality in the seven countries examined can be attributed to the within-household component. This paper follows a similar approach.

To provide evidence on within-household inequalities, this paper trials an innovative approach to the measurement of inequality. It follows Sahn and Younger's (2009) approach to measure inequality in BMI, a cardinal indicator, by decomposing total inequality into its within and between components using households as the defining groups. The innovation consists in adapting the methodology to be able to apply it to a larger number of indicators, ordinal as well as cardinal, and thus allows a broader understanding of inequality in different areas of child wellbeing. The method used is to obtain two cardinal values for each household out of the original binary indicators, so that a GE index can be constructed and then decomposed to assess inequality and its components, particularly to capture the share of within-household inequality.

The unit of analysis are the girls or boys within a household so the objective is to have a householdlevel variable representing separately the outcomes of girls and boys in each household. Binary

[^2]variables are recalculated as the share of girls and boys respectively within a household above a certain threshold. In the case of stunting for example, each household would have two observations: one corresponding to the share of girls that are stunted, and the other to the share of boys that are stunted (Box 2). The thresholds are defined following international standards defined by UNICEF's guidance on Indicators for Global Reporting (Apendix ). In the case of the non-binary variables (work time), the reconstructed household variables express averages for girls/boys in each household. Only households that have at least one boy and one girl are kept in the sample for the analysis. ${ }^{7}$ The main limitation of this approach is that the final variable is discontinuous, especially, but not exclusively, for smaller households. This may limit the comparability of the measure across countries, where the average household size varies. ${ }^{8}$ 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 wellbeing. ${ }^{9}$

Box 2- Household-level variable: Stunting
Stunting $=\left\{\begin{array}{l}\text { Stunting Girls }{ }_{h}=\frac{\text { number of girls stunted }{ }_{h}}{\text { total number of girls }} \\ \text { Stunting Boys }{ }_{h}=\frac{\text { number of boys stunted }}{h} \\ \text { total number of boys }{ }_{h}\end{array} \quad\right.$ for each household $h$

Intrahousehold inequality is presented in two ways. Firstly, the share of households who have a gender bias, that is, households that display higher outcomes in either boy or girl children are derived on the base of household ratios of achievement of girls to boys in each of the indicators. A

[^3]ratio of one indicates complete parity, ratios greater than one indicate that girls' achievements are higher than boys' and vice versa for ratios lower than one. A bias for girls occurs 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). ${ }^{10}$. This however, only shows gender differences in each household, or the average gender differences across the country, but it does not show the extent of intrahousehold inequalities in total inequalities. We use an aggregate measure of inequality - Theil Index - to capture these magnitudes.

With the household-level recalculated variables, a GE index can be computed for each indicator. The paper uses an L-Theil index (mean log deviation). The Theil is a summary measure of the difference between the (natural logarithm of the) shares of the wellbeing measure and the shares of population. It reflects the extent to which the distribution of wellbeing between groups differs from the distribution of the population in those groups. When all the groups have a share of wellbeing equal to their population share, the distribution is completely equal (overall Theil is zero). It also gives a higher weight to the lower end of the distribution, giving higher relevance to those who are more deprived, ${ }^{11}$ 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. A Gini coefficient, which ranges from zero to one, gives an indication of the extent of overall levels of inequality. However, unlike the Theil, the Gini coefficient is not perfectly decomposable (Bellu and Liberati 2006) ${ }^{12,13}$, impeding the assessment of the share of inequality that takes place withinhouseholds. For this reason the Theil, rather than the Gini, is the main measure of inequality used through the paper, although the Gini is presented to give a sense of the scale of overall inequality.
. In the decomposition, 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 them 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

[^4]$$
G E(1)=\sum_{j} \frac{N_{j}}{N} L_{j}+\sum_{j} \frac{N_{j}}{N} \ln \left(\frac{\mu}{\mu_{j}}\right)
$$
$N$ is the entire sample size and $N_{j}$ the sample size in the household. Similarly, $\mu$ is the average score of the variable for the entire sample and $\mu_{\mathrm{j}}$ is the average for household j . $\mathrm{L}_{\mathrm{j}}$ is the inequality (mean log deviation) of each household $j$.
differences within-households is presented for two periods in time. Inequality measures and corresponding standard errors are computed taking into account sample design and using the sample weights designed and incorporated by MICS to each survey. The computations are made with the Distributive Analysis Stata Package (DASP) (Araar and Duclos 2007) in Stata/SE V. 12 which allows including sample design into the estimation of standard errors. A 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 wellbeing and multidimensional inequality

Our point of departure is the interest in measuring child wellbeing from a multidimensional perspective, but seeking to expand this multidimensional lens to the analysis of inequality. A ground breaking approach to the measurement of child poverty and wellbeing was the Global Study on Child Poverty and Disparities (UNICEF 2007). This report combined the household income poverty measure with the multidimensional Bristol deprivations approach (Gordon et al.2001), the methodology used to produce the first internationally comparable estimates of child poverty across a large number of developing countries. ${ }^{14}$ Although it effectively captures the multidimensionality of poverty, and it is useful to analyse disparities across countries, such a measurement approach could mask child disparities within the household, affecting the assessment of poverty levels, excluding less well-off children.

The way in which child poverty is measured has an impact on the appropriate policy responses policymakers can derive from such measurement. There is a considerable shortage of data analysis on children per se, and often assessments of child wellbeing 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. When such an approach is used, for example, if child poverty is made equivalent to overall household poverty - " A " in Figure 1 below, policy responses may address the main underlying causes of poverty but fail to account for child specific concerns and experiences, as well as intrahousehold inequalities. A stronger focus on child outcomes and on non-material aspects of deprivation -"C "in Figure 1 - would be more appropriate to capture disparities in child poverty, and is useful to address the protection of child rights (Fajth and Holland 2007). Lack of data, however, may restrict this type of analysis (UNICEF 2007).

[^5]Figure 1 - Child poverty approaches: three models


Source: Based on Fajth and Holland (2007)
The dimensions relevant to measure child wellbeing are defined drawing from the Convention on the Rights of the Child (CRC) of 1989. The core set of dimensions that are essential to any child's development can be classified in three groups: survival, development, 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 child in the household, rendering them insufficient for the analysis. This exacerbates the data shortcomings: of the 17 dimensions of child wellbeing in the CRC, data constraints restrict our 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: p.9) with the information relevant to our study.
Data are obtained from the Multiple Indicator Cluster Surveys (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 the two periods.

Table 1-Child wellbeing dimensions, indicators and data availability

| Categories | Dimensions | CRC article | Indicators available | N. of countries <br> analysed |
| :--- | :--- | :--- | :--- | :--- |
| Survival | Food nutrition | Art 24 | Stunting and underweight | 15 |
|  | Water | Art 24 | No* |  |
|  | Health care | Art 24 | Immunization (DPT)**** |  |
|  | Shelter, housing | Art 27 | No* |  |
|  | Environment, pollution | Art 24 | No |  |
| Development | Education | Art 28 | School attendance and <br> Support for learning*** | 18 |
|  | Leisure | Art 31 | House work and chores | 11 |
|  | Cultural activities | Art 31 | No |  |
|  | Information | Art 13, 17 | No* |  |


| Protection | Exploitation, child labour | Art 32 | House work and chores |  |
| :--- | :--- | :--- | :--- | :--- |
|  | Other forms of exploitation | Art 33-36 | Female genital <br> mutilation*** |  |
|  | Cruelty, violence | Art 19, 37 | Child discipline*** |  |
|  | Violence at school | Art 28 | No |  |
|  | Social security | Art 16, 26, <br> 27 | No |  |
| Participation | Birth registration/ nationality | Art 7,8 | Birth registration | 19 |
|  | Information | Art 13, 17 | No* |  |
|  | Freedom of expression, views, <br> opinion; being heard; freedom <br> of association | Art 12-15 | No |  |

* The indicators for water and sanitation, information and shelter are measured at the household level..
*** Indicator available in 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: Neuborg et al (2011: p.9) and author's assessment

Children can be deprived in one or many of the dimensions of wellbeing. This paper analyses the distribution of each dimension separately opting for a dashboard approach to the measurement of inequality (the first approach in Box 3). In addition, it aims to analyse the joint distribution of inequalities (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, girls or none type of children in each household. These in turn are 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. ${ }^{15}$ This will be further explained in 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 wellbeing, 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 Thomas, Wang and Fan (2001) and Checchi (2000) who construct a Gini concentration index of educational achievement -measured by the average years of education. In health, Gakidou and King (2002) measure inequalities in expected child survival to age two and the 2000 World Health report (WHO 2000) uses a similar approach by measuring inequalities in life expectancy at birth. Sahn and Younger (2006) also use 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, Wang and Fan (2001) use subgroups 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.

[^6]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 OPHI's Multidimensional Poverty Index aggregates multiple deprivations at the individual and household level to measure poverty. Roche's (2013) study applies this methodology to the measurement of child poverty in Bangladesh using six dimensions, which correspond to those in the Bristol approach. The index can be decomposed 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 ${ }^{16}$ used to construct an aggregate deprivation index. ${ }^{17}$ 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 would take into consideration possible correlations between the various dimensions of welfare by considering joint distributions of the dimensions of wellbeing, but without integrating them into a single index. Wagstaff (2002) for example measures mortality, malnutrition and disease prevalence across socioeconomic status quintiles defined by a measure of household wealth. In analogy to a Lorenz curve, he defines a concentration curve ranked across socioeconomic quintiles. If the curve coincides with the diagonal or line of equality, all children irrespective of their socioeconomic status, enjoy 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 wellbeing 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, Lietchfield and Niimi (2004) use this approach in Brazil, constructing GE measures of income, health and political participation for each education quintile and repeating the exercise for all other pair-wise combinations (i.e. for health, political participation and income categories).

## 3. Results

This section presents the results by indicator, trying to find some patterns in the findings across countries. Nevertheless, given that the sample of countries and indicators relies on the 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 to 6 . Summary statistics can be found in Appendix 3. The section concludes by analysing the degree to which gender biases are jointly distributed within households.

[^7]Total inequalities between girls and boys across indicators of child wellbeing are of varying magnitude. On average across all countries and years the Gini 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 for birth registration is 0.42 while total inequality in school attendance is particularly low, the Gini coefficient is only 0.18 . Intrahousehold inequalities are also quite different across indicators and countries. The following sections ( 3.1 to 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 (WB 2006).

Different indicators can be used to determine whether a child is malnourished. Although the MDG indicator is underweight prevalence some argue in favour of replacing it with stunting as the main anthropometric indicator for children (see for example Black et al. 2013). Stunting reflects the cumulative effects of nutrition deprivation and thus is a better indicator of chronic malnutrition (WHO 2010). ${ }^{18}$

On average for all 15 countries and periods in the sample, $24 \%$ of boys and $23 \%$ of girls are stunted (summary statistics for all indicators are available in Appendix 3), figures which 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 5\% (Serbia 2010) and 41\% (Lao and Albania 2000), and for girls between 3\% (Serbia 2010) and 46\% (Albania 2000).

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 the households, our analysis shows that on average for all countries about $16 \%$ of households have a bias for boys and $16 \%$ a bias for girls, and these biases can be cancelled out through aggregation. About 68\% 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 boy while in others, girls.

[^8]Across countries, when pooling all country-year observations ${ }^{19}$ (Figure 2), the higher average stunting levels, the lower total inequality. 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 PDR, a country with high levels of stunting, close to $40 \%$ of inequality occurs within household. The opposite occurs in countries like Serbia. This suggests that for nutritional outcomes, intrahousehold inequality should be a stronger concern in countries with higher levels of deprivation, as we will see, this pattern that differs from the other indicators of child wellbeing.

Figure 2 - Average levels and inequality in stunting


According to the inequality decomposition of the Theil index, on average $80 \%$ of the inequality in stunting rates is attributed to inequality across households, while $20 \%$ occurs within households. However, in seven countries (Nigeria, Albania, Togo, Lao PDR, Sierra Leone, Swaziland and Gambia) in both periods, the within component contributed to more than $20 \%$ of the total inequality, up to $41 \%$ in Lao PDR.

In six of the 15 countries with stunting data, overall inequality measured by the Theil index increased between the two periods, in four countries it decreased and in five countries it remained virtually unchanged. But overall, as seen in Figure 3, there has been little change in stunting inequality and its relative components from the first to the second period. Within household inequality fell 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

[^9](the Gini for Mongolia rose from 0.71 to 0.85 ). For the rest of countries, the change in the withinhousehold component of inequality was not statistically significant and thus changes in total inequality were driven by the between-household component.

Figure 3 - Inequality decomposition. Stunting


### 3.2 Birth Registration

Unregistered children are deprived in 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 2013). It is possible that given these difficulties, parents may not always be willing or able to register all children. They may choose to register only one child, who may be 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, $53 \%$ of girls and $54 \%$ of boys are registered, but with large differences across countries, ranging from 2\% in Trinidad and Tobago (2006) to 90\% in Guyana (2006-07). The percentage of children registered has increased for girls and boys alike, from $50 \%$ in the first year in which registration was measured, to about $57 \%$ in the second, on average. Again the actual rates differ in each country, but the similar trend for boys and girls is common. Disparities inside the household when looking at the ratios of registration for girls and boys occur in about 18\% of households, and in most countries, a similar proportion of households have a bias for boys or girls, close to $9 \%$. Again this suggests that those differences are cancelling each other out in the aggregate.

Figure 4 shows that the higher average birth registration in the country, the lower total inequality in absolute terms; that is for example, the case of 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 such as Togo.

Figure 4 - Average levels and inequality. Birth registration

Birth registration


The ratio of between to within household inequality is 3.6 , which means that the between component accounts for $78 \%$ of the total inequality and the remaining $22 \%$ corresponds to inequality within households. The ratio of between to within inequality is below four (which roughly corresponds to a $20 \%$ or higher share of within household inequality) in both periods in Albania, Togo, Iraq, Mongolia and Guyana. The ratio decreased to below four in another six countries (Cameroon, Vietnam, Trinidad and Tobago, Lao PDR, Swaziland and Gambia). For the remaining eight countries, the ratio was above four in both periods.

With the general increase in birth registration rates, overall inequality has fallen over the two periods. Of the 19 countries with birth registration data, seven reduced overall inequality between the two periods, while in two (Lao PDR and Swaziland) inequality increased (Figure 5). In the remaining ten countries, inequality remained virtually unchanged. The within-group component rose sharply, from $17 \%$ of total inequality in the first period to $25 \%$ 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 increased in two countries (Swaziland and Lao PDR) and total inequality accompanied that upward trend. In further three countries (Trinidad and Tobago, Iraq and Guyana), within-household inequality decreased between the two periods; that reduction was accompanied by a reduction in total inequality.

Figure 5 - Inequality decomposition. Birth registration


### 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 example, in Pakistan literate working women earn 95\% more than women with weak literacy skills, while in rural Indonesia, literacy has been linked to a $25 \%$ decrease in the chance of falling back into poverty (UNESCO 2013). Education is also linked to better health and 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 who report going to school during the year of the survey (either 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 children. For example, as a consequence of the Syrian crisis, 2 million children had to leave school due to bombing or displacement (Watkins 2013). Even in more stable situations, physical barriers can still play a role. Reducing distance to school had a significant effect in increasing girls attendance in secondary school in rural Tanzania, although less of an impact for boys (Beegle and Burke 2004). In fact, inequalities in education have a strong relationship with differences between groups (by
wealth, ethnicity or location) and gender, which often overlap with each other. ${ }^{20}$ Commonly cited barriers to school attendance, such as disability and distance to school, are more relevant for some groups than others. For example, Rousso (2003) found that in terms of school attendance, disabilities tend to be less important for boys than for girls, because they interact with perceptions about gender roles and the lower value that parents place on their girls education.

School attendance exceeds $80 \%$ for both boys and girls on average for the 18 countries with data, but again, the range is wide across the sample. For boys, it ranges from $44 \%$ in Gambia to $96 \%$ in Cameroon, while for girls, the range is from $45 \%$ to $94 \%$ again the same two countries. In half of the countries school attendance rates have increased 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.

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, for example Burundi, within-household inequality is more of a problem. However when deprivations are low, intrahousehold 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. School attendance


[^10]In fact, for this indicator, the ratio of between to within household inequality was 0.70 , meaning that the within-household component accounted for a greater share of the total inequality ( $59 \%$ on average). For all but three countries (Nigeria, Burundi and Gambia), the within household component was the largest contribution to inequality in at least one period.

On average, total inequality has fallen over the two periods. In 11 of the 18 countries with schooling data overall inequality fell (Figure 7) ${ }^{21}$. In one country (Serbia) inequality rose between the two periods of time, while for the remaining countries the change was not statistically significant. The distribution of inequality has changed with the general increases in school attendance across the countries. Within-household inequality fell in seven countries (Albania, Burundi, Cote d'Ivoire, Trinidad and Tobago, Mongolia, Guyana, and Gambia), all of which also reduced overall inequality. Within-household inequality significantly increased in one country, Vietnam. In this country, the ratio of between to within inequality was higher in the first period and fell in the second period as the within household contribution increased from $54 \%$ in to $63 \%$. The changes in within-household inequality were statistically insignificant in the remaining 10 countries.

Figure 7 - Inequality decomposition. School attendance


### 3.4 Work 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). Regardless of whether or not the activity produces economic value, both paid and unpaid work and household chores like cooking, cleaning or caring for other children, are a drain in

[^11]the time children have to learn (education) and play (leisure), which are part of their fundamental rights. 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 of an ideal minimum age of work, as well as of the time children should keep free for their education and leisure. For this reason, the paper does not use this child labour definition but rather the total number of hours that children spend on these activities, to measure whether there is inequality in this respect.

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), ${ }^{22}$ 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 doing work.

In Togo and Cote d'Ivoire, there is a bias against girls, who work more hours than boys in both periods. In Nigeria and the 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 of the countries, the time that children, both girls and boys, spend working over the study period has reduced. In Nigeria, the reduction was only significant for boys, while in Gambia, there was an increase in the average number of hours that girls work by more than 3 hours per week. For this indicator the parity levels inside the households are the lowest. Just over one-third (34\%) of households have parity in the time boys and girls spend working. On average, across all countries and periods, girls spend less time working or doing chores in $14 \%$ of the households and boys spend less time in $51 \%$ of households.

Working hours follows a similar pattern to stunting. The higher the average number of hours worked by children, the lower 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, intrahousehold inequality is of a similar absolute magnitude in both countries. In relate terms, the share of intrahousehold inequality seems to be larger in countries where children work more hours.

[^12]Figure 8 - Average levels and inequality. Working hours


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 by inequality across households: only $10 \%$ of inequality occurs within them. It is possible that 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 is due to the fact that the latter captures not only if households favour certain children, but also, the amount by which one group works more hours than the other. The ratio of between to within household inequality is above 1 for all countries and periods.

Although the amount of working hours decreased over the two periods, inequality increased slightly. The Theil index was on average 8.6 in the first year and 11.3 in the second. In fact, total inequality increased in seven of the 11 countries and decreased only in Gambia. Within-household inequality did not change significantly in most countries, it increased in Sierra Leone and Gambia and decreased in Mongolia (Figure 9). ${ }^{23}$ In Burundi and Cameroon, the ratios were below 4 in the first period but increased substantially in the second, indicating a fall in the within-household component of inequality. In contrast, in Gambia, the within-household component of inequality saw a relative

[^13]increase and the ratio fell from 8 to 2.5 . Although as noted in footnote 25 , this could be due to measurement problems.

Figure 9 - Inequality decomposition. Working hours


Table 2 - Stunting Inequality ( 15 countries)

|  | Kazakhstan |  |  | Nigeria |  |  | Albania |  |  | Bosnia Herzegovina |  |  | Togo |  |  | Suriname |  | Belize |  | Iraq |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Absolute | Y1 | Y2 |  | 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 | 2.50 | 2.25 |  |
| 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 | 11.18 | 11.95 | * |
| Relative |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Ratio b/w | 6.33 | 7.89 |  | 2.93 | 2.93 |  | 2.53 | 2.63 |  | 12.59 | 16.05 |  | 3.43 | 2.83 |  | 11.54 | 13.04 | 4.42 | 4.87 | 3.47 | 4.32 |  |


|  | Lao |  | Mongolia |  |  | Serbia |  | Sierra Leone |  |  | Swaziland |  |  | Guyana |  | Gambia |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Absolute | Y1 | Y2 | Y1^ | Y2 |  | Y1 | Y2 | Y1 | Y2 |  | Y1 | Y2 |  | Y1 | Y2 | Y1 | Y2 |  |
| Within | 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 | 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 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Ratio b/w | 1.44 | 1.74 | 3.33 | 7.18 |  | 11.85 | 24.83 | 2.04 | 1.70 |  | 2.12 | 2.93 |  | 6.79 | 6.90 | 3.95 | 2.63 |  |

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

| Stunting | All | Y1 | Y2 |
| :--- | :--- | :--- | :--- |
| 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 |
| Ratio b/w | 3.91 | 3.74 | 4.09 |

Table 3 - Birth registration- Inequality (19 countries)


|  | Trinidad and Tobago |  |  | 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 |  | Y1 | Y2 |  |
| Within | 0.98 | 0.27 | * | 1.01 | 0.51 | * | 0.73 | 1.74 | * | 0.90 | 0.74 | 0.57 | 0.84 | 1.44 | 1.90 |  | 1.65 | 2.45 | * | 1.27 | 0.52 | * | 1.28 | 1.60 |  |
| Population | 5.95 | 0.49 | * | 4.48 | 1.62 | * | 5.91 | 6.89 | * | 2.33 | 3.31 | 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 | Y1 | Y2 |  | Y1 | Y2 |  | Y1 | Y2 |  | Y1 | Y2 |  |
| Ratio b/w | 5.06 | 0.82 |  | 3.44 | 2.19 |  | 7.10 | 2.97 |  | 1.60 | 3.48 | 11.80 | 5.98 | 6.45 | 4.12 |  | 4.10 | 2.96 |  | 1.48 | 0.96 |  | 7.70 | 2.99 |  |

* indicates that the difference between boys and girls in each year is statistically significant (5\%)
$\wedge$ Indicates that less than $10 \%$ of the original survey observations were kept for the analysis

| Absolute | All | Y1 | Y2 |
| :--- | :---: | :---: | :---: |
| Within | 1.12 | 1.11 | 1.14 |
| Population | 6.70 | 7.37 | 6.03 |
| Relative |  |  |  |
| Within (\%) | 0.22 | 0.17 | 0.25 |
| Between <br> (\%) | 0.78 | 0.83 | 0.75 |
| Ratio b/w | 3.64 | 4.73 | 2.93 |

Table 4 - School attendance- Inequality (18 countries)

|  | Kazakhstan |  | Nigeria |  | Albania |  |  | Burundi |  |  | Cameroon |  |  | Vietnam |  |  | Togo |  |  | Cote d'Ivoire |  |  | Suriname |  | Belize |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Absolute | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 |  | Y1 | Y2 |  | Y1 | Y2 |  | Y1 | Y2 |  | Y1 | Y2 |  | Y1 | $Y 2$ |  | 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 | 1.38 | 0.98 |  |
| 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 | 1.84 | 1.83 |  |
| Relative |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Ratio b/w | 0.31 | 0.32 | 2.51 | 2.47 | 8.38 | 0.31 |  | 2.10 | 0.75 |  | 4.83 | 0.82 |  | 0.99 | 0.34 |  | 0.53 | 0.39 |  | 1.33 | 1.14 |  | 0.3 | 0.4 | 0.33 | 0.86 |  |


|  | 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 |  |
| Within | 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 | 1.68 | 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 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Ratio b/w | 0.30 | 0.38 |  | 0.66 | 0.51 |  | 0.35 | 0.26 |  | 0.37 | 0.46 |  | 0.86 | 0.57 | 0.84 | 0.31 |  | 0.35 | 0.44 |  | 2.41 | 1.91 | 2. |

* indicates that the difference between boys and girls in each year is statistically significant (5\%)
$\wedge$ Indicates that less than $10 \%$ of the original survey observations were kept for the analysis

| Country | All | $Y 1$ | $Y 2$ |
| ---: | ---: | ---: | ---: |
| 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 |
| Ratio b/w | 0.70 | 0.85 | 0.58 |

Table 5 - Work time- Inequality (11 countries)

|  | Nigeria |  |  | Burundi |  |  | Cameroon |  |  | Togo |  |  | Cote d'Ivoire |  |  | Suriname |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Country | Economic or domestic work |  |  | Economic or domestic work |  |  | Economic or domestic work |  |  | Economic or domestic work |  |  | Economic or domestic work |  |  | Economic or domestic work |  |  |
| 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 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Ratio b/w | 11.85 | 9.88 |  | 3.63 | 19.71 |  | 3.32 | 9.09 |  | 4.74 | 7.42 |  | 5.40 | 6.30 |  | 83.20 | 129.23 |  |


$\wedge$ Indicates that less than $10 \%$ of the original survey observations were kept for the analysis

| Country |  |  |  |
| :--- | ---: | ---: | ---: |
| Absolute | All | Y1 | $Y 2$ |
| 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 |
| Ratio b/w | 9.11 | 7.96 | 10.60 |

### 3.5 Intrahousehold inequality as a barrier to 'get to zero'

Analysing MICS survey data for 20 countries we have assessed the degree of inequality between boys and girls that occurs within households. Although the sample of countries and indicators is limited in many respects, it is illustrative of the presence of such inequalities in four dimensions of child rights and wellbeing. Analysing when such differences exist in the realization of children rights is an important aspect of identifying the barriers to 'getting to zero' and eliminate child poverty.

In the aggregate, inequality is particularly high for stunting and work hours, and the lowest in school attendance. The analysis of the four child wellbeing variables used here shows that small aggregate differences between girls and boys obscure other inequalities. When looking at the decomposition of inequality, our measure of inequality (L-Theil index) shows that a large amount of inequality occurs within households, but with significant variation by country and indicator. In some areas, mainly working time, inequality occurs mainly between households. In contrast, inequalities inside the household 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.

Our results show that intrahousehold inequality represents an average of between 9\% and 63\% of total inequality across the four indicators when looking at averages across all countries.
Nevertheless the variability across countries and years is high: the contribution of intrahousehold inequality is the lowest in Suriname and Mongolia (1\% in the distribution of work time), and the highest in Albania ( $89 \%$ in the distribution of school attendance in the first period).

As seen in Table 6, intrahousehold inequality is an issue for countries even when total inequality is low. Moreover, even where progress raises average levels of child wellbeing considerably, withinhousehold inequalities are increasingly important in relative terms, accounting for a larger share of total inequality. 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. Only for stunting, within household inequalities are clearly less important both in absolute and relative terms when deprivations are low.

Table 6 - Direction of inequality with higher levels of wellbeing

| Indicator | Average level of <br> deprivation | Total inequality | Within- <br> household <br> inequality <br> (absolute) | Share of within- <br> household <br> inequality <br> (relative) |
| :--- | :--- | :--- | :--- | :--- |
| Stunting | $24 \%$ for boys and 23\% <br> for girls | $\uparrow$ | $\downarrow$ | $\downarrow$ |
| Birth <br> registration | $54 \%$ for boys and 53\% <br> for girls | $\downarrow$ | $\leftrightarrow$ | $\uparrow$ |
| School <br> attendance | $82 \%$ for boys and 81\% <br> for girls | $\downarrow$ | $\downarrow$ | $\uparrow$ |


| Working hours | 11 hours per week for <br> boys and 12 hours for <br> girls | $\uparrow$ | $\leftrightarrow$ | $\uparrow$ |
| :--- | :--- | :--- | :--- | :--- |

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

The previous section presented a detailed analysis of inequality for each indicator separately. Given that our interest is also to show whether intrahousehold inequalities are systematically present, it is important to analyse their joint distribution, in other words, to see whether households tend to favour girls (or boys) in all areas of wellbeing, or rather to compensate underinvestment in one area, with overinvestment in another, as was found for example in the Philippines by Estudillo et al. (2001).

The previous analysis by indicator showed that for most countries, some households tend to favour girls and some others, boys, and that the share of households in each country that do 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, that within households there is a systematic bias towards one gender. The share of households that favour girls or boys are 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, ${ }^{24}$ it was not possible to analyse joint distributions for combinations of three or all four indicators at the same time.

Table 7 below shows the cross-tabulation that is 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. Of all 27,394 households, 420 (1.5\%) 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 larger proportion (20.1\%) of the total possible 'match' cases, that is, the cases where was a bias for girls (2,090 households in this example). The " $P$ " statistic captures this relateionship. In contrast, a more commonly used indicator to measure the intercorrelation of two discrete variables - the Cramer's Vuses all the information in the matrix, the 'matches' and the 'mismatches' (i.e. indicates whether a bias for boys in stunting, is matched with a bias for boys in work hours, but also whether the bias for girls in stunting is matched with a bias for girls in working hours, whether the non-bias for any gender in stunting matches with a non-bias in working hours, plues the cases where there is no match at all). ${ }^{25}$ This is why the " $P$ " statistic tends to be higher than the Cramer's $V$, and more useful for our subsequent analysis. Because some of the indicators are only relevant and/or available for

[^14]children of certain age, only the information for those households with observations for each pairwise combination of indicators is used.

Table 7-Cross tab. Stunting and birth registration

| Stunting / Birth reg. | None | Bias for <br> boys | Bias for <br> girls | Total |
| :--- | ---: | ---: | ---: | ---: |
| None | 15,099 | 1,233 | 1,200 | 17,532 |
|  | $55.12 \%$ | $4.5 \%$ | $4.38 \%$ | $64 \%$ |
| Bias for boys | 3,854 | 384 | 470 | 4,708 |
|  | $14.07 \%$ | $1.4 \%$ | $1.72 \%$ | $17.19 \%$ |
| Bias for girls | 4,268 | 466 | 420 | 5,154 |
|  | $15.58 \%$ | $1.7 \%$ | $1.53 \%$ | $18.81 \%$ |
| Total | 23,221 | 2,083 | $\mathbf{2 , 0 9 0}$ | $\mathbf{2 7 , 3 9 4}$ |
|  | $84.77 \%$ | $7.6 \%$ | $7.63 \%$ | $100 \%$ |

Table 8 shows the results of this exercise. Starting with the households that have a bias for boys, $48 \%$ of households that tend to favour boys over girls in terms of nutrition (stunting) also favour them in terms of school attendance. 37\% of households favour boys in both birth registration and school. The proportion of households that favour boys in both stunting and work hours, school attendance and work, and stunting and birth registration is in the range of 20-30\% of households. The lowest degree of association is found in the households that favour boys in birth registration and work hours (17\%).

On the other hand, a large proportion of households favours girls in both nutrition and work, work and school, and birth registration and work; over half of households in each of these three cases. $32 \%$ of households favour girls in nutrition and school, $24 \%$ favour girls in birth registration and school, and $18 \%$ 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 three other cases they show a preference for girls. The average across indicators shows that there are fewer households that favour boys than those that favour girls in two indicators at the time. However, these results vary widely across countries (available in Appendix 7). Take for example the case of the positive bias for boys in stunting and school. 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 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, Cote 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" stat. boys | "P" stat. girls |
| :--- | ---: | ---: | ---: |
| Stunting/ Birth reg. | 0.039 | $\underline{0.201}$ | 0.184 |
| Stunting/ School | 0.070 | $\underline{0.481}$ | 0.322 |
| Stunting/ Work | 0.041 | 0.275 | $\underline{0.556}$ |
| Birth reg./ School | 0.021 | $\underline{0.366}$ | 0.240 |


| Birth reg./ Work | 0.018 | 0.168 | $\underline{0.515}$ |
| :--- | :--- | :--- | :--- |
| School/ Work | 0.067 | 0.231 | $\underline{0.543}$ |
| Average |  | 0.287 | 0.393 |

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

The household characteristics are associated with more intrahousehold inequality will depend on the country context and may relate to different social gender norms and household institutions. ${ }^{26} \mathrm{~A}$ more in depth analysis would be needed to uncover the specific characteristics that drive intrahousehold inequalities in each of the dimensions of child wellbeing presented in this study.

## 4. Discussion and Conclusions

Progress in improving child wellbeing 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 wellbeing. This working paper has provided an innovative methodological approach to measuring the extent of intrahousehold inequalities, providing a broader picture of children's wellbeing and its distribution. In all indicators of child wellbeing there have been improvements, but the patterns of distribution that emerge from those improvements are very different. Overall we advance five main findings.

First, assessing inequality, and in particular that which occurs within households is important, even in the context of relatively equitable country progress towards the realization of child rights and wellbeing. When comparing averages between girls and boys there seems to be little differences between boys and girls in many areas of wellbeing. Yet some disparities remain and are of important magnitude. Across 11 to 19 countries, 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.

[^15]Second, by using a decomposable measure of inequality, the Theil index, it was showed that significant inequalities occur within households. To close the gap between girls and boys it is important to know where these disparities are located. Between-household inequality in malnutrition, birth registration and in work is relatively large and has contributed to an increase in total inequality. For these indicators, addressing barriers across households may be the priority to close the gap in child wellbeing. However, the analysis also shower that intrahousehold inequality in birth registration and working hours tended to be higher even in countries where total inequality was lower, suggesting that the harder gaps to address may be located inside the households

Third, although the relatively small time-frame (around five years) and country sample is perhaps insufficient to capture long term global trends in inequality, it can hint at some tendencies for the countries in our sample. Inequality inside households decreased for a few countries in nutrition (one country), birth registration (three countries) and work time (one country). In schooling intrahousehold inequalities fell for a larger number of countries (seven countries), although it remained relatively high and likely to be the main barrier to close the gap in children's achievements. Moreover, it was showed that when average levels of child wellbeing have risen, within-household inequalities are of increasing importance in relative terms, accounting for a larger share of the total inequality. For example, inequality in school attendance has a large component that derives from an unequal distribution of resources within households; 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 wellbeing. In stunting and birth registration for example, a similar proportion of households have a bias for girls or boys. In school most households tend to favour girls, while in working hours, most favour boys. Moreover, when looking at pairs of indicators, in 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 would be needed to examine how these patterns behave for additional dimensions of wellbeing. The varying and sometimes large amount of intrahousehold inequality found in most countries poses difficulties for policy making. Interventions may need to be targeted more specifically at individuals or subgroups within households rather than to households in general (Haddad and Kanbur 1992; Roemling and Qiam 2012; Sahn and Younger 2009).

For all areas of wellbeing, focusing on those individual children who are most disadvantaged seems key to close the gap and address inequalities. But, to understand the causes of these patterns of discrimination inside the 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 the some of the intrahousehold inequality bias. Yet these are likely to differ across countries. A more in depth analysis would be needed to uncover the specific characteristics that drive intrahousehold inequalities in each of the countries analysed for this study. Interventions to address inequalities in child wellbeing 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

Progress in improving child wellbeing 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 has provided an innovative methodological approach to measuring the extent of intrahousehold inequalities, providing a broader picture of children's wellbeing and its distribution. Examining and tackling the differences that occur within households is important to ensure the realization of all children's rights and their wellbeing.

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## Appendix

## Appendix 1- Indicators

The indicators and definitions follow as closely as possible those used by UNICEF for global reporting. ${ }^{27}$

- Stunting

Under-five children 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) that 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 higher ${ }^{28}$ plus children 36-59 months ( 3 to 5 years) that attend some form of early childhood education programme.

- Work and chores

Includes number of hours 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, per week.

[^16]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 | $2000 / 2006$ |
| 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 | $2000 / 2006$ |
| Viet Nam | $2006 / 2010-11$ |

Appendix 3-Summary statistics
Stunting ratios (\% of households)

| Stunting | Kazakhstan |  | AlbaniaY1 | Y2 | $\begin{aligned} & \hline \text { Belize } \\ & \hline Y 1 \end{aligned}$ | Y2 | Bosnia Herzegovina |  | $\begin{array}{l\|} \hline \text { Gambia } \\ \hline \text { Y1 } \end{array}$ | Y2 | Guyana$Y 1$ | Y2 | $\begin{aligned} & \text { Lao PDR } \\ & \hline \text { Y1 } \end{aligned}$ | Y2 | Mongolia$Y 1$ | Y2 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Bias in favour of... | Y1 | Y2 |  |  |  |  | Y1 | Y2 |  |  |  |  |  |  |  |  |
| none | 75.2 | 81.3 | 64.1 | 64.9 | 67.5 | 71.7 | 82.8 | 90.6 | 66.8 | 56.4 | 73.5 | 72.2 | 50.6 | 54.9 | 66.4 | 78.1 |
| for boys | 12.3 | 10.5 | 21.4 | 17.6 | 15.8 | 17.9 | 7.6 | 4.2 | 15.2 | 19.2 | 15.0 | 12.2 | 25.8 | 22.2 | 17.0 | 11.5 |
| for girls | 12.5 | 8.2 | 14.5 | 17.6 | 16.7 | 10.3 | 9.6 | 5.2 | 18.0 | 24.4 | 11.5 | 15.7 | 23.6 | 22.8 | 16.6 | 10.4 |


| Stunting | Nigeria |  | Serbia |  | Sierra Leone |  | Suriname |  | Swaziland |  | Togo |  | Iraq |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Bias in favour of... | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 |
| none | 63.3 | 57.3 | 78.6 | 92.0 | 52.0 | 53.1 | 85.1 | 86.3 | 51.2 | 57.7 | 62.9 | 57.9 | 63.8 | 68.5 |
| for boys | 17.2 | 19.9 | 11.3 | 3.7 | 24.5 | 20.3 | 6.5 | 4.7 | 21.2 | 21.0 | 17.3 | 18.9 | 17.8 | 15.3 |
| for girls | 19.5 | 22.7 | 10.2 | 4.3 | 23.6 | 26.6 | 8.4 | 9.0 | 27.5 | 21.3 | 19.8 | 23.2 | 18.3 | 16.3 |


| Bias in <br> favour <br> of... | All | Year 1 | Year 2 |
| :--- | ---: | ---: | ---: |
| none | 68.0 | 66.8 | 69.2 |
| for boys | 15.6 | 16.4 | 14.7 |
| for girls | 16.4 | 16.8 | 16.0 |

## Birth registration ratios (\% of households)

| Birthreg | Kazakhstan |  | $\begin{aligned} & \hline \text { Albania } \\ & \hline Y 1 \end{aligned}$ | Y2 | $\begin{aligned} & \hline \text { Belize } \\ & \hline Y 1 \end{aligned}$ | Y2 | $\begin{array}{\|l\|} \hline \text { Burundi } \\ \hline Y 1 \end{array}$ | Y2 | $\begin{aligned} & \text { Cameroon } \\ & \hline Y 1 \end{aligned}$ | Y2 | Cote d'Ivoire |  | $\begin{aligned} & \hline \text { Gambia } \\ & \hline Y 1 \end{aligned}$ | Y2 | $\begin{aligned} & \hline \text { Guyana } \\ & \hline \text { Y1 } \end{aligned}$ | Y2 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Bias in favour of... | Y1 | Y2 |  |  |  |  |  |  |  |  | Y1 | Y2 |  |  |  |  |
| none | 93.8 | 94.8 | 90.8 | 94.6 | 81.4 | 79.4 | 87.1 | 87.7 | 71.3 | 80.1 | 74.5 | 71.7 | 81.1 | 67.6 | 77.2 | 86.0 |
| for boys | 3.5 | 3.2 | 3.8 | 0.0 | 7.1 | 7.6 | 7.1 | 6.2 | 13.3 | 10.2 | 11.9 | 14.3 | 10.4 | 16.0 | 10.5 | 5.5 |
| for girls | 2.6 | 2.0 | 5.3 | 5.4 | 11.5 | 13.0 | 5.8 | 6.0 | 15.4 | 9.6 | 13.5 | 14.0 | 8.6 | 16.4 | 12.3 | 8.5 |


| Birthre <br> g | $\begin{aligned} & \text { Lao } \\ & \text { PDR } \end{aligned}$ |  | Mongoli <br> a |  | Nigeri <br> a |  | Serbi $\mathrm{a}$ |  | Sierra Leone |  | Surinam <br> e |  | Swazilan <br> d |  | Tog o |  | Trinidad and Tobago |  | Vietna <br> m |  | Ira q |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Bias in favour of... | Y1 | $Y 2$ | Y1 | $Y 2$ | Y1 | Y2 | Y1 | $Y 2$ | Y1 | $Y 2$ | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | $Y 2$ | Y1 | $Y 2$ |
| none | 89.2 | $\begin{array}{r} 77 . \\ 0 \\ \hline \end{array}$ | 88.2 | $\begin{array}{r} 89 . \\ \hline 9 \end{array}$ | 91.1 | $\begin{array}{r} 89 . \\ 2 \\ \hline \end{array}$ | 88.9 | $\begin{array}{r} 88 . \\ 5 \\ \hline \end{array}$ | $\begin{array}{r} 74 . \\ 9 \end{array}$ | $\begin{array}{r} 71 . \\ 6 \\ \hline \end{array}$ | 78.8 | $\begin{array}{r} 82 . \\ 9 \\ \hline \end{array}$ | 69.2 | $\begin{array}{r} 64 . \\ 8 \end{array}$ | 71.0 | $\begin{array}{r} 75 . \\ 6 \\ \hline \end{array}$ | 81.6 | 90.5 | 70.7 | $\begin{array}{r} 82 . \\ 4 \\ \hline \end{array}$ | $\begin{array}{r} 85 . \\ 0 \\ \hline \end{array}$ | $\begin{array}{r} 89 . \\ \hline 9 \end{array}$ |
| $\begin{array}{r} \text { for } \\ \text { boys } \end{array}$ | 5.0 | $\begin{array}{r} 11 . \\ 4 \\ \hline \end{array}$ | 6.3 | 5.5 | 4.2 | 5.2 | 3.5 | 6.5 | 9.9 | $\begin{array}{r} 14 . \\ 7 \\ \hline \end{array}$ | 10.4 | $\begin{array}{r} 10 . \\ 3 \\ \hline \end{array}$ | 17.0 | $\begin{array}{r} 17 . \\ 0 \\ \hline \end{array}$ | 15.4 | $\begin{array}{r} 11 . \\ 3 \\ \hline \end{array}$ | 7.0 | 3.4 | 15.1 | 7.4 | 8.1 | 5.1 |
| $\begin{array}{r} \text { for } \\ \text { girls } \end{array}$ | 5.8 | $\begin{array}{r} 11 . \\ 6 \\ \hline \end{array}$ | 5.5 | 4.7 | 4.7 | 5.6 | 7.6 | 5.0 | 15. 3 | $\begin{array}{r} 13 . \\ 7 \end{array}$ | 10.8 | 6.7 | 13.8 | $\begin{array}{r} 18 . \\ 2 \end{array}$ | 13.6 | 13. 0 | 11.4 | 6.1 | 14.2 | $\begin{array}{r} 10 . \\ 2 \end{array}$ | 6.9 | 5.0 |


| Bias in <br> favour <br> of... | All | Year 1 | Year 2 |
| :--- | ---: | ---: | ---: |
| none | 81.9 | 81.4 | 82.4 |
| for boys | 8.7 | 8.9 | 8.5 |
| for girls | 9.4 | 9.7 | 9.1 |

School attendance ratios (\% of households)


| Schoo <br> I | $\begin{aligned} & \hline \text { Lao } \\ & \text { PDR } \\ & \hline \end{aligned}$ |  | Mongoli a |  | Nigeri <br> a |  | Serbi <br> a |  | Sierra Leone |  | Surinam e |  | Swazilan d |  | $\begin{aligned} & \text { Tog } \\ & \text { o } \end{aligned}$ |  | Trinidad and Tobago |  | Vietna m |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Bias in favour of... | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 |
| none | 50.3 | $\begin{array}{r} 57 . \\ 3 \end{array}$ | 73.2 | $\begin{array}{r} 83 . \\ 6 \end{array}$ | 61.0 | $\begin{array}{r} 63 . \\ 1 \end{array}$ | 60.2 | $\begin{array}{r} 63 . \\ 1 \\ \hline \end{array}$ | 59.6 | 54.4 | 67.5 | $\begin{array}{r} 63 . \\ 9 \end{array}$ | 63.7 | $\begin{array}{r} 70 . \\ 6 \end{array}$ | 55.4 | $\begin{array}{r} 58 . \\ 2 \end{array}$ | 69.3 | 90.2 | 80.3 | $\begin{array}{r} 80 . \\ 8 \end{array}$ |
| $\begin{array}{r} \text { for } \\ \text { boys } \end{array}$ | 22.8 | $\begin{array}{r} 19 . \\ 9 \\ \hline \end{array}$ | 8.9 | 5.4 | 14.2 | $\begin{array}{r} 14 . \\ 1 \\ \hline \end{array}$ | 15.1 | $\begin{array}{r} 14 . \\ 6 \\ \hline \end{array}$ | 18.6 | 19.9 | 15.1 | $\begin{array}{r} 16 . \\ 9 \\ \hline \end{array}$ | 16.4 | $\begin{array}{r} 13 . \\ 8 \\ \hline \end{array}$ | 19.9 | $\begin{array}{r} 20 . \\ 4 \\ \hline \end{array}$ | 12.0 | 5.0 | 9.8 | 8.6 |
| $\begin{array}{r} \text { for } \\ \text { girls } \end{array}$ | 26.9 | $\begin{array}{r} 22 . \\ 7 \\ \hline \end{array}$ | 18.0 | $\begin{array}{r} 11 . \\ 0 \end{array}$ | 24.8 | $\begin{array}{r} 22 . \\ 9 \end{array}$ | 24.7 | $\begin{array}{r} 22 . \\ 3 \\ \hline \end{array}$ | 21.8 | 25.7 | 17.4 | $\begin{array}{r} 19 . \\ 2 \end{array}$ | 19.9 | $\begin{array}{r} 15 . \\ 6 \\ \hline \end{array}$ | 24.7 | $\begin{array}{r} 21 . \\ 4 \\ \hline \end{array}$ | 18.7 | 4.8 | 9.9 | $\begin{array}{r} 10 . \\ 6 \\ \hline \end{array}$ |


| Bias in <br> favour <br> of... | All | Year 1 | Year 2 |
| :--- | ---: | ---: | ---: |
| none | 63.5 | 59.3 | 67.6 |
| for boys | 15.4 | 16.5 | 14.4 |
| for girls | 21.1 | 24.2 | 18.0 |

## Work time ratios (\% of households)

| Work | Burundi |  | Cameroon |  | Cote d'Ivoire |  | Gambia |  | Guyana |  | Mongolia |  | Nigeria |  | Sierra Le |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Bias in favour of... | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 |
| for boys | 15.9 | 66.7 | 14.7 | 24.5 | 23.8 | 28.2 | 38.6 | 22.7 | 36.8 | 49.4 | 24.1 | 37.7 | 45.2 | 30.3 | 55 |
| none | 61.7 | 26.9 | 56.1 | 55.2 | 60.4 | 54.0 | 46.4 | 62.3 | 45.2 | 38.2 | 60.1 | 59.8 | 36.9 | 54.4 | 28 |
| for girls | 22.4 | 6.4 | 29.2 | 20.3 | 15.8 | 17.8 | 15.1 | 14.9 | 18.0 | 12.4 | 15.8 | 2.5 | 17.9 | 15.2 | 16 |


| Bias in <br> favour <br> of... | All | Year 1 | Year 2 |
| :--- | ---: | ---: | ---: |
| none | 34.3 | 33.2 | 35.3 |
| for boys | 51.6 | 50.0 | 53.2 |
| for girls | 14.1 | 16.8 | 11.5 |

Appendix 4- Direction of the bias within households
Stunting (Average \%)

| Stunting | Kazakhstan |  |  | Nigeria |  | Albania |  |  | Bosnia 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 | 10247 | 288 | 158 |  | 714 | 403 | 1301 | 1873 |  | 612 | 1053 | 254 | 522 | 6979 | 16968 |  |


| Stunting | Lao |  |  | Mongolia |  |  | Serbia |  | Sierra Leone |  | Swaziland |  | Guyana |  | Gambia |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Y1 | Y2 | ** | Y1 | Y2 |  | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | $Y 2$ |  |
| 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 |  |

+ indicates that the difference between boys and girls in each year is statistically significant
*Indicates that the difference across periods is statistically significant for boys or girls, respectively

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

Birth registration (Average \%)

|  | Kazakhstan |  |  | Nigeria |  |  | Albania |  |  | Burundi |  |  | Cameroon |  |  | Vietnam |  | Togo |  | Cote d'Ivoire |  | Suriname |  | Belize |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Y1 | Y2 | * | Y1 | Y2 |  | Y1 | $Y 2$ |  | Y1 | Y2 |  | Y1 | Y2 |  | Y1 | Y2 | Y1 | $Y 2$ | Y1 | $Y 2$ | Y1 | $Y 2$ | Y1 | Y2 |
| Boy $s$ | 0.79 | 0.82 |  | 0.13 | 0.16 |  | 0.8 3 | $\begin{array}{r} \hline 0.9 \\ 2 \end{array}$ |  | 0.48 | 0.63 | * | 0.38 | 0.69 | * | 0.5 6 | $\begin{array}{r} \hline 0.6 \\ 3 \end{array}$ | 0.42 | 0.44 | 0.27 | 0.27 | $\begin{array}{r} \hline 0.5 \\ 9 \end{array}$ | 0.57 | 0.4 4 | 0.4 4 |
| $\begin{aligned} & \hline \text { Girl } \\ & s \end{aligned}$ | 0.79 | 0.80 |  | 0.11 | 0.16 | * | $\begin{array}{r} \hline 0.8 \\ 4 \end{array}$ | $\begin{array}{r} \hline 0.9 \\ 9 \end{array}$ | * | 0.46 | 0.63 | * | 0.37 | 0.69 | * | $\begin{array}{r} \hline 0.5 \\ 9 \end{array}$ | $\begin{array}{r} \hline 0.6 \\ 7 \end{array}$ | 0.40 | 0.47 | 0.27 | 0.28 | $\begin{array}{r} \hline 0.6 \\ 0 \end{array}$ | 0.51 | 0.4 7 | 0.4 6 |
| ++ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| $N$ | $\begin{array}{r} 100 \\ \hline \end{array}$ | 124 8 |  | 525 7 | $\begin{array}{r} 1022 \\ \hline 4 \end{array}$ |  | 288 | 158 |  | $\begin{array}{r}101 \\ 7 \\ \hline\end{array}$ | 219 3 |  | 146 3 | 254 5 |  | 706 | 547 | $\begin{array}{r} 129 \\ 4 \\ \hline \end{array}$ | $\begin{array}{r} \hline 186 \\ 6 \\ \hline \end{array}$ | 318 8 | $\begin{array}{r} 353 \\ 5 \\ \hline \end{array}$ | 608 | $\begin{array}{r} 105 \\ 3 \\ \hline \end{array}$ | 252 | 522 |


|  | Trinidad and Tobago |  | Iraq |  |  | Lao |  | Mongolia |  | Serbia |  | Sierra Leone |  | Swaziland |  | Guyana |  |  | Gambia |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Y1 | Y2 | Y1 | Y2 |  | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 |  | Y1 | Y2 |  |
| Boys | 0.04 | 0.02 | 0.72 | 0.89 | * | 0.64 | 0.57 | 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 | 0.05 | 0.01 | 0.71 | 0.88 | * | 0.64 | 0.57 | 0.86 | 0.81 | 0.57 | 0.67 | 0.33 | 0.37 | 0.42 | 0.36 | 0.79 | 0.95 | * | 0.27 | 0.53 | * |
| ++ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| $N$ |  |  | 6979 | 16968 |  | 1257 | 3105 | 568 | 754 | 1051 | 691 | 1625 | 2439 | 1415 | 842 | 880 | 788 |  | 1536 | 3251 |  |

+ indicates that the difference between boys and girls in each year is statistically significant
*Indicates that the difference across periods is statistically significant for boys or girls, respectively

|  | All |  | Y1 | Y2 |
| :--- | ---: | ---: | ---: | ---: |
| Boys | 0.53 | 0.50 | 0.56 |  |
| Girls | 0.54 |  | 0.50 |  |

School attendance (Average \%)

|  | Kazakhstan |  |  | Nigeria |  | Albania |  |  | Burundi |  |  | Cameroon |  |  | Vietnam |  | Togo |  | Cote d'Ivoire |  |  | Suriname |  | Belize |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\begin{aligned} & \hline \text { Count } \\ & \text { ry } \\ & \hline \end{aligned}$ | Y1 | Y2 | * | Y1 | Y2 | Y1 | Y2 |  | Y1 | Y2 |  | Y1 | Y2 |  | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 |  | Y1 | Y2 | Y1 | Y2 |  |
| Boys | $\begin{array}{r} 0.8 \\ 7 \end{array}$ | $\begin{array}{r} 0.8 \\ 5 \\ \hline \end{array}$ |  | 0.80 | 0.80 | $\begin{array}{r} 0.4 \\ 6 \end{array}$ | $\begin{array}{r} \hline 0.9 \\ 6 \\ \hline \end{array}$ | * | $\begin{array}{r} 0.4 \\ 7 \end{array}$ | 0.73 | * | $\begin{array}{r} 0.9 \\ 1 \end{array}$ | 0.96 | * | $\begin{array}{r} \hline 0.9 \\ 0 \\ \hline \end{array}$ | $\begin{array}{r} \hline 0.9 \\ 1 \\ \hline \end{array}$ | $\begin{array}{r} \hline 0.8 \\ 4 \\ \hline \end{array}$ | 0.8 5 | 0.77 | 0.85 | * | 0.8 6 | 0.8 7 | 0.7 3 | 0.8 3 | * |
| Girls | $\begin{array}{r} 0.8 \\ 7 \\ \hline \end{array}$ | $\begin{array}{r} 0.8 \\ 7 \end{array}$ |  | 0.79 | 0.80 | $\begin{array}{r} 0.4 \\ 5 \end{array}$ | $\begin{array}{r} 0.9 \\ 2 \\ \hline \end{array}$ | * | $\begin{array}{r} 0.4 \\ 3 \end{array}$ | 0.70 | * | $\begin{array}{r} 0.9 \\ 1 \end{array}$ | 0.94 |  | $\begin{array}{r} \hline 0.9 \\ 0 \\ \hline \end{array}$ | $\begin{array}{r} 0.9 \\ 2 \\ \hline \end{array}$ | $\begin{array}{r} 0.8 \\ 1 \end{array}$ | 0.8 2 | 0.69 | 0.80 | * | 0.8 7 | $\begin{array}{r} \hline 0.8 \\ 7 \\ \hline \end{array}$ | 0.7 5 | 0.8 0 | * |
| ++ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | + | + |  |  |  |  |  |  |
| $N$ | $\begin{array}{r} 581 \\ \hline 4 \end{array}$ | $\begin{array}{r} 559 \\ \hline 4 \end{array}$ |  | $\begin{array}{r} 2901 \\ 6 \end{array}$ | $\begin{array}{r} 4267 \\ 9 \end{array}$ | $\begin{array}{r} 259 \\ 8 \end{array}$ | $\begin{array}{r} 165 \\ 6 \end{array}$ |  | $\begin{array}{r} 641 \\ 7 \end{array}$ | $\begin{array}{r} 1206 \\ 6 \end{array}$ |  | 490 3 | $\begin{array}{r} 1108 \\ 9 \end{array}$ |  | 809 7 | 442 9 | 880 2 | 976 9 | $\begin{array}{r} 1572 \\ 5 \\ \hline \end{array}$ | 1340 1 |  | 375 1 | 562 6 | 206 5 | 337 1 |  |


|  | Trinidad and Tobago |  |  | Lao |  |  | Mongolia |  |  | Serbia |  | Sierra Leone |  | Swaziland |  |  | Guyana |  |  | Gambia |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Country | Y1 | Y2 |  | Y1 | Y2 |  | Y1 | Y2 |  | Y1 | Y2 | Y1 | Y2 | Y1 | Y2 |  | Y1 | Y2 |  | Y1 | Y2 |  |
| Boys | 0.83 | 0.96 | * | 0.78 | 0.79 |  | 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 | 0.88 | 0.96 | * | 0.74 | 0.77 | * | 0.90 | 0.94 | * | 0.90 | 0.87 | 0.81 | 0.82 | 0.84 | 0.88 | * | 0.80 | 0.90 | * | 0.45 | 0.76 | * |
| ++ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| $N$ | 2296 | 2625 |  | 8264 | 22243 |  | 4283 | 4497 |  | 3193 | 1821 | 11304 | 17669 | 8652 | 5652 |  | 5551 | 5619 |  | 7579 | 13438 |  |

+ indicates that the difference between boys and girls in each year is statistically significant
*Indicates that the difference across periods is statistically significant for boys or girls, respectively

| Country | All |  | Y1 | Y2 |
| ---: | ---: | ---: | ---: | ---: |
| Boys | 0.82 |  | 0.77 |  |
| Girls | 0.81 |  | 0.77 |  |

Work time (Average number of hours per week)

|  | Nigeria |  |  | Burundi |  |  | Cameroon |  |  | Togo |  | Cote d'Ivoire |  |  | Suriname |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Economic or domestic work |  |  | Economic or domestic work |  |  | Economic or domestic work |  |  | Economic or domestic work |  | Economic or domestic work |  |  | Economic or domestic work |  |
|  | 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 |
| ++ |  | + |  |  |  |  |  |  |  | + | + | + | + |  |  |  |
| $N$ | 21482 | 19296 |  | 2864 | 11727 |  | 3923 | 4183 |  | 4913 | 4018 | 10142 | 12380 |  | 1041 | 1734 |


|  | Mongolia |  |  | Sierra Leone |  |  | Swaziland |  |  | Guyana |  | Gambia |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Economic or domestic work |  |  | Economic or domestic work |  |  | Economic or domestic work |  |  | Economic or domestic work |  | Economic or domestic work |  |  |
|  | 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 | 11284 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

+ indicates that the difference between boys and girls in each year is statistically significant
*Indicates that the difference across periods is statistically significant for boys or girls, respectively

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

Appendix 5- Cross tabulations
Stunting and school attendance

| Stunting/ School | None | Bias for <br> boys | Bias for <br> girls | Total |
| :--- | ---: | ---: | ---: | ---: |
| None | 2,089 | 1,382 | 2,556 | 6,027 |
| Bias for boys | 20.55 | 13.59 | 25.14 | 59.28 |
|  | 555 | 613 | 736 | 1,904 |
| Bias for girls | 5.46 | 6.03 | 7.24 | 18.73 |
| Total | 666 | 495 | 1,075 | 2,236 |
|  | 6.55 | 4.87 | 10.57 | 21.99 |
|  | 3,310 | 2,490 | 4,367 | 10,167 |

Stunting and work hours

| Stunting/ Work | None | Bias for boys | Bias for girls | Total |
| :---: | :---: | :---: | :---: | :---: |
| None | 588 | 1,010 | 249 | 1,847 |
|  | 18.26 | 31.37 | 7.73 | 57.36 |
| Bias for boys | 171 | 340 | 101 | 612 |
|  | 5.31 | 10.56 | 3.14 | 19.01 |
| Bias for girls | 241 | 387 | 133 | 761 |
|  | 7.48 | 12.02 | 4.13 | 23.63 |
| Total | 1,000 | 1,737 | 483 | 3,220 |
|  | 31.06 | 53.94 | 15 | 100 |

## Birth registration and school attendance

| Birth reg./ School | None | Bias for <br> boys | Bias for <br> girls | Total |
| :--- | ---: | ---: | ---: | ---: |
| None | 3,849 | 2,604 | 4,387 | 10,840 |
| Bias for boys | 28.66 | 19.39 | 32.66 | 80.7 |
|  | 472 | 309 | 509 | 1,290 |
| Bias for girls | 3.51 | 2.3 | 3.79 | 9.6 |
| Total | 464 | 361 | 477 | 1,302 |
|  | 3.45 | 2.69 | 3.55 | 9.69 |
|  | 4,785 | 3,274 | 5,373 | 13,432 |
|  | 35.62 | 24.37 | 40 | 100 |

Birth registration and work hours

| Birth reg./ Work | None | Bias for <br> boys |  | Bias for <br> girls |  | Total |
| :--- | ---: | ---: | ---: | ---: | :---: | :---: |
| None | 1,232 | 2,076 | 567 | 3,875 |  |  |
| Bias for boys | 25.02 | 42.15 | 11.51 | 78.68 |  |  |
| Bias for girls | 164 | 262 | 83 | 509 |  |  |
|  | 3.33 | 5.32 | 1.69 | 10.34 |  |  |
| Total | 160 | 290 | 91 | 541 |  |  |
|  | 3.25 | 5.89 | 1.85 | 10.98 |  |  |

School attendance and work hours

| School/ Work | None | Bias for <br> boys | Bias for <br> girls | Total |
| :--- | ---: | ---: | ---: | ---: |
| None | 4,569 | 4,855 | 1,729 | 11,153 |
| Bias for boys | 24.97 | 26.53 | 9.45 | 60.95 |
|  | 1,186 | 1,932 | 441 | 3,559 |
| Bias for girls | 6.48 | 10.56 | 2.41 | 19.45 |
| Total | 1,454 | 1,479 | 653 | 3,586 |
|  | 7.95 | 8.08 | 3.57 | 19.6 |
|  | 7,209 | 8,266 | 2,823 | 18,298 |
|  | 39.4 | 45.17 | 15.43 | 100 |

Appendix 6- Measures of association by country

| By Country | Kaza | Alb | Beli | Bosh | Buru | Came | Cote | Gamb | Guy | Lao | Mong | Niga | Serb | Sier | Suri | Swaz | Togo | Trin | Viet | Iraq |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Cramer's V |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Stunting/ Birth reg. | 0.070 | 0.159 | 0.094 | . | . | . | . | 0.053 | 0.091 | 0.062 | 0.028 | 0.023 | 0.052 | 0.064 | 0.069 | 0.025 | 0.047 | . |  | 0.043 |
| Stunting/ School | 0.058 | 0.198 | 0.100 | . | . | . | . | 0.068 | 0.027 | 0.152 | 0.172 | 0.100 | 0.082 | 0.093 | 0.083 | 0.058 | 0.078 |  |  | . |
| Stunting/ Work | . |  | . | . | . | . | . | 0.114 | 0.071 | . | 0.289 | 0.024 | . | 0.070 | 0.106 | 0.099 | 0.033 | . | . | . |
| Birth reg./ School | 0.076 | 0.161 | 0.046 | . | 0.065 | 0.072 | 0.052 | 0.047 | 0.041 | 0.098 | 0.056 | 0.036 | 0.044 | 0.038 | 0.062 | 0.035 | 0.072 | 0.127 | 0.060 | . |
| Birth reg./ Work | . |  | . | . | 0.035 | 0.057 | 0.048 | 0.035 | 0.137 | . | 0.336 | 0.036 | . | 0.054 | 0.125 | 0.215 | 0.093 | . | . | . |
| School/ Work |  |  | . | . | 0.145 | 0.068 | 0.072 | 0.084 | 0.128 | . | 0.187 | 0.064 | . | 0.092 | 0.174 | 0.071 | 0.091 | . | . | . |
| "P" stat boys |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Stunting/ Birth reg. | 0.261 | 0.182 | 0.143 | . | . |  |  | 0.216 | 0.092 | 0.201 | 0.125 | 0.181 | 0.118 | 0.284 | 0.052 | 0.218 | 0.190 |  | . | 0.218 |
| Stunting/ School | 0.457 | 0.700 | 0.536 | . | . | . | . | 0.433 | 0.455 | 0.592 | 0.615 | 0.457 | 0.458 | 0.560 | 0.500 | 0.270 | 0.507 | . | . | . |
| Stunting/ Work |  |  | . | . | . |  | . | 0.307 | 0.294 |  | 0.500 | 0.265 | . | 0.306 | 0.200 | 0.308 | 0.250 |  | . | . |
| Birth reg./ School | 0.636 | 0.600 | 0.393 | . | 0.351 | 0.190 | 0.327 | 0.347 | 0.471 | 0.347 | 0.556 | 0.325 | 0.688 | 0.514 | 0.538 | 0.290 | 0.375 | 0.438 | 0.260 | . |
| Birth reg./ Work |  |  | . | . | 0.067 | 0.182 | 0.137 | 0.179 | 0.250 | . | 0.500 | 0.172 | . | 0.255 | 0.000 | 0.077 | 0.237 | . | . | . |
| School/ Work | . |  | . | . | 0.332 | 0.293 | 0.205 | 0.367 | 0.250 | . | 0.328 | 0.211 | . | 0.229 | 0.250 | 0.250 | 0.245 | . | . | . |
| "P" stat girls |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Stunting/ Birth reg. | 0.176 | 0.200 | 0.280 | . | . | . | . | 0.211 | 0.153 | 0.219 | 0.135 | 0.154 | 0.135 | 0.178 | 0.184 | 0.214 | 0.181 | . | . | 0.192 |
| Stunting/ School | 0.161 | 0.667 | 0.410 | . | . | . | . | 0.325 | 0.286 | 0.467 | 0.276 | 0.311 | 0.067 | 0.320 | 0.333 | 0.269 | 0.359 | . | . | . |
| Stunting/ Work | . | - | . | . | - | . | . | 0.636 | 0.375 | . | 0.571 | 0.523 | . | 0.478 | 0.833 | 0.500 | 0.629 | . | . | . |
| Birth reg./ School | 0.267 | 0.000 | 0.222 | . | 0.167 | 0.036 | 0.303 | 0.205 | 0.236 | 0.220 | 0.091 | 0.182 | 0.077 | 0.308 | 0.310 | 0.221 | 0.420 | 0.000 | 0.222 | . |
| Birth reg./ Work | . | . | . | . | 0.415 | 0.595 | 0.532 | 0.615 | 0.200 | . | . | 0.407 | . | 0.465 | 0.364 | 0.412 | 0.586 | . | . | . |
| School/ Work |  | . | . | . | 0.485 | 0.656 | 0.595 | 0.661 | 0.555 |  | 0.649 | 0.544 |  | 0.510 | 0.715 | 0.619 | 0.696 | . | . | . |


[^0]:    ${ }^{1}$ Childhood experiences of deprivation and inequality can have lasting consequences and may be different to adult experiences. Some studies have focused on child poverty, in particular, the Young Lives longitudinal study on childhood poverty carried out in four developing countries (Peru, Vietnam, Ethiopia and India), UNICEF's State of the World's Children reports and cross-country Multiple Overlapping Deprivation Analysis (MODA) (Neuborg et al. 2012), and Roche's (2013) study of multidimensional child poverty in Bangladesh, among others.
    ${ }^{2}$ Data from DHS and MICS is cross-sectional, which allows following general country trends, but is perhaps insufficient to track the long-term impacts of inequalities on children. Panel data is still rare and would be helpful this regard.
    ${ }^{3}$ Group based differences on the basis of ethnicity, location and wealth can also influence this partial view of progress. See for example Lenhardt (2014 forthcoming).
    ${ }^{4}$ Inheritance practices, for example, reflect these preferences. Inheritance of land and productive assets has been found to be biased against women in many countries (see for example Estudillo et al. 2001 and Cooper 2011; Doss et al. 2011; Bird 2011; among others).

[^1]:    ${ }^{5}$ Even if these are aggregate differences, rather than differences captured within households, they can be indicative of the type of parental preference for a particular gender.

[^2]:    ${ }^{6}$ Total consumption expenditure, education of the mother, household size, ethnicity/caste and location (urban/rural).

[^3]:    ${ }^{7}$ This means that the sample of households is reduced. On average for all countries, the share of households kept in the analysis is $18 \%$ for stunting, $19 \%$ for birth registration, $17 \%$ for support for learning, $38 \%$ in school attendance, and $20 \%$ for work time.
    ${ }^{8}$ The discontinuity could be problematic if it affected the inequality measure, that is, if inequality was larger in smaller households where the discontinuity could potentially be larger. To test whether it is likely that the household size, in particular the number of children in the household, had an impact in inequality we ran a simple OLS regression of the standardized household ratios (which are a measure of intrahousehold inequality) on the number of children in the household. We find that the coefficients are significant, but of very small magnitudes (the highest being 0.025 ), and that the overall R2 is very small (below 0.003 ), indicating that its contribution to intrahousehold inequality is small. Moreover, even if there was an impact, the direction of the bias was not consistent; the coefficients are positive in two cases and negative in the other. When adding country dummies to this simple regression, the coefficients and R2 increase, but the variable loses significance in one case (birth registration). This may again indicate that the effect of children number of intrahousehold inequality may be influenced by the country context. For once, the average household size varies considerably across countries (from 5.8 to 8.0 in our sample) and thus controlling for household size (or number of children) when measuring poses the problem of defining an appropriate level for comparison. 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. larger ones), distribute their resources more (un)equally than others. The coefficient indicating the relationship between children number and intrahousehold inequality is also significant (and negative) for the work hours indicator, which does not suffer from the discontinuity problem.
    ${ }^{9}$ Our 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 (see for example Dutta and Foster (2011), Allison and Foster (2004) and Kobus and Piotr (2012)). The discontinuity of the variable is unlikely to affect the mean value for each household, and thus the inequality measure.

[^4]:    ${ }^{10}$ Variables are recoded to match this interpretation.
    ${ }^{11}$ The Gini on the other hand, places equal weight to all parts of the distribution.
    ${ }^{12}$ Apart from the within and the between components, the Gini has a non-zero residual term and is not subgroup consistent, that is, if inequality declines in one subgroup (region, ethnic group, etc.) and remains unchanged in the rest of population, then the overall inequality does not decline.
    ${ }^{13}$ 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.

[^5]:    ${ }^{14}$ 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 wellbeing: shelter, sanitation, safe drinking water, information, food, education and health.

[^6]:    ${ }^{15}$ Other possibilities, such as for example measuring multidimensional inequality using the count vector in the Alkire-Foster method, 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.

[^7]:    ${ }^{16}$ 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.
    ${ }^{17}$ It also outlines the construction of a multidimensional Gini (Decanq and Lugo 2009; Tsui 1995 and 1999) to analyse the distribution of the deprivation index, although to the date that analysis is undergoing and yet unpublished.

[^8]:    ${ }^{18}$ There are also differences in the standards to measure nutrition indicators, which largely depend on the underlying population reference. Patterns differ substantially when using the old NCSH/WHO or the new WHO standards established in 2006, in particular stunting is likely to be higher when using the new standards (de Onis et al. 2006). For example, in an experiment using a DHS survey for Bangladesh, both underweight and stunting rates are about 10\% higher with the WHO standards (de Onis et al. 2006). Even though the WHO standards are probably better to capture 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 are used in this paper to compute stunting rates and the respective inequality indicators. This was done to ensure comparability over time, because MICS surveys from round 2 and most of round 3 were conducted when this was the standard in place.

[^9]:    ${ }^{19}$ In Figures 2-5 average levels are computed as the mean value for girls and boys in the sample. Total and within-household inequality refer to the L-Theil Index results in each country.

[^10]:    ${ }^{20}$ For data on this type of inequality see http://www.education-inequalities.org/

[^11]:    ${ }^{21}$ 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 those cases, which can be a result of both progress in the dimension, or measurement error at the time of collecting the survey.

[^12]:    ${ }^{22}$ These averages include girls and boys who do not engage in work or chores at all ( 0 hours a week). The average number of hours for those children that work is 19.8 hours for boys and 20.5 hours for girls.

[^13]:    ${ }^{23}$ The large jumps in between-household inequality 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 those cases, which can be a result of both, progress in the dimension, or measurement error at the time of collecting the survey.

[^14]:    ${ }^{24}$ 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.
    ${ }^{25}$ See Alkire et al. (2013) for a more detailed explanation. http://www.ophi.org.uk/wp-content/uploads/SS13Associations SA-PB-JMR-AV.pdf?7ff332\&7ff332

[^15]:    ${ }^{26}$ In addition, as an exploratory exercise we pooled the observations for all countries with available data in this study, and run a simple OLS regression with country fixed effects to try to see whether some types of households would be more prone to certain intrahousehold inequalities (as measured by the ratios of girl to boy achievements as the dependent variable). Unfortunately, the availability of comparable information across surveys limited the selection of explanatory variables; this included the number of children in the household, the gender of the head of the household, a household wealth index and its location in a rural or urban area. Nevertheless, the explanatory power of these regressions was generally very low, indicating that there are many unexplained factors influencing 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 intrahousehold inequalities.

[^16]:    ${ }^{27}$ http://www.childinfo.org/mics4 questionnaire.html
    ${ }^{28}$ 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 and a later edition of UNICEF's The State of the World's Children.

