Multidimensional Poverty and Inequality of Opportunity in Peru: Taking Advantage of the Longitudinal Dimension of Young Lives

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Abstract

Multidimensional poverty and inequality of opportunity are closely interconnected concepts. Equality of opportunity levels the playing field so that circumstances such as gender, ethnicity, geographical location or family background, which are beyond the control of a child, do not influence his or her life chances. This means that if equality of opportunity is achieved, a child will be able to overcome multidimensional poverty and deprivation. Using the information collected in Peru during the first two rounds of the Young Lives longitudinal study, we describe how multidimensional poverty and inequality of opportunity evolve as children get older. Results show that although scalar indices of multidimensional poverty, deprivations or inequality of opportunity may be quite useful as an advocacy tool, they may mask important heterogeneities.

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1. Introduction

Equality of opportunity has increasingly captured the attention of policymakers. Recently, international organisations like the World Bank and UNDP have included specific indicators to trace inequality in access to key public goods and services (see Paes de Barros et al. 2009 and UNDP 2007). Unlike equality of outcome, in which one seeks to reduce or eliminate differences in material condition between individuals or households in a society, equality of opportunity aims to level the playing field so that circumstances such as gender, ethnicity, birthplace, maternal education or any other aspect of family background, which are beyond the control of an individual, do not influence a person's life chances.

The literature recognises that inequality may include many dimensions. Some authors tend to focus on inequality in terms of outcomes like income, consumption, access to education and access to work, and measure it accordingly. Others, such as Sen (1985), have advocated the need to look at activities and states that make up people's well-being, taking into account a wider range of outcomes, including elementary ones, such as being in good health and properly nourished and sheltered, and social outcomes such as having self-respect or taking part in the life of the community. Yet others, such as Roemer (1998), have emphasised the fact that inequality of opportunity should be measured in such a way that it is independent of an individual's circumstances, and is a function only of their effort.

In an ideal world, children's chances of success in life would depend on their effort, talent and choices and not on their circumstances at birth or other circumstances beyond their control. While outcomes can usually be measured with a considerable degree of precision, opportunities cannot. However, when we look at children – especially at an early age – it is more likely that it is circumstances and not effort that are determining their well-being. Something different may happen as the children grow up to become young people and adults. In those cases we might expect that effort would

play an increasing role as a determinant of their well-being. Therefore, the best group to use to evaluate how these initial circumstances affect opportunities in life is young children, given that at very early ages the effort component is very small.[1]

Several indicators have been constructed to try to measure inequality of opportunity. Following the work of Roemer (1998), which distinguishes between 'circumstances' and 'effort', authors like Lefranc et al. (2006) have developed statistical tests to compare the distribution of opportunities between individuals with similar circumstances. Ruiz-Castillo (2003) and Bourguignon et al. (2003) followed a complementary approach and constructed a scalar index of inequality of opportunity, based on dividing the population according to such categories of circumstances as parents' education, occupation and race. This index has been adapted and used in several World Bank publications including Paes de Barros et al. (2009),who used it to evaluate inequality of opportunity among children in Latin America.

A closely related concept of inequality of opportunity is that of experiencing deprivations. Gordon et al. (2003) introduced the concept of deprivations, highlighting the multidimensional nature of poverty in general and child poverty in particular. These authors constructed a poverty headcount based on counting children with two or more severe deprivations. The gauge included seven indicators: appropriate shelter; sanitation facilities; safe drinking water; adequate nutrition as reflected by not being stunted, wasted or undernourished; school attendance; adequate immunisation coverage; and access to information sources like radio, television, telephone, newspaper or computer. In 2007, UNICEF fully acknowledged the multidimensional nature of child poverty. The January 2007 UN General Assembly stated, in its annual resolution on the rights of the child, that 'Children living in poverty are deprived of nutrition, water and sanitation facilities, access to basic healthcare services, shelter, education, participation and protection, and that while a severe lack of goods and

[1] One may wonder, however, if equality of opportunity for children can be achieved without greater equality of outcome for parents.

services hurts every human being, it is most threatening and harmful to children, leaving them unable to enjoy their rights, to reach their full potential and to participate as full members of the society' (UNICEF 2007: 11).

In Peru, inequality in general, and inequality of opportunity in particular, has increasingly captured the attention of researchers and policymakers.[2] Although there is some evidence that income inequality has been decreasing in recent years (Jaramillo and Saavedra 2009; Lopez-Calva and Lustig 2009) this reduction is small when compared to the high level of income inequality prevailing in Peru, and it masks important inequality trends along other relevant dimensions such as location (urban/rural/remote), ethnicity and life stage. For example, although income inequality, as measured by the Gini coefficient, may show a very small decline, the gap in income or in other well-being dimensions between urban/rural areas is increasing. Figueroa and Barrón (2005) and Barrón (2008) suggest that inequality along the ethnic divide may be increasing. Escobal and Ponce (2010) show that while income inequality, measured by a Gini coefficient, diminished between 1993 and 2007, during the same period geographic polarisation of well-being increased. Similarly, Muñoz et al. (2007) show that inequalities between groups continue to be very high. In relation to child well-being, data available from INEI, the Peruvian national statistics agency (2010), show that although the gap between the top 20 per cent and bottom 20 per cent of the income distribution has been reduced in the last decade in important poverty (or lack of well-being) indicators such as chronic malnutrition or low weight at birth, it continues to be large and is increasing in other relevant dimensions such as prevalence of acute respiratory infections, or access to key services like full immunisation.

We believe that inequality of opportunity should not be analysed taking each opportunity or outcome in isolation from other relevant outcomes. Instead we need to recognise that children who share a certain set of

[2] Equality of opportunity was the central campaign slogan of one of the candidates running in the 2011 presidential election.

circumstances may be simultaneously deprived in several well-being dimensions, and inequality in accessing one particular opportunity may be correlated with inequality in accessing several other opportunities. In addition, an indicator of multiple deprivations should allow us to focus on the deprivations of groups in specific circumstances, in order to target them with relevant policies.

In this paper we explore different dimensions and complexities of deprivations and inequality (or equality) of opportunity for children in Peru, using the Young Lives sample. Young Lives is an international study carried out in four countries (Ethiopia, Vietnam, India and Peru), whose objective is to improve our understanding of the causes and consequences of childhood poverty and to examine how circumstances and government policies affect children's well-being over time. Young Lives has been tracking 2,000 Peruvian children from a Younger Cohort, who were aged between 6 months and 18 months in 2002, when the study began. The study also tracks an Older Cohort of about 700 children who were aged between 7.5 and 8.5 years old in 2002. The second round of data gathering was carried out between late 2006 and early 2007, and the third round between August 2009 and January 2010.

The benefits of looking at inequality of opportunity using the lens provided by the Young Lives data are two-fold. First, in comparison with traditional surveys like the Living Standard Measurement Surveys or the Demographic and Health Surveys, Young Lives covers a wide range of well-being indicators for the sampled children, including physical health, nutrition, education and material wealth of their parents, as well as maternal psychosocial well-being (self-esteem and sense of efficacy, sense of discrimination, etc.). This range of well-being indicators is seldom covered in national representative samples, which typically need to narrow their focus towards people's ability to access to basic services. By looking at a broad range of indicators, we can identify whether inequality of opportunity is affecting the various dimensions of child well-being differently. A second benefit of using Young Lives data is that of taking advantage of the longitudinal nature of the sampling framework. Although the original

sampling framework allows us to be statistically representative of the Peruvian children of the two cohorts at the time the sampling was done, following children over time allows us to incorporate different outcome indicators as they grow up. In addition, we are able to track individual trajectories and evaluate whether or not replacing these individual trajectories with looking at averages over time may mask increasing inequality among children. The longitudinal nature of the data allows us to understand better why inequality of opportunity may be increasing or decreasing, as we are able to control for individual and community fixed non-observables that are typically embedded in repeated cross-sectional data.

In this paper we use a variety of indicators to track multidimensional poverty and inequality of opportunity. First, we use aggregate indicators of multidimensional poverty and deprivations. Next we use the methodology developed by Paes de Barros et al. (2009) to measure a person's chances of success in life in different dimensions like schooling and health. This measure is called the Human Opportunity Index (HOI). The HOI controls for previous circumstances or a child's background to determine their chances of success in life.

Although any scalar index of poverty, deprivations or inequality of opportunity may be useful as an advocacy tool, this paper shows that it may mask important heterogeneities that make it insufficient to show the full scope and depth of inequality of opportunity. Looking at a broad range of indicators, evaluating how opportunities and deprivations are unevenly distributed across a sample of children, and showing that circumstances are correlated are crucial to address inequality properly. In this context we need to look not just at differences in opportunities or deprivations between those who are affected by a certain circumstance and those who are not, but also at these indicators within groups of children affected simultaneously by a range of circumstances. This range of circumstances may not be isolated and specific, but may be related to broad patterns of discrimination.

Having children as a target population for these indicators brings children's issues and needs into the arena of policy. Exploring whether or not inequality of opportunity widens at early stages of life will allow us to engage in a policy debate associated with the costs and benefits of early childhood development programmes.

The paper is divided into five sections. Section 2, after this introduction, presents briefly the Young Lives data used, stressing the importance of capturing a wide range of variables that can cover the range of functionings that are relevant for children at different stages of their lives. Section 3 discusses alternative multidimensional poverty and deprivation indices, including those suggested by Chakravarty et al. (1998), Bourguignon and Chakravarty (2003) and Alkire and Foster (2008). Next it presents the HOI championed by the World Bank. In Section 4, we estimate multidimensional poverty indices and the HOI to analyse Peruvian Young Lives data for both the Younger and Older Cohorts for the first two survey rounds (2002 and 2006–7). Finally in Section 5, we discuss the importance of looking beyond single scalar indices of inequality of opportunity or multidimensional poverty by considering which poverty dimensions matter for whom.

2. The Young Lives data

Young Lives is an innovative long-term international research study that investigates the changing nature of childhood poverty. By making publicly available the information gathered, the project seeks to improve understanding of the causes and consequences of childhood poverty, to examine how government policies affect children's well-being, and to inform the development and implementation of future policies and practices aimed at reducing childhood poverty. Since 2002, the study has been tracking 2,860 children in Peru through quantitative and qualitative data collection and through research, and will continue to do so over a 15-year period. The study collects information at the child, household and community level, covering a range of issues that determine and affect the welfare of children.

The depth and extent of the Young Lives database is unique. No longitudinal research of this size, scope and complexity has ever been undertaken in the developing world. The project not only collects data on underlying processes and outcomes associated with child poverty, but also gathers qualitative information that allows a very rich and in-depth analysis of children's lives and how they are affected by poverty and government policies.

In Peru, the Young Lives team used multistage, cluster-stratified, random sampling to select the two cohorts of children. This methodology, unlike the one applied in the other Young Lives countries, randomises sentinel sites as well as households within sentinel site locations. To ensure the sustainability of the study, and for resurveying purposes, a number of well-defined sites were chosen. These were selected with a pro-poor bias, ensuring that randomly selected clusters of equal population excluded districts located in the top 5 per cent of the poverty map developed in 2000 by FONCODES (the Fondo Nacional de Cooperacion para el Desarrollo – National Fund of Cooperation for Development). Details about the sampling frame and sampling weights can be found in Escobal and Flores (2008).

2.1 Well-being, opportunity outcomes and circumstances in Young Lives data

Table 1 shows the indicators in the Young Lives survey that can be used to assess inequality of opportunity for children in Peru. The survey includes a range of child, household and community characteristics that can be used to control for circumstances when calculating the HOI, shown in Table 2.

As we have mentioned, obtaining an empirical approximation of inequality of opportunity for children involves the difficult task of classifying available indicators into 'outcomes', 'circumstances' and 'efforts'. Although when children are very young, most of the outcomes are the result of circumstances, as effort on the part of the child is not considered relevant, we may still need to acknowledge that circumstances can also encompass situations where some parental outcomes are directly related to parental efforts. Here we exclude some parental outcomes (like income) as they should be considered circumstances from the child's point of view. On the

other hand, access to key services (like electricity, water and sanitation, and vaccination) could be considered circumstances, but at the same time they are outcomes in terms of child well-being, even if children have absolutely no control over them. We acknowledge however that the distinction between outcomes and circumstances is never an easy one.

Table 1. Selected child well-being and poverty outcomes measured in Young Lives survey (Rounds 1 and 2)

	Younger Cohort		Older Cohort	
	Round 1	**Round 2**	**Round 1**	**Round 2**
Mother had access to prenatal care	X			
Child was ever breast-fed	X	X	X	X
Child has vaccination card	X			
Access to electricity	X	X	X	X
Access to water piped into dwelling	X	X	X	X
Access to safe drinking water (public network)		X		X
Sanitation facilities (flush toilet or septic tank)	X	X	X	X
Chronic malnutrition (WHO 2006) stunting	X	X	X	X
Global malnutrition (WHO 2006) underweight	X	X	X	X
Child consumed protein in last 24 hours)		X		X
Child experienced positive child-rearing practices	X	X		
Child attended a childcare centre		X	X	
Preschool enrolment (child has attended preschool regularly since age 3)		X	X	
School enrolment (child is enrolled in school)		X	X	X
Verbal and maths skills		X	X	X
Child is not over-age (above the age expected for their grade)			X	X
Cognitive ability (standardised PPVT)[a]			X	X
Child does paid work			X	X
Subjective well-being (child perception)			X	X
Respect from adults in his/her community			X	X

[a]Peabody Picture Vocabulary Test

Table 2. Young Lives selected child and household circumstances included in the Young Lives survey

	Younger Cohort		Older Cohort	
	Round 1	**Round 2**	**Round 1**	**Round 2**
Gender	X	X	X	X
Maternal education	X	X	X	X
Household income	X	X	X	X
Maternal marital status	X	X	X	X
Number of children in the household	X	X	X	X
Lives in a rural area	X	X	X	X
Mother's age (in years)	X	X	X	X
Mother's first language (Spanish or indigenous)	X	X	X	X
Maternal migration status	X	X	X	X
Maternal body mass index (BMI)	X	X	X	X
Wealth index (standard YL index)[a]	X	X	X	X
Region (coast, mountains, jungle)	X	X	X	X
Altitude (metres above sea level)	X	X	X	X
Travel time to nearest educational facility	X	X	X	X
Travel time to nearest health facility	X	X	X	X

[a]The wealth index is a simple average of the following three components: a) housing quality, which is the simple average of rooms per person, floor, roof and wall; b) consumer durables, being the scaled sum of consumer durable dummies; and c) services, being the simple average of drinking water, electricity, toilet and fuel, all of which are 0–1 variables.

As has been documented (see Escobal et al. 2008) large numbers of the Young Lives children (80 per cent) live below the national poverty line. This high proportion is due in part to the pro-poor sampling strategy followed by the Young Lives study. Still, between Rounds 1 and 2 of data collection (2002 and 2006/7), we observed some improvement in household living standards for both the Younger and the Older Cohort across several indicators. Most of these improvements were found in urban areas, thus closely resembling Peru's national trends over the same period, and pointing to the inequalities that persist despite recent economic growth.

Table 3. Changes in selected Young Lives well-being and poverty indicators between Rounds 1 and 2: Younger Cohort

	Round 1	Round 2	
Household well-being indicators			
Wealth index	0.39	0.41	**
Per capita food consumption (soles)	62.81	102.6	***
Real per capita food consumption (soles)	69.58	106.5	***
Asset value at median prices: 12 assets (soles)	759.2	883.7	*
Asset value at median prices: 22 assets (soles)	850	1,073	***
Well-being perception in the household (%)			
Can manage to get by	27.2	37.0	***
Poor/destitute	32.2	21.9	***
Access to services (%)			
Access to electricity	59.4	69.9	***
Access to water piped into dwelling	54.0	58.9	**
Sanitation facilities (flush toilet or septic tank)	38.0	42.0	**
Child-related well-being and poverty indicators (%)			
Mother had prenatal care	92.5	–	
Low weight at birth	5.7	–	
Has a vaccination card	89.1	97.0	***
Chronic malnutrition (WHO 2006) stunting	30.9	37.4	***
Global malnutrition (WHO 2006) underweight	7.2	5.9	*
Consumed protein in the last 24hrs	–	91.3	
Experienced positive child-rearing practices	68.9	31.2	***
Attended a childcare centre	4.0	19.5	***
Preschool enrolment (has attended preschool regularly since age 3)	–	81.5	
Low cognitive ability (standardised PPVT)	–	70.8	

Note: Sample averages and significance levels include sample design.

Sample differences are: * significant at 10%; ** significant at 5%; *** significant at 1%.

Source: Young Lives.

Tables 3 and 4 show the changes in child well-being and poverty indicators when we compare Rounds 1 and 2; the pattern is mixed. At the household level all indicators show an improvement. Further, the subjective assessment of mothers and caregivers coincides with this improvement in material well-being, as a reduced percentage feel poor or destitute and a

higher percentage said in Round 2 that they could 'manage to get by'.[3] Similar results can be found for the Older Cohort (Table 4). Similarly, access to electricity and to sanitation facilities improved between the two rounds, improving the availability of key services to Young Lives children.

Table 4. Changes in selected Young Lives well-being and poverty indicators between Rounds 1 and 2: Older Cohort

	Round 1	Round 2	
Household well-being indicators			
Wealth index	0.36	0.37	*
Per capita food consumption (soles)	16.2	22.8	**
Real per capita food consumption (soles)	18.3	24.2	
Asset value at median prices: 12 assets (soles)	471.7	589.6	**
Asset value at median prices: 22 assets (soles)	604.8	764.8	**
Well-being perception in the household (%)			
Can manage to get by	25.0	27.4	**
Poor/destitute	36.1	28.5	***
Access to services (%)			
Access to electricity	54.9	64.8	***
Sanitation facilities (flush toilet or septic tank)	28.1	34.3	**
Child-related well-being and poverty indicators (%)			
Chronic malnutrition (WHO 2006) stunting	34.5	41.8	**
Global malnutrition (WHO 2006) underweight	6.1	–	
Enrolled in school	99.2	99.0	
Verbal skills	42.6	79.6	***
Maths skills	47.0	93.4	***
Does paid work	24.1	31.0	
Over-age for school grade	30.7	24.0	*
Respect from adults in his/her community	76.9	95.3	***
Subjective well-being child perception (on a scale from 1 to 9)	–	4.76	

Note: Sample averages and significance levels include sample design. Sample differences are: * significant at 10%; ** significant at 5%; *** significant at 1%

Source: Young Lives

[3] The relevant questions reads: 'During this period, how would you describe the household you were living in? 01= Very rich; 02= Rich; 03= Comfortable – manage to get by; 04= Struggle – never have quite enough; 05=Poor; 06=Destitute'.

Despite this improvement in dwelling and household indicators, child nutritional indicators show some deterioration between rounds. Among them key nutritional outcomes like stunting (low height-for-age) and underweight (low weight-for age) stand out. As has been noted by Escobal et al. (2009), we can expect deterioration in these indicators as children get older because children tend to depart from the 'normal growth curve'.[4] However when we explore changes in these indicators for different sub-groups we can find that some groups (for example, urban children born to educated mothers) show some evidence of catching up, something that is not apparent in rural children.

Other child-related well-being and poverty indicators show a mixed pattern. Among the Younger Cohort there is an increase in vaccination coverage and in attendance at childcare centres. However the percentage of mothers who implement 'positive' child-rearing practices is reduced substantially. Among these practices, which have been shown to affect child well-being positively and are included in the survey are: (1) adequate child feeding practices (including breast-feeding and complementary feeding when appropriate); and (2) psychosocial care, associated with 'the provision of affection and warmth, responsiveness to the child, and the encouragement of autonomy and exploration' (Engle et al. 1999: 1,327). In the case of the Older Cohort, we find significant improvement in age for school grade and in mathematical and verbal skills (although these 'improvements' really reflect the fact that some children have caught up on some basic skills that should have been learned at a younger age). In addition, this cohort increasingly reports obtaining respect from adults in their community. The data also show changes associated with increases in paid child work as well as an increase in stunting.

2.2 Recent trends in unequal outcomes with respect to child well-being in Peru

Although Young Lives follows the same children as they grow older and shows changes in inequality, we can also explore some trends in inequality

[4] The WHO reference population was purposely designed to reflect the growth curve of healthy children living in conditions adequate to fulfill their genetic growth potential.

in child well-being by looking at repeated cross-sections of nationally representative data. Using INEI (2010) data, Table 5 shows that in several key indicators related to health and nutrition, as well as access to basic services, the gap between children living in households located in the richest 20 per cent and the poorest 20 per cent of Peruvian population has narrowed.

Table 5. Peru 2000–9: evolution of key child well-being & poverty indicators (%)

	2000	2005	2007	2008	2009
Stunting (chronic malnutrition) (NCHS/[a]CDC/[b]WHO standard)	**25.4**	**22.9**	**22.6**	**21.5**	**18.3**
Urban	13.4	9.9	11.8	11.8	9.9
Rural	40.2	40.1	36.9	36.0	32.8
Bottom 20%	–	46.8	45.1	45.0	37.1
Top 20%	–	4.3	4.2	5.4	2.3
Stunting (chronic malnutrition) (WHO standard)	–	**28.0**	**28.5**	**27.5**	**23.8**
Urban	–	13.5	15.6	16.2	14.2
Rural	–	47.1	45.7	44.3	40.3
Bottom 20%	–	55.2	53.5	54.6	45.3
Top 20%	–	4.7	5.9	8.1	4.2
Low weight at birth (<2.5 kg) (WHO standard)	–	**8.7**	**8.4**	**7.2**	**7.1**
Urban	-	7.8	7.7	6.4	6.6
Rural	-	10.6	9.5	8.9	8.4
Bottom 20%	-	12.1	11.7	10.3	8.9
Top 20%	-	5.4	7.2	4.8	4.9
Access to safe water	**84.4**	**92.1**	**92.9**	**93.8**	**91.1**
Urban	93.9	97.3	96.8	97.9	96.3
Rural	68.1	81.7	85.3	85.9	80.4
Bottom 20%	N.A.	66.8	63.8	69.7	73.6
Top 20%	N.A.	99.7	100.0	100.0	99.9
Access to sanitation	**75.9**	**80.5**	**81.8**	**85.0**	**83.3**
Urban	91.7	95.7	92.4	93.3	92.3
Rural	48.6	50.8	61.0	68.8	64.7
Bottom 20%	N.A.	37.4	35.8	44.1	54.9
Top 20%	N.A.	100.0	99.9	99.9	100.0

[a] National Center for Health Statisics, [b]Centers for Disease Control and Prevention.

Source: INEI (2010).

This narrowing gap is partly due to the fact that the top 20 per cent have full or almost full coverage of services, and the poorest are starting to receive some access. It might also reflect improved targeting, as the National Strategy for Poverty Reduction, known as *CRECER* ('to grow') aimed at fighting poverty and childhood malnutrition was put into place in 2007, and pushed for better coordination of programmes developed by ministries in different social sectors (e.g. Health, Education, and Women and Social Development).

In addition to reductions in the gaps related to stunting, low weight at birth and access to services, INEI (2010) reports reductions in the coverage gap between children in the top 20 per cent and in the bottom 20 per cent of the income distribution for acute diarrhoea, prenatal check-ups, delivery in a health institution and growth monitoring. Despite these gap reductions, inequality is increasing in other dimensions like possession of identity cards (which allow the children to get healthcare under the public health programme), access to full immunisation and prevalence of acute respiratory infections, where the gap between rich and poor children has increased. These data indicate that inequality of opportunity for children is a complex phenomenon, since the gap between rich and the poor children may decrease in some dimensions while it may be widening in others.

In addition, these results are only useful to show an 'average' picture, as official statistics are unfortunately not able to focus on children as the relevant unit of analysis, nor to account for their multidimensional experience. For example, if we have two well-being dimensions, and 50 per cent of these children cover one dimension while the other 50 per cent cover the other dimension, using official statistics we cannot distinguish this case from a case where 50 per cent of children are covering both dimensions while the other 50 per cent of children are not able to satisfy either dimension. In both cases, the average coverage in each dimension will be 50 per cent. This example highlights the fact that we need to study child well-being looking at how children individually experience the multidimensional nature of their well-being, as aggregate data blur the

picture and may hide important inequalities. This is precisely why Young Lives data are well positioned to shed light on the multidimensional nature of inequality of opportunity.

3. Multidimensional well-being, multidimensional poverty and deprivation indices

As we have seen, child well-being evolves differently along different dimensions. We can recognise that children's well-being depends on (a) physical health and nutritional status; (b) the development of pro-social skills and competences (life skills beyond educational achievement measures); and (c) the consolidation of self-esteem and the ability and opportunity to make their own decisions. Household material well-being and access to services can be considered as inputs for generating these three outcomes.

Further, we need to acknowledge the fact that the relative importance of different dimensions of child well-being change as children grow older. As we depict in Table 6, we can expect that health and nutrition are relatively more importance during the first years of life. Later in life, between 6 and 11 years old, education and capacity-building competences become increasingly important. Later still (between 12 and 17 years old) social and environmental opportunities and risks are relatively more important (Lynch 2003; Strauss and Thomas 2007).

Table 6. Relative importance of different dimensions of child well-being as children grow up

Age groups	Health & nutrition	Education & capacity building	Social & environmental risks & opportunities
0–5 years			
6–11 years			
12–17 years			

Key: dark coloured = important; light coloured = less important; not coloured = not very important.

Even within each of these dimensions, the indicators relevant for each age group can vary. For example, at the beginning of children's lives vaccination is important, while later in life sexual and reproductive health becomes important. Similarly preschool enrolment and being over-age for one's school grade are variables to look at at different stages in life when considering the educational dimension. Good child-rearing practices also change with the age of the child.[5] In some cases certain dimensions may need to be age-specific in order to get a better assessment of well-being or inequality in opportunities. For example, certain verbal or mathematical abilities may be appropriate for certain age groups.

Given that there are many dimensions relevant tor measuring the well-being of a child, and that each of these dimensions may be captured with a different range of indicators depending on the age of the children, one wonders why we really need a single multidimensional indicator of child poverty. The use of a unique multidimensional index has been championed by UNICEF since early 1990s, on the basis that the Human Development Index can illustrate 'how powerful one composite index can be in bringing attention to critical policy issues' (UNICEF 2007: 19). UNICEF has also championed the need to provide a unique and 'simple' indicator of child well-being, claiming that it is extremely helpful for policy planning, targeting and monitoring. As we contend in this paper, such an aim for simplicity may be unhelpful.

Although they have been typically portrayed as improved alternatives to monetary measures of poverty, several of the poverty indices that appear in the literature have been constructed without careful attention to the complexities of well-being aggregation. Are the dimensions complements or substitutes? Are minimum thresholds of certain indicators absolutely essential to define a minimum standard that can be socially acceptable?

[5] To explore child-rearing practices in Round 1, the following question was included: 'When the child cries, what do you do? (breast-feed him/her; shout at or threaten him/her verbally; use physical violence; use other negative behaviours; do nothing)?' In Round 2, the question was changed to reflect the age of the child: 'When the child cries, what do you do? (talk to him/her, scold him/her; ground him/her; shout or threaten him/her verbally; use physical violence; do nothing)?'

These types of questions are very much related to specific ways in which dimensions could be aggregated in a meaningful way.

If the index has been constructed based solely on statistical procedures that capture the maximum variability of the sample, as is typical when one constructs implicit weights through factor or principal component analysis (Nardo et al. 2005), it may be extremely difficult to interpret the resulting index, as it is hardly the case that the more variance some indicator has, the more important it is in terms of the well-being of the children.

To clarify this let's put forward a hypothetical example. Suppose that the children are distributed in our sample as follows:

		Children have toys			
		NO		YES	
		Children have enough food		Children have enough food	
		NO	YES	NO	YES
Children have a pencil	NO	0	60	5	35
	YES	5	35	10	50

Here half of a sample of children lacks pencils, half of the sample lacks toys and 'just' 10 per cent of the sample lacks minimum food requirements. If one performs the classic principal component analysis to extract a linear combination of the three variables that contain most of the variance and use that indicator to rank children's well-being, children that have pencils and toys but not food will be ranked higher than those that have food but have no pencils or toys. This is so because there is a larger variance that

can be extracted from the pencil and toys variables.[6] This example shows that when there are trade-offs between different well-being dimensions, it is the explicit consideration of these trade-offs and not an empirical regularity that should drive any conclusion regarding well-being rankings.

There are many ways in which these trade-offs can be taken into consideration. Bourguignon and Chakravarty (2003), for example, make a distinction between 'intersection' and 'union' definitions of poverty. These authors argue that if we measure well-being in more than one dimension, then a person can be considered poor if he or she is poor in any dimension. They define this as a 'union' definition of multidimensional poverty. Alternatively, an intersection definition would consider a person to be poor only if he or she was poor in all dimensions at the same time. Either of these two indicators of multidimensional well-being may be considered valid as far as we agree with the benchmark used.[7]

Considering *D* different dimensions of well-being, the union headcount index for multidimensional poverty (*M*) can be calculated as follows:

$$M(X_i, Z) = 1 - \prod_{j=1}^{j=D} I(z_j < x_{i,j}) \qquad (1)$$

while the intersection headcount index can be calculated as follows:

$$M(X_i, Z) = \prod_{j=1}^{j=D} I(z_j > x_{i,j}) \qquad (2)$$

If one is interested in considering intermediate cases, we can calculate a multidimensional poverty indicator as a weighted mean of poverty levels by

[6] The 50/50 distribution of the sample between those that have and have not got pencils and toys will generate the maximum possible variance for dichotomous variables.

[7] Note that if enough relevant dimensions are taken, virtually everyone could be judged poor by the union definition.

attribute. If this is the case, Chakravarty et al. (1998) derive the following index:

$$M(X_i, Z) = \sum_{j=1}^{j=D} a_j \left(\frac{z_j - x_{i,j}}{z_j} \right)_+^{\alpha} \quad (3)$$

This measure is simply a multidimensional extension of Foster et al.'s (1984) FGT (Foster, Greer, Thorbecke) measure with vector of well-being dimensions $Y_i = (x_{i,1}, \ldots, x_{i,D})$ and vector of poverty lines (z_j), determining *i*'s contribution to total multidimensional poverty $M(Y_i, Z)$. a_j stands for the relative importance of each of the *D* well-being dimensions being considered and α is a measure of the aversion with respect to any dimension. Here the choice of a_j is critical, as different dimensions may be considered more or less important for the well-being of the child. In a way similar to any FGT measure, this indicator captures how far an individual is from achieving a minimum requirement in a particular dimension.

These indices are individual poverty measures and they will need to aggregate across all individuals. Such aggregation can be a simple average. However the formula will need to satisfy the multidimensional transfer principle.

3.1 Another way of looking at multidimensional poverty: the Adjusted Headcount Ratio or Multidimensional Poverty Index

Many aggregate measurements have been developed focusing mainly on aggregating different well-being dimensions into one single indicator. The work of Alkire and Foster (2008) focuses on a prior step needed to construct such an indicator. This step is the *identification* of who is really poor. Conceptually this approach is similar to that proposed by Bourguignon and Chakravarty (2003) when presenting 'intersection' and 'union' poverty indicators. Using an intuitive approach, Alkire and Foster (2008) generalise this type of indicator by establishing two consecutive cut-offs. The first is the traditional dimension-specific poverty line, which is established for each

of the dimensions being considered. The second establishes how widely deprived a person must be in order to be considered poor. This second cut-off point may generate the intersection poverty indicator if we establish a demanding cut-off point (a child needs to be poor or deprived in all dimensions in order to be considered multidimensionally poor). Alternatively it may generate the union poverty indicator if the cut-off point is low enough as to consider a child as multidimensionally poor if she is poor in at least one dimension.

Suppose we have n number of persons in the population and let $d \geq 2$ be the number of dimensions under consideration. Let $Y = [Y_{ij}]$ denote the n x D matrix of well-being outcomes, where the typical entry Y_{ij} is the achievement of the individual $i = 1, 2, \ldots, n$ in dimensions $j = 1, 2, \ldots, D$. Let z_j denote the cut-off below which a person is considered to be deprived in dimension j.

To measure multidimensional poverty or multidimensional well-being we need to first identify who is poor and then construct a consistent aggregating function, like the one we presented in equations (1), (2) and (3). Here we transform the data matrix from outcomes to deprivations $g(0)$ (instead of achievements, or being not poor). Here $g^0_{ij} = 1$ when $Y_{ij} < z_j$ while, and $g^0_{ij} = 0$ otherwise.

To help understand this notation we present the same example as the one presented by Alkire and Foster (2008). Here we have four persons and four well-being dimensions. Further, each dimension has its corresponding cut-off point z_j, below which the child may be considered poor or deprived in that dimension:

Dimensions ***Deprivations***

c_i

$$y = \begin{vmatrix} 13.1 & 14 & 4 & 1 \\ 15.2 & 7 & 5 & 0 \\ 12.5 & 10 & 1 & 0 \\ 20 & 11 & 3 & 1 \end{vmatrix} \quad \textit{children} \quad \Rightarrow \quad g^0 = \begin{vmatrix} 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 1 \\ 1 & 1 & 1 & 1 \\ 0 & 1 & 0 & 0 \end{vmatrix} \quad \begin{matrix} 0 \\ 2 \\ 4 \\ 1 \end{matrix}$$

z (13 12 3 1) Cut-offs

For matrix g^0 we can construct an extra vector that sums the number of deprivations per person in the population (c_j). For k = 1, ...,*D*; let p_k be the identification method defined by $p_k(Y_i, z_j)=1$ whenever $c_i > k$ and $M_k(Y_i, z_j)=0$ whenever $c_i < k$.

In a way similar as the one presented in equation (3), based on rationale behind FGT indicators, we can use a cut-off level *k* that lies between 1 and *D* to say that a person is multidimensionally deprived if the number of deprivations is larger than this cut-off level. In other words, a person i is poor when the number of dimensions in which i is deprived is at least k. This method is known as the *dual cut-off* method of identification.

To start measuring poverty, a common way is to calculate the percentage of poor people. The headcount ratio $H(y_i, z)$ is defined by $H = q/n$, where $q = q(y_i, z)$ is the number of persons in the set Z_k, and therefore the number of poor people identified using the dual cut-off approach. Following the example, given a cut-off of $k \geq 2$, we would have 2 persons who are defined as 'poor', thus our poverty rate would be 50 per cent[8] of the population qualifying as poor.

[8] According to H= $q/n \rightarrow 2/4$ where 2 is the number of persons with more than 2 deprivations and 4 is the total number of population.

What happens once we raise k to 3, meaning $k \geq 3$? The poverty rate stays the same, hence the dimensional monotonicity property has not been satisfied. Attending to this concern, Alkire and Foster have defined an Adjusted Headcount Ratio M_0 as a Multidimensional Poverty Index (MPI). It is a measure that is sensitive to the frequency and the extent of multidimensional poverty that satisfies the monotonicity property. In other words, the Adjusted Headcount Ratio is the total number of deprivations experienced by poor people, divided by the maximum number of deprivations that could possibly be experienced by all people.

Going back to the example mentioned above: keeping up the cut-off at $k \geq 2$, we would have 6 (2+4) experienced deprivations divided by the 16 maximum possible deprivations of the population (4 deprivations, for 4 persons), giving us 37.5 per cent of the population qualifying as 'poor'. If we raise the bar up to 3 or more deprivations ($k \geq 3$), we would have 4 experienced deprivations against 16 possible deprivations, which is equal to a 25 per cent rate. In this case the rate changes according to the cut-off set and satisfies the monotonicity property.

3.1.1 Decomposing the Adjusted Headcount Ratio

Up to now we have discussed different measures of multidimensional well-being or opportunities without considering how opportunities or functionings are distributed within the population. One way of tackling this issue has been proposed by Alkire and Foster (2008). They established that the Adjusted Headcount Ratio M_0 is 'decomposable' in the sense that the overall multidimensional measure is always a weighted average of sub-group multidimensional poverty levels. Using this property we can show which sub-groups of the population are most affected by multidimensional poverty.

Recent literature has paid much more attention to individual inequality and relatively little attention to group inequality. Stewart et al. (2005) contend

that inequality between groups (referred to as 'horizontal inequalities'), might be much more revealing in certain cases than overall inequality (sometimes referred as 'vertical inequality'). Elbers et al. (2008) have shown that between/within decomposition exercises typically underestimate the importance of inequality between groups, as the benchmark to which between-group inequality is compared is total inequality and not the maximum inequality possible, given that individuals are typically divided into social groups according to their circumstances.

3.2 Inequality of opportunity: measuring the Human Opportunity Index

An alternative way to explore the multidimensional well-being of children is to calculate the Human Opportunity Indices championed by the World Bank (Paes de Barros et al. 2009). Based on Sen's approach (Sen 1976), the HOI can be used to construct a synthetic measure of inequality of opportunity for children. The approach followed by Paes de Barros et al. (2009) is based on the assumption that a society must assure the universality of key opportunities (for example, key basic public services) to all children. To track the achievement of this target, we need to evaluate both the improvements in the overall coverage of these opportunities and whether or not their distribution favours particular disadvantaged groups. The HOI summarises in a single indicator: (a) how many opportunities are available for the population; and (b) how equitably distributed these opportunities are. Thus, an increase of the coverage in public services will always improve the HOI if the increase of the coverage is targeted in favour of disadvantaged families; it will reduce inequality in access, increasing the HOI more than proportionally.

The HOI includes in one single indicator two components: access to a certain opportunity and how well distributed this opportunity is. Let $\overline{p}$ be the *average coverage rate* of a certain opportunity (i.e. some basic public service). This coverage rate can be determined by any household data available as follows:

$$\overline{p} = \sum_{1}^{n} w_i \, \hat{p}_i \qquad (4)$$

where w_i is the weight applied to each individual (in case using survey data), and $\hat{p}_i$ is the estimated access rate for each individual. To obtain the estimated access rate we follow Paes de Barros et al. (2009) estimating a probit model relating access to a given opportunity as a function of circumstances. The circumstances considered include parental characteristics, gender, ethnicity and area of residence. The idea behind using the conditional mean instead of the unconditional mean is to take away any other factor (like effort) that may affect outcomes beyond circumstances.

The second component of the HOI is the *equality of opportunity distribution* and requires a more elaborate calculation. Paes de Barros et al. (2009) propose a version of the dissimilarity index used in sociological studies to calculate equality in opportunities. The *D-Index* measures the dissimilarity of access rates for the opportunity between groups defined by common circumstances such as gender, location, parental education, etc. Such a dissimilarity index is evaluated comparing the estimated access rate for the group and the average access rate for the same opportunity/service for the population as a whole.[9] The D-Index is calculated as follows:

$$\hat{D} = \frac{1}{2\bar{p}} \sum_{t=1}^{n} w_i \left| \hat{p}_i - \bar{p} \right| \quad \text{where } w = \frac{1}{n} \tag{5}$$

where w_i is the weight applied to each individual; $\hat{p}_i$ is the household's probability of access to that particular public service and; $\bar{p}$ is the average obtained from that probability estimation for all the population.

The D-Index is a weighted average of the existent gap between each individual's probability of access and the average estimated access rate for the whole population. If individuals share a similar set of circumstances, there would be as many gaps as there are groups are in the sample. The D-Index takes values from zero to one. Thus, in an equal opportunity scenario

[9] Paes de Barros et al. (2009)

the $\hat{D}$ = 0, since no gap should be found between the access rate of each group and the access rate of the overall population. Note that in the calculation, we use the estimated probability of access to a certain opportunity and not the actual access rate. This is because we are interested in controlling for an observed set of circumstances and leave outside of the estimation the residual term that should account for those elements like effort that are not part of the circumstance set.

Once the D-Index is calculated, to obtain the HOI we combine the average access rate of opportunities ($\overline{p}$) with how equitably distributed these opportunities are ($\hat{D}$); the proposed index has the following form:

$$HOI = \overline{p}\ (1 - \hat{D}) \qquad (6)$$

Intuitively, the HOI uses the access to opportunities measure and starts to discount from it if the service is unequally distributed among the groups.

To grasp the intuition behind the HOI it is worthwhile to look at a hypothetical example. Here we look at the inequality of opportunity for a child being in the correct grade according to his or her age. Not achieving the correct grade will mean that there is 'over-age'. The basic set of circumstances will only include in this example the area of residence (urban/rural). We would like that the circumstance of being born in an urban or rural area should not affect the chances of a child being in the correct grade according to his/her normative age. Assume that the distribution of children in the sample is as follows:

	Rural	**Urban**	**Total**
With over-age	35	35	70
With no over-age	5	25	30
Total	40	60	100

In this example, substantially fewer children living in rural areas are attending their correct grade at school according to their age. We may want to know how many of the existing opportunities we will need to re-distribute in order for both groups to have an equal chance of being in the correct grade at their normative age.

If we estimate the probit and we calculate the conditional mean access we get:

	Average probability (%)	**Gap $\|p_i-p\|$(%)**	***D* (ΣGaps)**
Rural Urban	12.50 41.67	17.50 11.67	7 7
Total	30		

where the average probability was obtained by averaging fitted values of the probit estimation for each of the two sub-groups. The Gap |x-p| was calculated for both urban and rural children against the estimated population average. *D* (∑Gaps) is the total gap difference (in absolute values); with these components we can now estimate the D-Index and the HOI established in equations (5) and (6). The D-index is simply the weighted average gap divided by twice the access rate ([0.4*0.175+0.6*0.1167]/0.6=0.2333), and the HOI is 0.3*(1-0.2333):

	D-Index	**HOI**
Total	23.33%	23%

where D-Index is the fraction of all opportunities available that need to be re-allocated for everyone to have equality of opportunity (7/30). In this example, we need to close the existent gaps re-allocating 75 children (23.33 per cent of the 30 children with no over-age) from the urban to the rural sectors. Given the shares of the population, 23.33 per cent of the available opportunities is equivalent to 17.5 per cent of the rural population

(7/40) and it is also equivalent to 11.67 per cent of the urban population (7/60).

	Original % of children in the correct grade(1)	**% to be added/ subtracted**	**New % of children in the correct grade**(1)
Rural Urban	12.5 41.67	17.5 −11.67	30 30
Total	30		30

3.2.1 Decomposition of changes in the Human Opportunity Index

Following Paes de Barros et al. (2009) we can decompose the HOI as follows:

$$\Delta \text{HOI} \equiv \Delta_{\bar{p}} + \Delta_D \tag{7}$$

where $\Delta_{\bar{p}}$ captures the effect of changes in coverage and Δ_D captures the effect of changes in inequality of access. Each of these effects can be obtained as follows:

$$\Delta_{\bar{p}} = \bar{p}_1 \cdot (1\text{-}D_0) \text{-} \bar{p}_0 \cdot (1\text{-}D_0) \tag{8}$$

$$\Delta_D = \bar{p}_1 \cdot (1\text{-}D_1) \text{-} \bar{p}_1 \cdot (1\text{-}D_0) \tag{9}$$

This type of decomposition exercise allows us to evaluate the effect that pro-poor policies and improved targeting may have on equality of opportunity. Although, in general, it is difficult to observe improvements in

the distribution of existing opportunities in a country without also observing expansion of coverage, a similar increase in coverage ($\Delta_{\bar{p}}$) may be accompanied by different reductions in inequality rendering different increases in the HOI.

This decomposition exercise allows us to highlight the fact that expansion in coverage is therefore a necessary condition to reduce inequality, but not a sufficient one.

4. Estimating multidimensional poverty and the Human Opportunity Index using Young Lives data

4.1 Aggregate multidimensional poverty

The first indicators of multidimensional poverty we mentioned were the family of indicators proposed by Bourguignon and Chakravarty (2003) – the union and intersection indicators – and the FGT-like measure proposed by Chakravarty et al. (1998).

To evaluate how multidimensional poverty and well-being have changed over time we focus our attention here on the panel (the same children in Rounds 1 and 2): we also need to focus on well-being indicators that were collected in both rounds. In this case we consider six indicators for the Younger Cohort (access to electricity; access to proper sanitation; being well nourished, i.e. not being stunted or underweight (low weight-for-age); having a vaccination card; and experiencing positive child-rearing practices); and six indicators for the Older Cohort (instead of the last two, we take age for their grade at school, and getting respect from adults in their community). Chakravarty et al. (1998) consider both the variable used to proxy certain dimensions of well-being, and the threshold below which a child is considered poor in that dimension. For several of the dimensions considered here (like access to electricity or access to proper sanitation) the variable used is dichotomous (0 or 1), while for other variables, like stunting, we have both a continuous variable and a threshold.

This is the reason why all estimates of Chakravarty et al. (1998) measurement are different for different values of *α*.

The first row of Table 7 shows that if we consider as poor those that have no access to any one of these well-being dimensions, the incidence of child poverty has increased between Rounds 1 and 2. This increase is related both to increases in stunting and to increases in inadequate child-rearing practices. In the case of the Older Cohort (Table 8) the same indicators show a similar increase in the incidence of poverty. If we are stricter and consider poor (in fact destitute) only those that are poor in all dimensions (the second row), there is no significant increase in the incidence of multidimensional poverty: a very small proportion of the sample is poor in all dimensions. If we look at an intermediate case and include all the dimensions with equal weight, the Chakravarty et al. poverty measurement depicted in equation 3 shows a statistically significant (albeit small) increase in multidimensional poverty for both the Younger and the Older Cohorts.

Similar effects are obtained for the Younger Cohort when one focuses attention on the multidimensional poverty gap and the severity indicators. The Older Cohort, however, shows a reduction in the multidimensional poverty gap and no statistically significant change in the severity (Table 8). This distinct pattern of poverty change between cohorts seems to be driven by improvements in the sense of respect from adults in the community as the child gets older.

Table 7. Different definitions of multidimensional poverty: Younger Cohort (%)

	Round 1			Round 2		
	Estimate	Lower bound	Upper bound	Estimate	Lower bound	Upper bound
Union	79.1	77.7	80.6	92.4	91.5	93.4
Intersection	0.2	0.0	0.4	0.1	0.0	0.3
Chakravarty (α=0)	30.4	29.6	31.3	33.9	33.0	34.7
Chakravarty (α=1)	21.5	20.8	22.2	24.0	23.4	24.6
Chakravarty (α=2)	26.0	25.2	26.8	28.6	27.8	29.3

Note: Indicators are based in the Panel sub-sample. Lower and upper bounds are calculated using a 95% confidence interval.

Source: Young Lives data using Bourguignon and Chakravarty (2003) and Chakravarty et al. (1998) methodology.

Table 8. different definitions of multidimensional poverty: Older Cohort (%)

	Round 1			Round 2		
	Estimate	Lower bound	Upper bound	Estimate	Lower bound	Upper bound
Union	74.0	71.3	76.8	85.5	83.3	87.8
Intersection	0.1	0.1	0.4	0.3	0.0	0.6
Chakravarty (α=0)	27.8	26.3	29.3	30.9	29.5	32.3
Chakravarty (α=1)	11.2	10.1	12.4	7.2	5.5	8.8
Chakravarty (α=2)	12.8	11.6	13.9	12.9	9.5	16.3

Note: Indicators are based in the Panel sub-sample. Lower and upper bounds are calculated using a 95% confidence interval.

Source: Young Lives data using Bourguignon and Chakravarty (2003) and Chakravarty et al. (1998) methodology.

We are finding increases in multidimensional child poverty despite the fact that, as seen in Tables 3 and 4, several dimensions of material well-being have improved in the households these children live in. On the other hand, some changes in well-being between rounds may not be attributable to changes in conditions between rounds, but to long-term effects of conditions that affect the children in the first few months after birth. For example, a gap in malnutrition rates opens up between children in urban and rural areas during the first months of life and tends to remain constant afterwards (Escobal et al. 2008). However those children whose mothers are relatively more educated or who are associated with less harsh circumstances may show some evidence of catch-up growth in urban areas, possibly mediated by access to key private and public assets. These results highlight the importance of investing in early childhood.

One way of looking at how multidimensional poverty changes for different socio-economic groups is to calculate the union, intersection and Chakravarty et al. FGT-type indices for key groups in the population. We have chosen, somewhat arbitrarily, to look at two distinct social groupings. The first one consists of the following six groups according to mother's first language, number of siblings, maternal education, income level and altitude:[10]

[10]As Escobal and Flores (2009) have shown, altitude in the context of Peru can be considered as a proxy of remoteness, which in turn is usually related to access to services. Cueto (2005)

1. Indigenous language, four or more siblings, low level of maternal education
2. Indigenous language, three or fewer siblings, medium level of maternal education
3. Non-indigenous language, three or fewer siblings, low level of maternal education, low/medium income
4. Non-indigenous language, three or fewer siblings, medium level of maternal education, low/medium income
5. Non-indigenous language, three or fewer siblings, medium level of maternal education, high income
6. Non-indigenous language, three or fewer siblings, high level of maternal education, medium/high income, low altitude area.

This grouping exercise was the result of evaluating from the full set of circumstances how best to divide the children into groups. We also constructed a second social grouping considering the same set of variables and fitting the best regression tree using as outcomes the total number of deprivations each child has. This generated 11 groups that divide the sample into those whose circumstances are extremely unfavourable (a child whose mother's first language is indigenous and whose mother has a low level of education (incomplete primary or less), who has four or more siblings, is among the poorest of the sample according to their family's income and lives in a high-altitude rural area) to those whose circumstances are extremely favourable, and nine other intermediate groupings. For both groupings, we have calculated all indicators of well-being for the Younger Cohort. These tables can be found in the Statistical appendix (Tables A1 and A2). A summary of these tables, comparing children in the sub-groups with the best and worst circumstances (in the first grouping), is depicted in Figure 1 (for Round 1) and Figure 2 (for Round 2).

Figure 1. Multidimensional well-being in key sub-groups (first grouping), worst and best circumstances: Younger Cohort, Round 1

mentions that a recent review of the literature on high altitude and development concluded, among other things, that 'height and weight at birth are usually lower in high altitude'.

[Insert Figure 1 here]

Source: Young Lives data, Round 1

In Round 1, those children whose mothers lack education, are of indigenous origin, and have four or more children, are twice as likely to be poor in dimensions like having a vaccination card or experiencing positive child-rearing practices, as compared to children whose mothers are more educated, are Spanish speakers, have three children or fewer, and live in low altitude areas of the country. These poverty gaps are even more pronounced when we look at access to electricity and access to prenatal care, where the children in the first group are six to seven times more likely to be poor than those in the second group. The biggest gap is in malnutrition, which is ten times more likely to affect children coming from the less favourable backgrounds.

Figure 2. Multidimensional well-being in key sub-groups (first grouping), worst and best circumstances: Younger Cohort, Round 2

[Insert Figure 2 here]

Source: Young Lives data, Round 2

Comparing the likelihood of being poor in these dimensions in the two rounds, we can see that although the coverage of certain services has improved, the odds of being deprived of those services has increased for those coming from the less favourable backgrounds because for several services the coverage is near to universal for the children with more favourable backgrounds. For other well-being dimensions, like having a vaccination card, there is some evidence of a reduction in the inequalities. The reduction of the gap in deprivation of positive child-rearing practices is a result of deterioration in the sub-group of children with the most favourable backgrounds rather than improvements in the well-being of those children coming from the least favourable backgrounds.

Aggregate multidimensional indices (Table 9) again mask the heterogeneity of well-being by groups.[11] The aggregates show some evidence of reduction in inequities, although the poverty levels continue to be high.

Table 9. Multidimensional poverty in key sub-groups (second grouping): Younger Cohort (%) (by different definitions)

	Worst circumstances Indigenous language, Low maternal education	**Best circumstances** Non-indigenous language 3 or fewer siblings High maternal education High income
Round 1		
Union	97.5	53.3
Intersection	0.6	0.0
Chakravarty (α=0)	41.4	11.2
Chakravarty (α=1)	26.0	8.6
Chakravarty (α=2)	34.5	9.5
Round 2		
Union	98.6	86.9
Intersection	0.6	0.0
Chakravarty (α=0)	41.6	17.1
Chakravarty (α=1)	26.1	14.8
Chakravarty (α=2)	33.4	15.5

Note: Indicators are based in the Panel sub/sample.

Source: Young Lives data using Bourguignon and Chakravarty (2003) and Chakravarty et al. (1998) methodology.

4.2 Measuring multidimensional poverty

As we have mentioned, an alternative way of looking at multidimensional poverty is to consider in how many dimensions children are deprived. Alkire and Foster (2008) have constructed a class of poverty measures that are

[11] Table 9 only shows the aggregate indices for the extreme groups for the second grouping (i.e with worst and best circumstances). The detailed tables for both groupings appear in the Statistical appendix (Tables A3 and A4).

decomposable, in the sense that we can trace the importance of each poverty dimension and the importance of different sub-groups in the magnitude of the poverty measure. This is known as the Multidimensional Poverty Index (MPI) and is based on the Adjusted Headcount Ratio discussed in Section 3.1. By establishing alternative cut-off points (related to how widely deprived a person must be in order to be categorised as poor) this class of poverty measures allows us to better measure the depth and scope of multidimensional childhood poverty.

Table 10 presents the MPI for the Younger Cohort from both Round 1 and Round 2 data. The dimensions included in the analysis are the same as those in the union, intersection, and Chakravarty et al. indices: access to basic services like electricity, sanitation, childcare facilities, vaccination card; two measures of nutritional and health well-being – not being stunted and globally malnourished; and experience of positive child-rearing practices. Taking advantage of the decomposability properties, we present in this table what percentage of the MPI can be attributed to those children that are poor and share specific child, maternal and household characteristics.

Our first finding is that the percentage of children with at least one deprivation has increased between rounds (from 78.7 to 92.4 per cent). If we increase the threshold level to at least two or three deprivations (being less demanding), the headcount ratio still increases (from 57.2 per cent to 59.1 per cent and from 31.4 per cent to 35.4, respectively). If we look at the MPI (i.e. total number of deprivations experienced by the poor divided by the maximum number of deprivations that could possibly be experienced by all people) we find that the index continues to show a poverty increase between rounds independent of the threshold that has been used.

When we decompose the MPI by gender we find that, independently of the threshold level, deprivations are equally likely between boys and girls.[12] For

[12] Only when we use six deprivations as the threshold are all boys deprived, while no girls are in this condition. However this case is of little relevance given the very small sample size (less than 20 cases).

the other circumstances, however, the decomposition exercise shows that being part of a family with four or more children, and having a mother who is not married, who did not complete primary school and is of indigenous origin makes the children much more likely to be deprived regardless of the threshold level.

The importance of family size as a possible explanation of higher deprivation rates has been reduced between Round 1 and Round 2. Similarly the share of deprivations among those children of indigenous origin, which was overrepresented in the sample in Round 1, has been reduced, indicating that this variable contributes less in the deprivation decomposition exercise. On the other hand maternal education and income status have increased their share in the decomposition exercise when one looks at the higher threshold (four or more deprivations) but not when one looks at the lower deprivation threshold. This may be an indication that policies are working on certain segments that are marginally deprived but have much more difficulty in overcoming deprivations among those that are simultaneously deprived in many dimensions.

Table 10. Decomposition of the Multidimensional Poverty Index: Younger Cohort (%)
(by household, mother and child characteristics)

Round 1

	H (Multidimensional headcount)	MPI	Gender		No. of children		Household income			Mother's marital status		Mother's first language		Maternal education		
			Boy	Girl	1–3	4=<	T1	T2	T3	Not married	Married	Not Spanish	Spanish	< Primary	Some second.	second.=<
0 deprivations	**21.3**															
At least 1 deprivation	**78.7**	**30.0**	50.5	49.5	70.7	29.3	48.7	31.1	20.3	59.0	41.0	52.0	48.0	49.8	31.9	18.3
At least 2 deprivations	**57.2**	**26.7**	50.3	49.7	68.8	31.2	52.6	30.0	17.4	57.7	42.3	56.3	43.7	54.3	32.2	13.5
At least 3 deprivations	**31.4**	**18.4**	52.3	47.7	65.4	34.6	56.2	27.9	15.9	57.7	42.3	61.8	38.2	60.6	29.9	9.5
At least 4 deprivations	**11.3**	**8.8**	53.3	46.7	60.5	39.5	61.8	23.0	15.1	60.6	39.4	68.3	31.7	67.2	26.4	6.5
At least 5 deprivations	**1.4**	**1.8**	52.2	47.8	51.7	48.3	65.7	26.3	8.0	65.7	34.3	67.4	32.6	67.3	26.0	6.7
At least 6 deprivations	**0.1**	**0.2**	100.0	0.0	70.4	29.6	75.3	0.0	24.7	100.0	0.0	84.0	16.0	59.4	16.0	24.7
Sample distribution			49.9	50.1	77.4	22.6	36.4	32.5	31.0	63.1	36.9	36.8	63.2	34.0	30.9	35.1

Round 2

	H (Multidimensional headcount)	MPI	Gender		No. of children		Household income			Mother's marital status		Mother's first language		Maternal education		
			Boy	Girl	1–3	4=<	T1	T2	T3	Not married	Married	Not Spanish	Spanish	< Primary	Some second.	second.=<
0 deprivations	**7.7**															
At least 1 deprivation	**92.4**	**33.6**	49.0	51.0	59.6	40.4	47.0	35.2	17.8	60.2	39.8	47.4	52.6	46.2	33.6	20.2
At least 2 deprivations	**59.1**	**32.9**	49.1	50.9	58.9	41.1	47.9	35.5	16.6	60.1	39.9	48.3	51.7	47.1	34.1	18.8
At least 3 deprivations	**35.4**	**30.0**	48.8	51.2	56.3	43.7	51.3	36.3	12.4	59.3	40.7	51.7	48.3	51.0	34.8	14.2
At least 4 deprivations	**12.6**	**25.6**	47.8	52.2	53.0	47.0	55.7	36.0	8.3	57.5	42.5	55.5	44.5	55.6	34.7	9.7
At least 5 deprivations	**2.0**	**19.2**	47.6	52.4	50.0	50.0	59.5	34.6	5.9	58.2	41.8	59.6	40.4	59.6	33.5	6.9
At least 6 deprivations	**0.1**	**11.2**	43.6	56.4	44.2	55.8	64.0	31.0	5.0	58.2	41.8	59.9	40.1	66.2	31.0	2.7
Sample distribution			49.9	50.1	67.3	32.7	36.4	34.0	29.6	63.1	36.9	36.8	63.2	33.9	33.1	33.0

Source: Young Lives data using Alkire and Foster (2008) methodology

If we look at the MPI decomposition by rural/urban residence and context characteristics such as access to education and healthcare, we find again that circumstances that should not affect the opportunities of recently born children are very important as correlates of multidimensional poverty (Table 11). The percentage of deprived children among those living in rural areas, at altitudes above 2,500 metres above sea level, and in remote areas far exceed the percentages that they would have if deprivations were assigned proportionally to the sample distribution. For example, although a little less than 40 per cent of the Younger Cohort sample lived in rural areas in Round 1, almost 75 per cent of deprived children (for a threshold of children with 3 or more deprivations) were concentrated in rural areas. Even if we use a threshold of children with 5 or more deprivations, 87 per cent are concentrated in rural areas.[13] Similar results are evident when we split the sample between those living above and below 2,500 metres above sea level, which highlights the fact that most of the inequalities are concentrated in the mountainous region. Again if we look at remoteness and split the sample between those that are 30 minutes or more from a key public service (like educational or health facilities), we find that those children living in remote areas experienced far more deprivations than their weight in the Young Lives sample, no matter what threshold level is used. Even worse, when we look at the most deprived (using a threshold of at least 4 or 5 deprivations), the severity of the deprivation rates is far greater in rural, high altitude and remote areas, than the deprivation rates that we obtain if we use lower thresholds (at least 1, 2 or 3 deprivations). This pattern shows that those living in less favourable areas are not only more deprived but deprived in many more dimensions.

[13] We excluded from the analysis the deprivation index based on a threshold of 6, since the sample size is very small.

Table 11. Decomposition of the Multidimensional Poverty Index: Younger Cohort (%)
(by region and remoteness characteristics)

Round 1											
	MPI	**Area of residence**		**Altitude**							
		Urban	Rural	< 2500	> 2500						
At least 1 deprivation	**30.0**	38.9	61.1	44.5	55.5						
At least 2 deprivations	**26.7**	32.4	67.6	41.7	58.3						
At least 3 deprivations	**18.4**	25.4	74.6	36.3	63.7						
At least 4 deprivations	**8.8**	22.9	77.1	31.9	68.1						
At least 5 deprivations	**1.8**	12.8	87.2	35.1	64.9						
At least 6 deprivations	**0.2**	54.2	45.8	70.2	29.8						
Sample distribution		60.1	39.9	54.4	45.6						
Round 2											
	MPI	**Area of residence**		**Altitude**		**Remoteness (access to nearest educational facility)**			**Remoteness (access to nearest health facility)**		
		Urban	Rural	< 2500	2500= <	Immediate	Less than 30 min	30 min or more	Immediate	Less than 30 min	30 min or more
At least 1 deprivation	**33.6**	47.1	52.9	49.8	50.2	61.4	23.8	13.8	7.0	46.1	44.3
At least 2 deprivations	**32.9**	46.1	53.9	49.3	50.7	62.0	23.4	13.7	7.0	45.2	45.2
At least 3 deprivations	**30.0**	41.9	58.1	46.9	53.1	63.5	21.5	14.0	6.8	41.6	48.9
At least 4 deprivations	**25.6**	35.6	64.4	44.2	55.8	64.7	19.6	14.7	6.6	37.2	53.1
At least 5 deprivations	**19.2**	29.3	70.7	42.6	57.4	64.6	17.7	16.6	6.8	33.9	55.5
At least 6 deprivations	**11.2**	26.7	73.3	43.0	57.0	63.9	17.8	16.7	6.8	32.1	58.5
Sample distribution		62.1	37.9	56.3	43.6	56.9	30.0	12.1	7.4	57.3	33.1

Source: Young Lives data using Alkire and Foster (2008) methodology

If we look at how the MPI has changed as the children grew up from 7.5–8.5 months to 4.5–5.5 years old for children living in different contexts, we find some evidence of reduction of the severity of deprivations: those children living in rural, high altitude and remote areas still suffer far more deprivations than their weight in the Young Lives sample, but less than the concentration found in Round 1.

Taking advantage of the fact that the MPI can also be decomposed alongside the different poverty dimensions covered in the Young Lives survey, Table 12 shows the relative importance of each dimension in the overall deprivation index for the Younger Cohort. Two deprivations (stunting

and inadequate child-rearing practices) increase their relative importance between rounds and could be behind the results shown so far.

Table 12. Relative importance of each poverty dimension: Younger Cohort (%)

	Round 1		Round 2	
	Deprivation headcount	**Share**	**Deprivation headcount**	**Share**
No access to electricity	40.0	22.2	29.5	14.6
No proper sanitation	61.6	34.2	57.6	28.6
Stunting	30.4	16.9	37.2	18.4
Underweight	6.7	3.7	5.7	2.8
No vaccination card	10.5	5.8	2.9	1.4
Lacking positive rearing practices	30.9	17.2	68.6	34.1

Source: Young Lives Data using Alkire and Foster (2008) methodology

In the case of the Older Cohort, Table 13 shows the multidimensional headcount as well as the MPI. As can be seen here, the number of Older Cohort children deprived increased between 2002 and 2006. This is true independently of the threshold level used to define the multidimensional poverty indicator. In the case of the MPI, the results show that the rate is about the same for low threshold levels (below 3 deprivations). However if we use 4, 5 or 6 deprivations as the threshold level, the severity of deprivation levels increase. Again this is consistent with the fact that deprivations are highly correlated and increases in deprivation rates of certain dimensions occur precisely among children who are already deprived in several other dimensions.

Table 13 also shows the decomposition exercise of the MPI by child, maternal and household characteristics for the Older Cohort. Here, as was the case for the Younger Cohort, being a member of a family with four or more children, and having a mother who is not married, who did not complete primary school, and is of indigenous origin, makes the children much more likely to be deprived whatever threshold level is used. Similarly, the gender gap is small, with slightly higher deprivation rates for girls in

Round 1, and for boys in Round 2. However these differences are probably not statistically significant.

The deprivations for those children with less educated mothers from indigenous backgrounds, and living in households with four or more siblings, rises between rounds, independently of the threshold level. Further as the threshold is raised, the gap between those with these less favourable backgrounds and others increases sharply. For example, children from the Older Cohort having mothers who did not complete primary school (which represents about 44 per cent of the sample in Round 1) constitute 58 per cent of the possible deprivations when the threshold is set to at least one deprivation and this rises to 70 per cent when the threshold is raised to at least four deprivations. These same deprivation rates have increased to 63 per cent and 75 per cent, respectively in Round 2. Similar results are evident when we look at other circumstances, like ethnicity and number of children in the household.

Table 13.Decomposition of the Multidimensional Poverty Index: Older Cohort (%)

(by household, mother and child characteristics)

ROUND 1																
	H (Multi-dimensional headcount)	**MPI**	**Gender**		**No. of children**		**Household income**			**Mother's marital**		**Mother's first**		**Maternal education**		
			Boy	Girl	1–3	4=<	T1	T2	T3	Not married	Married	Not Spanish	Spanish	< Primary	< Second.	Second.=<
0 deprivations	**14.9**															
At least 1 deprivation	**85.1**	**37.9**	49.7	50.3	40.6	59.4	57.3	27.6	15.1	39.2	60.8	55.6	44.0	57.7	33.7	8.6
At least 2 deprivations	**68.2**	**35.2**	49.7	50.3	38.2	61.8	59.8	26.7	13.5	38.0	62.0	58.4	41.2	61.0	33.1	5.8
At least 3 deprivations	**45.6**	**27.9**	50.5	49.5	34.3	65.7	61.8	25.8	12.4	37.8	62.2	61.3	38.2	65.8	31.4	2.7
At least 4 deprivations	**21.5**	**16.0**	48.0	52.0	30.2	69.8	67.5	21.9	10.6	39.7	60.3	66.3	32.8	69.9	28.0	2.1
At least 5 deprivations	**6.9**	**7.1**	31.4	68.6	33.7	66.3	72.9	8.6	18.5	43.0	57.0	70.5	29.5	77.3	20.5	2.2
At least 6 deprivations	**0.2**	**0.6**	100.0	0.0	34.5	65.5	65.5	34.5	0.0	100.0	0.0	69.5	30.5	100.0	0.0	0.0
Sample distribution			50.6	49.4	52.1	47.9	45.6	30.6	23.8	43.5	56.5	43.8	55.9	43.8	35.0	21.2
ROUND 2																
	H (Multidi-mensional headcount)	**MPI**	**Gender**		**No. of children**		**Household income**			**Mother's marital status**		**Mother's first language**		**Maternal education**		
			Boy	Girl	1–3	4=<	T1	T2	T3	Not married	Married	Not Spanish	Spanish	< Prim	< Second	Second=<
0 deprivations	**1.1**															
At least 1 deprivation	**98.9**	**37.8**	51.5	48.5	33.2	66.8	61.1	23.9	15.0	42.3	57.7	56.3	43.6	63.4	27.9	8.6
At least 2 deprivations	**91.5**	**37.1**	51.5	48.5	32.0	68.0	62.7	23.2	14.1	41.7	58.3	57.5	42.4	65.1	27.9	7.0
At least 3 deprivations	**72.1**	**33.2**	51.3	48.7	29.7	70.3	66.0	21.8	12.3	40.2	59.8	61.3	38.6	69.2	25.6	5.2
At least 4 deprivations	**53.2**	**27.5**	50.2	49.8	28.2	71.8	67.9	20.2	11.9	39.0	61.0	64.3	35.7	75.4	22.1	2.5
At least 5 deprivations	**35.0**	**20.2**	48.6	51.4	25.4	74.6	68.4	20.8	10.8	44.7	55.3	62.1	37.9	77.1	21.5	1.4
At least 6 deprivations	**18.2**	**11.8**	57.9	42.1	15.2	84.8	63.6	20.2	16.3	41.0	59.0	69.4	30.6	89.4	10.6	0.0
Sample distribution			50.6	49.4	43.5	56.5	49.0	28.0	23.0	43.5	56.5	43.8	55.9	43.8	35.0	21.2

Source: Young Lives data using Alkire and Foster (2008) methodology

Again, decomposing the MPI alongside the different well-being dimensions, Table 14 shows the relative importance of each dimension in the overall deprivation index for the Older Cohort. Here together with stunting, which was a deprivation whose importance also increased among the Younger Cohort, two others increase their relative importance between rounds: no access to proper sanitation and being involved in paid work.

Table 14. Relative importance of each poverty dimension: Older Cohort (%)

	Round 1		Round 2	
	Deprivation headcount	**Share**	**Deprivation headcount**	**Share**
No access to electricity	45.1	19.9	35.3	17.7
No proper sanitation	71.6	31.5	65.7	32.9
Stunting	33.2	14.6	40.8	20.4
Over-age	30.0	13.2	23.1	11.6
Disrespect from adults	22.8	10.0	4.7	2.4
Does paid work	24.6	10.8	29.9	15.0

Source: Young Lives Data using Alkire and Foster (2008) methodology

4.2.1 Decomposing deprivations by social groups

So far we have shown that there are a number of circumstances associated with the children, their mothers, their households and the contexts where the children live that seem to be significant: children's deprivations are concentrated among those with less favourable circumstances. However, we have taken each of these circumstances as if they were uncorrelated with each other – looking at each one independently of the others.

In what follows we look at the same decomposition exercise splitting the sample into the groups we described in section 4.1, where we divided the sample into 6 or 11 groups according to circumstances that have correlated the most with the different multidimensional poverty and deprivation indices

discussed so far. Table 15 presents the first grouping, while Table 16 presents the second grouping.

The last columns of Tables 15 and 16 show how much more likely a child who belongs to a group with less favourable circumstances is to be deprived than if it belongs to a group with more favourable circumstances. The odds of a deprived child being in a disadvantaged group increase dramatically as we raise the threshold level. This, as we have already mentioned, is consistent with fact that unfavourable circumstances keep building up a social environment where deprivations are exacerbated. Consequently, analysing and decomposing any deprivation index by individual dimensions may be very misleading.

Table 15. Decomposition of the Multidimensional Poverty Index: Younger Cohort (%)
(by group characteristics – first grouping, worst and best circumstances)

Round 1				
	MPI	Indigenous language 4 or more siblings Low maternal education	Non-indigenous language 3 or fewer siblings High maternal education Medium/high income Low altitude area	Deprivation odds between the worst and best backgrounds
0 deprivations				
At least 1 deprivation	**30.0**	36.7	1.3	29.1
At least 2 deprivations	**26.7**	40.6	1.1	37.9
At least 3 deprivations	**18.4**	46.0	0.8	59.4
At least 4 deprivations	**8.8**	51.1	0.0	
At least 5 deprivations	**1.8**	49.3	0.0	
At least 6 deprivations	**0.2**	59.4	0.0	
Sample distribution		23.3	2.3	10.1
Round 2				
	MPI	Indigenous language 4 or more siblings Low maternal education	Non-indigenous language High maternal education Medium/high income Low altitude area	Deprivation odds between the worst and best backgrounds
0 deprivations				
At least 1 deprivation	**33.6**	33.2	1.6	21.2
At least 2 deprivations	**32.9**	33.9	1.5	22.3
At least 3 deprivations	**30.0**	36.8	1.2	29.9
At least 4 deprivations	**25.6**	40.6	0.9	42.8
At least 5 deprivations	**19.2**	43.7	0.5	95.4
At least 6 deprivations	**11.2**	48.8	0.0	
Sample distribution		23.3	2.3	10.1

Source: Young Lives data using Alkire and Foster (2008) methodology

Table 16. Decomposition of the Multidimensional Poverty Index: Younger Cohort (%)
(by group characteristics – second grouping, worst and best circumstances)

Round 1				
	MPI	Indigenous language, Low maternal education	Non-indigenous language 3 or fewer siblings High maternal education High income	Deprivation odds between the worst and best backgrounds
0 deprivations				
At least 1 deprivation	**30.0**	16.1	11.2	1.4
At least 2 deprivations	**26.7**	17.7	7.1	2.5
At least 3 deprivations	**18.4**	21.6	4.2	5.1
At least 4 deprivations	**8.8**	27.9	1.7	16.9
At least 5 deprivations	**1.8**	29.7	0.0	
At least 6 deprivations	**0.2**	29.6	0.0	
Sample distribution		10.0	25.8	0.4
Round 2				
	MPI	Indigenous language, Low maternal education	Non-indigenous language 3 or fewer siblings High maternal education High income	Deprivation odds between the worst and best backgrounds
0 deprivations				
At least 1 deprivation	**33.6**	14.5	15.3	0.9
At least 2 deprivations	**32.9**	14.8	13.9	1.1
At least 3 deprivations	**30.0**	16.0	10.0	1.6
At least 4 deprivations	**25.6**	18.1	6.1	3.0
At least 5 deprivations	**19.2**	20.1	3.6	5.6
At least 6 deprivations	**11.2**	22.5	1.5	14.9
Sample distribution		10.0	25.8	0.4

Source: Young Lives data using Alkire and Foster (2008) methodology

We can also decompose the MPI alongside the deprivation dimensions being explored here. Tables 17 and 18 do this for the Younger and the Older Cohorts respectively. In the case of the Younger Cohort, the decomposition exercise shows that the share in the deprivation index has *increased* between rounds. This suggests that the improved access to services like electricity, sanitation and to a lesser extent vaccination has been benefiting those with more favourable circumstances: their share in the overall deprivation index has decreased between rounds.

Table 17. Decomposition of deprivation dimensions: Younger Cohort (for key sub-groups, second grouping)

	ROUND 1				**ROUND 2**			
	Indigenous language, Low maternal education		Non-indigenous language 3 or fewer siblings High maternal education High income		Indigenous language, Low maternal education		Non-indigenous language 3 or fewer siblings High maternal education High income	
	H (Multidimen-sional headcount)	**Share (%)**	**H (Multidimen-sional headcount)**	**Share (%)**	**H (Multidimen-sional headcount)**	**Share (%)**	**H (Multidimen-sional headcount)**	**Share (%)**
No access to electricity	0.706	24.9	0.137	14.0	0.561	19.5	0.079	5.8
No proper sanitation	0.934	32.9	0.372	37.9	0.924	32.1	0.255	18.7
Stunting	0.540	19.0	0.150	15.2	0.641	22.3	0.194	14.2
Malnutrition	0.132	4.6	0.023	2.3	0.110	3.8	0.021	1.5
No vaccination card	0.108	3.8	0.141	14.3	0.029	1.0	0.021	1.5
Lacking positive rearing practices	0.418	14.7	0.160	16.2	0.610	21.2	0.795	58.3

Source: Young Lives data using Alkire and Foster (2008) methodology

In the case of the Older Cohort, access to proper sanitation and having the expected age for the school grade the child is attending, are the two well-

being dimensions that seem to drive the results, as deprivation on these two fronts is capturing an increasing share of the Multidimensional headcount among disadvantaged groups.

Table 18. Decomposition of deprivation dimensions: Older Cohort (for key sub-groups, second grouping)

	ROUND 1				ROUND 2			
	Indigenous language, Low maternal education		Non-indigenous language 3 or fewer siblings High maternal education High income		Indigenous language, Low maternal education		Non-indigenous language 3 or fewer siblings High maternal education High income	
	H (Multidimen-sional headcount)	**Share (%)**	**H (Multidimen-sional headcount)**	**Share (%)**	**H (Multidimen-sional headcount)**	**Share (%)**	**H (Multidimen-sional headcount)**	**Share (%)**
No access to electricity	0.597	19.2	0.021	1.7	0.527	19.3	0.106	8.1
No proper sanitation	0.932	30.0	0.481	39.3	0.904	33.0	0.311	23.7
Stunting	0.467	15.0	0.271	22.1	0.556	20.3	0.410	31.3
Over-age	0.369	11.9	0.266	21.7	0.321	11.7	0.145	11.1
Disrespect from adults	0.315	10.2	0.094	7.7	0.109	4.0	0.049	3.7
Does paid work	0.423	13.6	0.091	7.5	0.321	11.7	0.289	22.1

Source: Young Lives data using Alkire and Foster (2008) methodology

Although the decomposition properties of the MPI have allowed us to unveil the importance of key circumstances and combinations of circumstances (called in this context 'key sub-groups') this type of exercise falls short of giving us a complete picture of which well-being dimensions matter for whom. To explore this issue in the next sub-section we look at each dimension separately.

4.3 Measuring the Human Opportunity Index

In the following tables we present the HOI calculation for the Younger and Older Cohorts from Young Lives data from Peru, for both Round 1 and Round 2. As we have already mentioned, the HOI combines both the access to certain services (e.g. electricity, prenatal care or vaccination card) or rights and practices (e.g. being well nourished or experiencing positive child-rearing practices), and how inequitably these services, rights and practices are distributed across different segments of society. Potentially we may have a low, medium or high coverage together with equitable or inequitable access.

Table 19. Human Opportunity Index for selected outcomes: Younger Cohort, Round 1 (%)
(considering basic circumstances) I/

	Access rate	**Simulated probability of access**	**Dissimilarity Index**	**HOI**
Access to electricity	60.0	60.0	25.3	44.8
Has proper sanitation	38.4	38.4	36.3	24.5
Adequate weight at birth	94.4	94.4	0.5	93.9
Prenatal care	93.0	93.0	2.4	90.8
Attended childcare centre	4.0	4.0	19.7	3.2
Not stunted	69.6	69.6	10.8	62.1
Not underweight	93.3	93.3	2.4	91.0
Has vaccination card	89.5	89.5	1.2	88.4
Positive rearing practices	69.1	69.1	5.2	65.5

I/. Controlling for these initial conditions: gender of child, maternal education, maternal education squared, per capita income (in logs), marital status, number of children and urban/rural area of residence

Source: Young Lives data using Paes de Barros et al. (2009) methodology

Table 19 shows the HOI, controlling for the basic set of circumstances considered in the World Bank Study (Paes de Barros et al. 2009). This set of

circumstances includes gender of child, maternal education, per capita income, marital status, number of children, and area of residence (urban/rural). Table 20 reproduces the same exercise, controlling for a more complete set of circumstances, including maternal language of the mother, maternal migration status before the birth of the child, altitude of the district where the child was born, region of residence (coast, highlands, Amazon), the value of household assets (valued at median prices), and a measure of remoteness, proxied by the distance to the nearest educational and health centres. First it is interesting to highlight that the results obtained using the smaller set of circumstances are very similar to the results obtained when we expand the set of circumstances, indicating that the results are reasonably robust.[14]

Table 20. Human Opportunity Index for selected outcomes: Younger Cohort, Round 1 (%)
(considering extended circumstances) II/

	Access rate	Simulated probability of access	Dissimilarity index	HOI
Access to electricity	60.0	60.6	25.1	45.4
Has proper sanitation	38.4	38.6	37.8	24.0
Adequate weight at birth	94.4	94.2	0.9	93.4
Prenatal care	93.0	93.0	3.6	89.7
Attended a childcare centre	4.0	4.0	31.4	2.8
Not stunted	69.6	69.9	11.4	62.0
Not underweight	93.3	93.2	2.5	90.9
Has vaccination card	89.5	90.0	1.6	88.6
Positive rearing practices	69.1	69.6	5.5	65.7

II/. Controlling for the following initial conditions: gender of child, maternal education, maternal education squared, per capita income (in logs), marital status, number of children and area of residence (urban/rural), maternal migration status before the birth of the child, altitude of district when child was born, region (coast, highlands, Amazon), maternal language and asset index, distances to the nearest educational and health centres.
Source: Young Lives data using Paes de Barros et al. (2008) methodology

[14] The same results are obtained when we do this comparison in Round 1 and Round 2 for both the Younger and Older Cohorts (see Tables A5 in the Statistical appendix for the Younger Cohort and Tables A6 and A7 for the Older Cohort). In addition there are no important differences between the indicators obtained from Round 1 data and the ones reported here based solely on panel data. This was expected as the attrition rate is very low and it is shown to be overwhelmingly a random phenomenon (Outes-Leon and Dercon 2007).

Table 20 shows that at the highest inequalities occur in access to key public services like proper sanitation, electricity or access to a childcare centre and that these are pushing down the HOI. For these services we can claim that the Government faces not only a problem of delivery of services but also a need to deliver them in a more equitable way. For other services like access to prenatal care and vaccination, inequality of access is very small and access is high, highlighting the fact that the Government has advanced a lot in delivering those services.[15] Finally, we have rights like not being stunted (adequate height-for-age), which reflect inadequate policies and childcare practices before the child was born and during the first few months after birth, that show some inequity and insufficient coverage.

When one compares how the HOI has evolved between Round 1 and Round 2 as the children of the Younger Cohort grew up from 6–18 months to 4.5–5.5 years, we see that the coverage has increased for services like childcare centres, electricity, and vaccination, it has remained about the same for access to sanitation services and the coverage of key rights like not being stunted or accessing adequate child-rearing practices has deteriorated. In the case of stunting, as we have already mentioned this is the result of policies and practices occurring before the child was born and during the first few months after birth. In the case of access to good child-rearing practices, it might be a reflection of inadequate education for the previous generation and the lack of information about how to discipline a child without using physical or verbal violence or neglecting the child.

In Round 2, when the child was 4.5 to 5.5 years old, we evaluate their cognitive abilities using a standardised vocabulary test (PPVT).[16] It is important to highlight that it is precisely in this dimension that the HOI shows one of its lowest values, denoting a high degree of inequality of opportunity. This result is consistent with ample evidence associated not only with the low quality of public education in Peru but the fact that

[15] The right to not be underweight (adequate weight-for-age) also falls within this category, as it shows high access and low inequity.

[16] The Peabody Picture Vocabulary Test (PPVT) is a norm-referenced test of receptive vocabulary that can be used to evaluate the relative scores for children. Its main objective is to measure vocabulary acquisition in people from 2.5 years old to adulthood. A detailed analysis of the validation of the PPVT instrument can be found in Cueto et al. (2009)

education is one of the most significant factors behind inequality of opportunity in Peru.

Table 21. Human Opportunity Index for selected outcomes: Younger Cohort, Round 2 (%)
(considering extended circumstances) III/

	Access rate	Simulated probability of access	Dissimilarity Index	HOI
Access to electricity	69.9	70.7	17.6	57.3
Has proper sanitation	42.0	42.3	37.6	26.4
Not stunted	62.6	63.0	16.6	52.5
Not underweight	94.1	94.1	2.1	92.1
Attended a childcare centre	19.5	19.8	21.5	15.6
Preschool enrolment	81.5	81.5	7.9	75.1
High cognitive ability (standardised PPVT)	29.2	29.4	37.0	18.5
Has a vaccination card	97.0	97.0	0.7	96.4
Consumed protein in last 24h	91.3	91.2	4.0	87.6
Positive rearing practices	31.2	31.0	12.9	27.0

III/. Controlling for the following initial conditions: gender of child, maternal education, maternal education squared, per capita income (in logs), marital status, number of children and area of residence (urban/rural), maternal migration status before the birth of the child, altitude of district when child was born, region (coast, highlands, Amazon), maternal language and asset index, distances to the nearest educational and health centres.
Source: Young Lives data using Paes de Barros et al. (2008) methodology

Table 22 decomposes the changes in the HOIs between changes in coverage and changes in distribution. This exercise shows how more or less inequitable the access to the service has become. The last column in Table 15 indicates how important the distributional effect has been. As expected in services like electricity and sanitation the distributional component is relatively high, as the new access to these services is focused in groups that typically are marginalised. However when one looks at access to services like a childcare centre or health facilities (proxied here as access to

vaccination card) most of the increase in access rates is happening among children that have more favourable circumstances, leaving behind those children with less favourable circumstances (uneducated mothers of indigenous origin living in rural areas).

Table 22. Decomposition of Human Opportunity Index changes for selected outcomes: Younger Cohort
(considering extended circumstances)

	Coverage effect (1)	**Distributional effect (2)**	**Change in HOI (3)=(1)+(2)**	**Relative importance of the distributional effect (4)=(2)/(3)**
Access to electricity	7.6	5.9	13.4	43.7
Has proper sanitation	2.3	1.0	3.3	30.0
Attended a childcare centre	10.8	2.0	12.8	15.5
Not stunted	−6.1	-3.1	−9.3	33.4
Not underweight	0.9	0.4	1.2	28.7
Has a vaccination card	6.9	0.9	7.8	11.4
Positive rearing practices	−36.5	−2.3	−38.8	5.9

Source: Young Lives data using Paes de Barros et al. (2009) methodology

4.3.1 Looking at the Older Cohort

Table 23 looks at the opportunity indices for the Older Cohort in Round 1, when these children were aged between 7.5 and 8.5 years. When we looks at the Older Cohort at this stage, we see again that the access to proper sanitation combines both a low access rate and high inequality in access, indicating that children not deprived in this dimension tend to be concentrated in a relatively homogenous group associated with more favourable circumstances (like better educated mothers of non-indigenous origin, living in urban areas). Although access to electricity has a somewhat higher rate, it also shows high inequality, generating a relatively low HOI (below 50 per cent).

Other well-being dimensions where inequality is high are related to rights linked to health and education. Stunting for the Older Cohort is clearly disproportionally distributed among those children with less favourable circumstances. The same is true when one looks at the right to have some minimum maths and verbal skills. Together with the inequality in access to sanitation, inequality of access to minimum educational competences is the most serious well-being handicap that Young Lives Older Cohort children are confronting.

Table 23. Human Opportunity Index for selected outcomes: Older Cohort, Round 1 (%)
(considering extended circumstances) II/

	Access rate	Simulated probability of access	Dissimilarity Index	HOI
Access to electricity	54.9	56.2	26.5	41.3
Has proper sanitation	28.4	29.2	47.8	15.2
Ever breast-fed	98.4	98.3	0.8	97.5
Not stunted	66.8	66.8	10.3	59.9
Not underweight	94.6	94.6	2.1	92.6
Enrolled in school	99.4	99.4	0.5	98.9
Verbal skills	43.2	42.9	20.7	34.0
Maths skills	47.8	47.9	17.2	39.7
Not over-age	70.0	69.8	8.3	64.0
Respect from adults	77.2	78.3	5.4	74.1
Not doing paid work	75.4	75.2	6.7	70.1

II/. Controlling for the following initial conditions: gender of child, maternal education, maternal education squared, per capita income (in logs), marital status, number of children and area of residence (urban/rural), maternal migration status before the birth of the child, altitude of district when child was born, region (coast, highlands, Amazon), maternal language and asset index, distances to the nearest educational and health centres
Source: Young Lives data using Paes de Barros et al. (2009) methodology

Table 24 shows the opportunity indices in Round 2, when these children were between 11.5 and 12.5 years of age. Here we have added the standardised vocabulary test (PPVT) to evaluate their cognitive abilities. Again low coverage of this ability and high inequities combine to generate the lowest opportunity index.

Table 24. Decomposition of Human Opportunity Index changes for selected outcomes: Older Cohort, Round 2 (%) (considering extended circumstances) III/

	Access rate	Simulated probability of access	Dissimilarity index	HOI
Access to electricity	64.8	66.3	17.7	54.6
Has proper sanitation	32.9	35.0	37.8	21.8
Consumed proteins in last 24h	80.7	84.8	6.8	79.0
Not stunted	58.2	59.2	13.9	51.0
Enrolled in school	99.0	98.9	0.9	98.1
Not over-age	76.0	76.2	8.5	69.7
Verbal skills	79.6	79.5	6.9	74.0
Maths skills	93.4	93.7	3.0	90.8
High cognitive ability (standardised PPVT)	27.8	27.6	36.0	17.7
Respect from adults R2	91.5	95.8	2.1	93.8
Not doing paid work	69.0	69.0	7.2	64.1

III/. Controlling for the following initial conditions: gender of child, maternal education, maternal education squared, per capita income (in logs), marital status, number of children and area of residence (urban/rural), maternal migration status before the birth of the child, altitude of district when child was born, region (coast, highlands, Amazon), maternal language and asset index, distances to the nearest educational and health centres.

Source: Young Lives data using Paes de Barros et al. (2009) methodology

To achieve a larger increase in the opportunity index, expansions in coverage must be accompanied by reductions in inequality of opportunity. As can be seen in Table 25, the largest 'improvements' in inequality have occurred in access to verbal and maths skills. However this change is misleading as the relevance of the minimum cognitive skill depends on age. The fact that still 20 per cent of the sample cannot read an extremely basic sentence years after the competence is expected cannot be considered a real improvement.[17]

[17] The reading items required the children to read three letters (N, A, P); one word ('pan', which is Spanish for 'bread'); and one sentence ('El pan es rico', which is Spanish for 'the bread is delicious'). The item used to for writing assessment required children to write the sentence 'me gustan los perros' (which is Spanish for 'I like dogs').

Table 25. Decomposition of Human Opportunity Index for selected outcomes: Older Cohort (%)
(considering extended circumstances)

	Change in coverage effect (1)	Distributional effect (2)	Change in HOI (3)=(1)+(2)	Relative importance of the distributional effect (4)=(2)/(3)
Access to electricity	7.4	5.8	13.3	43.9
Has proper sanitation	3.0	3.5	6.5	53.4
Not stunted	−6.8	−2.1	−8.9	23.9
Enrolled in school	−0.5	−0.4	−0.9	47.0
Verbal skills	29.0	11.0	40.1	27.4
Maths skills	37.9	13.3	51.2	26.0
Not being over-age	5.9	−0.1	5.7	–
Respect from adults	16.6	3.2	19.7	16.0
Not doing paid work	−5.8	−0.3	−6.0	4.8

Source: Young Lives data using Paes de Barros et al. (2008) methodology

Inequality of opportunity may change when we redefine key outcomes considering issues of quality. As can be seen in Table 26, as we move to more precise outcome definitions in which the quality of the services is more closely monitored, then inequality of opportunity, as measured by the HOI increases. Here although access to electricity is almost universal, when we take into account the number of hours households in the Young Lives sample have access to this service, inequality increases dramatically. Similar results can be shown when we look at access to safe water.

Table 26. Changes in Human Opportunity Index along quality dimensions: Younger Cohort (%)

	Coverage rate	Dissimilarity Index	HOI
Electricity (Round 1)			
Some access to electricity	96.84	1.29	95.59
Electricity all days (last 15 days)	70.25	9.17	63.81
Electricity 24 hours	58.34	14.55	49.86
Safe water (Round 2)			
Access to piped water into dwelling	59.12	11.70	52.20
Access 7 days a week	47.71	11.31	42.31
Access 24 hours	21.45	15.27	18.17

Source: Escobal et al. 2009, based on Peru Young Lives data

5. Concluding remarks

We have used Young Lives longitudinal data for Peru to construct a variety of indicators to trace inequality of opportunity among children. First, we use aggregate indicators of multidimensional poverty and different indices of deprivations that have the benefit of allowing for exact decomposition in both the well-being and the circumstance dimensions. Next we use the methodology developed in Paes de Barros et al. (2009) to measure an opportunity index that aims to combine access to services and rights with the inequality of access, controlling for those circumstances that are beyond children's control.

An important finding here is that independently of the index and the poverty threshold used, the ranking of multidimensional poverty, deprivation, and lack of opportunities is the same when we group the children in alternative groupings based on their circumstances at birth: mother's indigenous origin, maternal education, area of residence (urban/rural), living at altitudes higher than 2,500 metres above sea level, remoteness, etc. It is precisely the groups of children in society that have less favourable circumstances who not only have less access to basic services and other key well-being dimensions (like not being stunted, not having over-age, or being respected by adults), but are also the ones who are lagging behind as the public sector assigns disproportionally more resources to those children that lack one or two of these opportunities (or have one or more of these deprivations) rather than address the lack of services and access to rights of those that are simultaneously deprived in many dimensions.

The paper has also shown that the 'devil is in the detail' as more precise definitions of certain outcomes (for example, moving from access to a certain service to the number of hours in which the service is available to Young Lives families) can reveal hidden inequalities.

The paper shows that while there is an appearance of decreasing inequality according to some indicators, this masks increasing inequality in other areas, and in particular that certain vulnerable groups may be left out of attempts to reduce inequality of opportunity across the population. It also shows that although scalar indices of poverty, deprivations or inequality of opportunity may be useful as an advocacy tool, they may mask important heterogeneities so as to make such indicators, to say the least, insufficient to show the full scope and depth of inequality of opportunity. Looking at a broader range of indicators, evaluating how opportunities and deprivations are unevenly distributed among children, and showing that circumstances are correlated is critical. So we need to look not just at opportunities or deprivations between those that are affected by a certain circumstance and those that are not affected, but look at these indicators within groups of children affected simultaneously by a range of circumstances. This range of circumstances may be related to broader patterns of discrimination and not just be related to specific and isolated circumstances.[18]

Trying to assess who is deprived in which dimensions requires being able to decompose these indicators on both the circumstance dimension and the well-being dimension. This is something that the MPI does and into which it has provided some useful insights. Still, we need to ask the broader question: it is really needed to aggregate multiple dimensions of child well-being in one unique indicator if we recognise that child well-being is truly multidimensional and the well-being dimensions relevant at different stages in life are not the same. Is the pressure for a 'simple' unique indicator aimed at advocacy so high that we are willing to ignore this? Many UNICEF national reports construct aggregate indices based on principal component analysis or other multivariate statistical techniques.

The MPI recognises that it is important to be explicit not only about the threshold from which a deprivation is recognised, but also about mildness or severity in terms of a second threshold that indicates whether a child is deprived in just one dimension or is deprived many dimensions. Although

[18] The distinction is related to the differences between horizontal and vertical inequality (Stewart et al. 2005)

the MPI is a step forward in multidimensional poverty estimation, because its decomposability properties allow us to look at the relative importance of specific circumstances and the relative importance of specific well-being dimensions, it still fails to provide a comprehensive account of multidimensional child poverty. If we want to pursue a better understanding of child poverty, we need not a single indicator but a range of indicators.

The pressure to look at just one gauge is nevertheless very strong, because of its supposed simplicity. Many have argued that aggregate well-being indicators tend to be highly correlated with GDP per capita and monetary poverty at the level of spatial aggregation where they are commonly used. This may be the result of mechanical aggregation, using only the indicators that are at hand (which typically favour material well-being), arbitrary weights, or statistical procedures like principal component or factor analysis, which act as 'grinders', losing any relationship between weights and the intrinsic importance of the indicators for child well-being. Even worse, after pulling together everything, the index is elevated to the category of a multidimensional index without its compilers knowing what it is really trying to aggregate.

On the other hand, the suggested aggregation techniques typically indicate that the one should not use well-being dimensions that are highly correlated which each other (UNDP 2007: 22). Although this may be reasonable from the statistical point of view, it is very risky to drop certain dimensions 'just' because they are highly correlated with others without understanding the intrinsic relationship between these dimensions, and which roles they play in understanding multidimensional child well-being.

Because of these considerations our opinion is that either one should not try to aggregate dimensions that are by nature different, or one should be much more explicit about the trade-offs one is prepared to admit in relation to this. If absolutely necessary, aggregation could be done in either of two ways. One is obtaining a consensus regarding the relative importance that society places on different child well-being dimensions. This may be called a normative aggregation. The other way is to find what implicit trade-off

exists, regardless of normative considerations. For example, we can use the amount of resources that are allocated in the national budget for each dimension and for each social sub-group as a way of recognising the implicit trade-offs. Even in this case, it is very likely that both indicators would be needed.

Aggregate multidimensional poverty indices are here to stay, whether we like them or not. This paper has shown that although scalar indices of poverty, deprivations or inequality of opportunity may be somewhat useful as an advocacy tool (as the poverty rankings between those having different circumstances may be reasonably robust), they may mask important heterogeneities, which makes them of limited usefulness for analytical and policy purposes, once we move beyond counting poor children.

One further area of concern which has not been directly addressed in this paper is the unit of analysis on which many of these indicators are based. In our own case we are taking advantage of child-specific data that has been collected at an individual level and using a longitudinal framework. However, statistical agencies and international organisations (like UNICEF and UNDP) are forced to construct their indices using already aggregated data at the sub-national or national level. Further analysis is urgently needed to understand the potential biases that these alternative aggregation schemes generate, once we lose contact with the multidimensional nature of *each* child and allow that at the aggregate level 50 per cent of boys and girls with a certain deprivation is not different from 100 per cent of girls with a deprivation and no boy deprived; or that changes in individual multidimensional poverty do not matter as long as the aggregate remains the same.

We have shown the complexity of child poverty, and how misleading it can be to rely on a single multidimensional measure of poverty. However complex and sophisticated the measure may be, it cannot show all the variations in outcomes. On the other hand, dimensions of deprivations cannot be understood without relating them to each other. A multi-

dimensional approach is necessary, but this should not be in the form of a single multidimensional measure. We cannot rely solely on aggregate measures of poverty if support is to be given to the most disadvantaged groups of children.

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Statistical appendix

Table A1. Multidimensional well-being in key sub-groups (first grouping, showing indicators): Younger Cohort (%)

	Indigenous language 4 or more siblings Low maternal education	Indigenous language 3 or fewer siblings Medium maternal education	Non-indigenous language 3 or fewer siblings Low maternal education Low/medium income	Non-indigenous language 3 or fewer siblings Medium maternal education Low/medium income	Non-indigenous language 3 or fewer siblings Medium maternal education High income	Non-indigenous language 3 or fewer siblings High maternal education Medium/high income Low altitude area	Odds of being poor between the worst and best backgrounds
Round 1							
Access to electricity	37.1	42.3	39.6	56.2	82.4	90.9	6.9
Has proper sanitation	9.7	23.8	16.7	30.4	63.9	73.2	3.4
Adequate weight at birth	92.4	96.4	98.4	91.4	93.1	95.8	1.8
Prenatal care	90.0	96.3	91.4	88.1	96.5	98.3	5.9
Attended a childcare centre	4.6	4.3	1.5	1.4	4.6	6.6	1.0
Not stunted	42.3	57.7	71.2	75.0	84.2	87.5	4.6
Not underweight	82.8	92.4	87.3	94.2	94.1	98.2	9.8
Has a vaccination card	82.5	85.8	95.2	91.9	86.7	91.7	2.1
Positive rearing practices	55.8	63.2	70.5	66.1	76.1	80.1	2.2
Round 2							
Access to electricity	47.5	51.0	71.3	71.3	90.9	94.7	9.9
Access to safe drinking water	69.7	76.4	71.2	68.0	88.5	90.9	3.3
Has proper sanitation	7.4	21.0	16.9	37.1	70.3	79.2	4.5
Not Stunted	33.5	47.0	61.3	62.1	81.4	88.1	5.6
Not underweight	88.3	94.4	88.2	94.2	96.0	99.0	11.5
Attended a childcare centre	21.3	20.1	2.2	10.2	20.4	27.5	1.1
Preschool enrolment	63.8	80.3	72.1	79.5	88.9	96.3	9.8
Has a vaccination card	96.7	97.4	95.6	96.6	96.3	97.9	1.6
Consumed protein in last 24h	84.3	93.0	91.6	87.9	95.8	99.0	15.6
Positive rearing practices	35.0	48.0	25.8	28.1	27.3	21.2	0.8
High cognitive ability (standardised PPVT)	7.5	15.9	13.2	20.5	39.4	59.2	2.3

Note: Indicators are based in the Panel sub-sample

Table A2. Multidimensional well-being in key sub-groups (second grouping, showing indicators): Younger Cohort (%)

	Indigenous language Low maternal education	Indigenous language Medium maternal education	Indigenous language High maternal education	Non-indigenous language 3 or fewer siblings Low/medium maternal education Low income	Non-indigenous language 3 or fewer siblings Low/medium maternal education Medium income	Non-indigenous language 3 or fewer siblings Low/medium maternal education High income	Non-indigenous language 3 or fewer siblings High maternal education Low income	Non-indigenous language 3 or fewer siblings High maternal education Medium income	Non-indigenous language 3 or fewer siblings High maternal education High income	Non-indigenous language 4 or more siblings Low/medium maternal education	Non-indigenous language 4 ore more siblings High maternal education	Odds of being poor between the worst and best backgrounds
Round 1												
Access to electricity	29.4	48.7	77.7	42.6	62.0	79.8	65.3	87.7	93.0	46.7	86.3	1.5
Has proper sanitation	6.6	24.9	46.9	24.0	34.2	61.2	47.3	63.8	79.3	23.8	62.8	1.0
Adequate weight at birth	94.3	97.1	91.4	92.0	92.1	93.5	96.6	94.3	96.8	90.3	97.8	3.0
Prenatal care	93.7	94.2	89.2	80.6	92.6	96.2	98.8	98.3	98.3	84.0	91.6	0.4
Attended childcare centre	3.3	3.7	2.6	3.3	1.4	5.1	2.3	6.8	6.4	2.4	4.0	1.0
Not stunted	46.0	58.9	78.4	71.9	74.1	84.1	82.0	83.4	90.1	61.6	85.0	1.1
Not underweight	86.8	93.1	97.4	94.5	91.5	95.3	97.3	98.0	98.4	90.1	97.7	2.1
Has vaccination card	89.2	85.8	80.1	92.9	88.8	87.6	93.9	92.1	91.4	89.8	85.9	0.9
Positive rearing practices	58.2	64.6	68.2	58.4	71.4	76.1	67.9	79.5	80.6	71.5	84.0	1.5
Round 2												
Access to electricity	43.9	56.6	86.7	64.4	77.4	89.3	78.3	93.9	95.2	55.1	92.1	1.4
Access to safe drinking water	69.9	75.0	78.8	56.9	76.1	87.5	84.7	89.7	91.6	56.5	89.9	1.2
Has proper sanitation	7.6	22.9	55.1	28.3	39.6	67.3	51.7	70.4	84.9	29.0	74.5	1.3
Not stunted	35.9	46.9	74.4	56.3	65.2	80.0	77.1	82.3	91.9	54.4	80.6	1.0
Not underweight	89.0	94.0	98.7	93.2	92.8	94.9	95.9	98.6	99.2	94.3	97.9	2.5
Attended a childcare centre	24.1	17.4	20.7	7.1	11.6	20.5	11.0	28.9	26.5	10.6	24.3	1.1
Preschool enrolment	69.6	77.7	82.3	76.4	80.3	87.7	94.5	92.7	98.6	74.6	95.1	2.5
Has a vaccination card	97.1	98.0	92.3	95.9	96.1	97.0	98.7	96.6	98.7	97.1	97.9	1.4
Consumed protein in past 24h	85.9	92.3	98.5	84.4	92.3	95.4	94.4	98.4	99.4	82.5	100.0	
Positive rearing practices	38.9	48.3	43.5	26.6	29.4	26.2	25.8	25.6	18.4	31.3	20.5	0.9
High cognitive ability (standardised PPVT)	7.0	16.0	44.3	14.3	22.7	36.8	44.0	48.7	66.0	12.1	42.2	1.1

Note: Indicators are based in the Panel sub-sample

Table A3. Multidimensional well-being in key sub-groups: Younger Cohort (%)

	Indigenous language 4 or more siblings Low maternal education	Indigenous language 3 or fewer siblings Medium maternal education	Non-indigenous language 3 or fewer siblings Low maternal education Low/medium income	Non-indigenous language 3 or fewer siblings Medium maternal education Low/medium income	Non-indigenous language 3 or fewer siblings Medium maternal education High income	Non-indigenous language 3 or fewer siblings High maternal education Medium/high income Low altitude area
Round 1						
Union	97.5	90.2	92.8	85.2	63.9	53.3
Intersection	0.6	0.0	0.0	0.0	0.0	0.0
Chakravarty (α=0)	41.4	33.6	31.4	26.6	16.1	11.2
Chakravarty (α=1)	26.0	23.9	23.2	20.6	11.7	8.6
Chakravarty (α=2)	34.5	27.8	26.8	23.3	13.9	9.5
Round 2						
Union	98.6	95.3	98.6	94.8	85.5	86.9
Intersection	0.6	0.0	0.0	0.0	0.0	0.0
Chakravarty (α=0)	41.6	34.5	34.4	30.1	19.7	17.1
Chakravarty (α=1)	26.1	23.3	24.4	21.8	15.6	14.8
Chakravarty (α=2)	33.4	27.5	28.7	25.1	16.9	15.5

Note: Indicators are based in the Panel sub-sample
Source: Young Lives data using Bourguignon and Chakravarty (2003) and Chakravarty et al. (1998) methodology

Table A4. Multidimensional poverty in key sub-groups (second grouping): Younger Cohort (%)

	Indigenous language Low maternal education	Indigenous language Medium maternal education	Indigenous language High maternal education	Non-indigenous language 3 or fewer siblings Low/medium maternal education Low income	Non-indigenous language 3 or fewer siblings Low/medium maternal education Medium income	Non-indigenous language 3 or fewer siblings Low/medium maternal education High income	Non-indigenous language 3 or fewer siblings High maternal education Low income	Non-indigenous language 3 or fewer siblings High maternal education Medium income	Non-indigenous language 3 or fewer siblings High maternal education High income	Non-indigenous language 4 or more siblings Low/medium maternal education	Non-indigenous language 4 or more siblings High maternal education
Round 1											
Union	98.7	90.0	75.4	89.2	85.7	66.4	74.5	63.2	47.2	90.5	56.4
Intersection	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0
Chakravarty α=0	40.9	32.1	21.6	31.3	25.4	16.5	22.1	13.8	9.7	31.8	14.0
Chakravarty α=1	26.6	22.7	16.8	24.5	18.7	12.4	17.9	10.2	7.5	21.6	10.8
Chakravarty α=2	34.6	26.5	19.1	27.7	21.7	14.4	19.9	11.6	8.3	28.0	11.9
Round 2											
Union	98.2	94.3	82.2	95.6	94.9	86.6	92.3	86.5	86.8	94.2	91.7
Intersection	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Chakravarty α=0	41.2	33.3	21.3	33.8	28.6	20.9	25.1	19.0	15.8	34.9	19.5
Chakravarty α=1	26.0	21.9	16.8	24.0	21.0	16.6	19.9	15.4	14.3	24.1	15.8
Chakravarty α=2	34.1	27.6	17.7	28.6	23.5	17.7	21.7	16.5	14.8	29.4	16.6

Note: Indicators are based in the Panel sub-sample
Source: Young Lives data using Bourguignon and Chakravarty (2003) and Chakravarty et al. (1998) methodology

Table A5: Human Opportunity Index for selected outcomes, Younger Cohort, Round 2 (%)
(considering basic circumstances) I/

	Access rate	Simulated probability of access	Dissimilarity Index	HOI
Access to electricity	69.9	70.1	16.6	58.5
Has proper sanitation	42.0	42.1	35.0	27.4
Not stunted	62.6	63.0	15.2	53.4
Not underweight	94.1	94.2	1.9	92.4
Attended childcare centre	19.5	19.7	14.6	16.9
Preschool enrolment	81.5	81.4	6.7	75.9
Has vaccination card	97.0	97.1	0.6	96.6
Consumed protein in last 24h	91.3	91.3	3.5	88.2
Positive rearing practices	31.2	31.0	8.2	28.5

I/. Controlling for the following initial conditions: gender of child, maternal education, maternal education squared, per capita income (in logs), marital status, number of children and area of residence (urban/rural)

Source: Young Live data using Paes de Barros et al. (2009) methodology

Table A6. Human Opportunity Index for selected outcomes, Older Cohort, Round 1 (%)
(considering basic circumstances) I/

	Access rate	Simulated probability of access	Dissimilarity Index	HOI
Access to electricity	54.3	54.1	28.3	38.8
Has proper sanitation	28.7	28.2	47.6	14.8
Ever breast-fed	98.1	98.5	0.6	97.8
Not stunted	65.4	65.3	11.1	58.0
Not underweight	93.9	94.1	1.4	92.8
Enrolled in school	99.2	99.4	0.3	99.1
Not over-age	69.3	69.7	8.2	64.0
Respect from adults	76.7	76.8	5.3	72.7
Not doing paid work	76.1	75.9	6.1	71.3

I/. Controlling for the following initial conditions: gender of child, maternal education, maternal education squared, per capita income (in logs), marital status, number of children and area of residence (urban/rural)

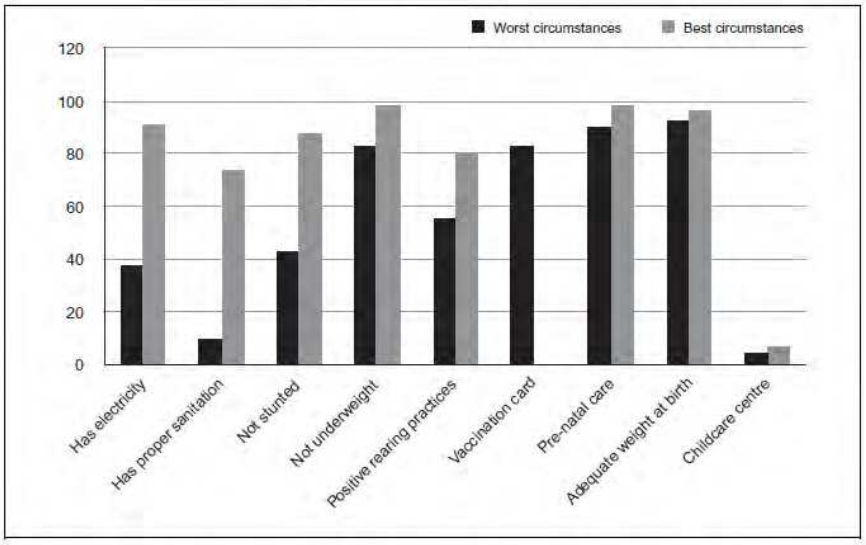
Source: Young Lives data using Paes de Barros et al. (2009) methodology

Table A7. Human Opportunity Index for selected outcomes: Older Cohort, Round 2 (%)
(considering basic circumstances) I/

	Access rate	Simulated probability of access	Dissimilarity Index	HOI
Access to electricity	64.8	65.1	20.6	51.7
Has proper sanitation	32.9	34.0	42.2	19.6
Consumed protein in last 24h	80.7	83.8	6.3	78.5
Not stunted	58.2	59.7	12.9	52.0
Enrolled in school	99.0	99.1	0.5	98.6
Not over-age	76.0	77.6	7.2	72.0
Respect from adults	91.5	95.1	2.1	93.1
Not doing paid work	69.0	70.6	5.9	66.4

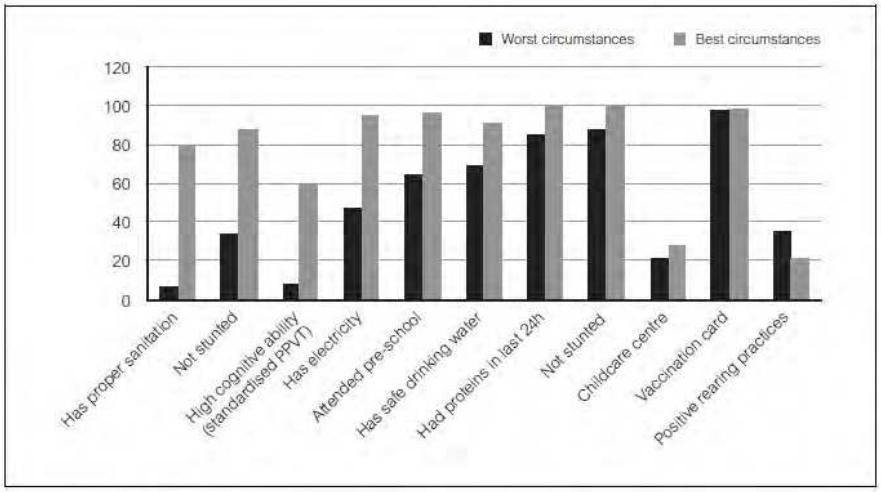
I/. Controlling for the following initial conditions: gender of child, maternal education, maternal education squared, per capita income (in logs), marital status, number of children and area of residence (urban/rural)
Source: Young Lives data using Paes de Barros et al. (2009) methodology

Figure 1. *Multidimensional well-being in key sub-groups (first grouping), worst and best circumstances: Younger Cohort, Round 1*



Source: Young Lives data, Round 1.

Figure 2. *Multidimensional well-being in key sub-groups (first grouping), worst and best circumstances: Younger Cohort, Round 2*



Source: Young Lives data, Round 2.