The Many Dimensions of Child Poverty in Indonesia:

Patterns, Differences and Associations

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Abstract

This paper examines the different dimensions of child poverty in Indonesia, looking at outcomes and opportunities across consumption, health, education, housing, food sufficiency, social assistance and infrastructure. In addition to looking at each of these measures separately, we go further to investigate the associations between them, asking whether it is the same children who are poor on each dimension or different ones. For example, we look at the associations between physical access to education, health and transportation services; and consumption, housing, water and sanitation; whether money poor and food poor children are the same; the linkages between access to health services and social assistance and health outcomes; and associations between barriers to enrolment. These associations have important implications for program design and targeting. We present results over time, as well as for different populations of interest, such as rural, urban regional, and female-headed households.

While poverty on some indicators remains high, in general child poverty has fallen along most dimensions since 2002, including for most health, education, housing and consumption outcomes, and health and education opportunities. However, lack of access to quality housing and proper sanitation remains high. There are few differences between the opportunities and most outcomes of children living in male and female-headed households, with the key exception of consumption poverty. Rural children are more likely to be poor on many dimensions than urban children, often considerably so, and similarly for poorer children compared to richer ones. Poverty in Eastern Indonesia is higher than rest of the country on most dimensions, especially in Papua.

We also find a strong association of poverty for children across a number of dimensions of opportunity in rural areas, but not for urban areas. In all areas, poor housing, water and sanitation are strongly associated with low incomes, but extend well beyond the poor. Interestingly, despite an official poverty line that is largely based on obtaining sufficient calories, the majority of food energy-deficient households are not consumption poor. Moreover, over half of unskilled deliveries (a key driver of maternal mortality in Indonesia) are not associated with low incomes or lack of access to a midwife. Finally, not only is poverty high on most indicators in Maluku and Papua, it is generally the same children who suffer on each dimension, compounding their situation and life chances. Policy implications for program design and targeting are considered.

Introduction

Poverty and well-being occur on multiple dimensions. The case for this, as well as the need to consider all of these dimensions within a generalised framework, has been made famously by Sen (2000). There have been various attempts to measure and aggregate this multi-dimensionality (both monetary and non-monetary). An early, and perhaps the most well-known approach, is the UNDP's Human Development Index (HDI). However, the choice of dimensions and weights has been criticized (Kovacevic 2010). UNICEF adopted a multi-dimensional framework to analyse child welfare in their recent Global Study on Child Poverty and Disparities (2011). Their approach, the 'Bristol Deprivation method', uses an analytical framework based on the Convention on the Rights of the Child and explicitly examines child welfare vis-à-vis access to severe deprivations of human needs, including shelter, sanitation, safe drinking water, information, food, education, health. This framework was applied to seven countries in the East Asia Pacific in 2011, not, however, including Indonesia.

An alternative approach which has gained popularity is the Multidimensional Poverty Index (MPI) (Alkire and Foster 2011; Alkire and Santos 2010), which introduces a count of the number of dimensions in which people are deprived. The method reflects both the headcount ratio of poverty – the proportion of the population that is multi-dimensionally poor – and the average intensity of their poverty, and introduces both into a composite 'score', the MPI. The MPI specifically looks at ten indicators which measure poverty across three dimensions: education, health, and living standards. An MPI was calculated for Indonesia and its provinces, based on the 2007 Demographic and Health Survey data (Alkire 2012). Although some dimensions pertain to child welfare, such as years of schooling and child mortality, the MPI does not explicitly focus on child welfare as the UNICEF Global Study does.

The results of the MPI in Indonesia broaden the concept of poverty. Officially, 17% of the population lived below the national (consumption-based) poverty line in 2007. Under the MPI approach, where a person is poor if they are deprived on at least one third of the weighted indicators, 21% of the Indonesian population was multi-dimensionally poor in 2007. The average intensity of their poverty, or the average proportion of indicators in which the poor were

deprived, was 46%, and around 8% of the population was defined as 'severely poor', facing deprivation in at least half or more of the weighted indicators.

As with other analyses, the MPI also looked at multidimensional poverty at the sub-national level, and found significant disparities, with provincial multidimensional poverty rates ranging from 10% in Jakarta to 44% in Papua. Differences also occur in the ratio of multidimensional poverty to official poverty. In Jakarta, official poverty was 5%, or about half of its multidimensional poverty rate, while in Papua, the official poverty of 41% was very similar to its multidimensional counterpart. 23% of Papuans were 'severely poor' according to the MPI. Elsewhere in Eastern Indonesia, 40% of East Nusa Tenggara was multi-dimensionally poor, and 20% severely so.

The MPI and other composite indices have come under criticism for the sometimes ad hoc, arbitrary or non-transparent way in which they are aggregated, or in which non-monetary poverty lines are set. Rather than aggregating to a single number, which arguably obscures which dimensions are driving overall deprivation, Ravaillon (2010; 2011) suggests a dashboard approach, focusing on indicators separately for each dimension.

Ferreira and Lugo (2012) argue that both the dashboard and index approaches miss an important element of the multivariate nature of poverty. By focusing separately on indicators for different dimensions, or by aggregating them into a single number, they miss (or obscure) the interactions or associations between these dimensions. That is, whether it is the same people who are poor on selected dimensions, or different people, makes a significant difference to program and policy design and targeting.

They explore three alternative approaches for analysing the dependency structure of the joint distributions: the multivariate stochastic dominance techniques of Duclos et al. (2006); a direct representation of the dependency structure (for example, Atkinson and Lugo 2010; Atkinson *et al*. 2010); and copula functions (Decanq 2009, Quinn 2007). Our paper explores this associative approach with direct representations.

While the MPI requires at least three indicators of deprivation for a given person to be poor, it is agnostic to which dimensions these are and how they relate to each other. As we show in this

paper, a closer examination of associations of poverty across *specifically selected* dimensions can provide important guidance for program design and targeting, and directions for future research.

Methodology and Data

A range of dimensions are examined, representing both child outcomes and opportunities. In particular we look at outcomes on the monetary, health, education, housing and food sufficiency dimensions, while considering access to health and education facilities, transportation, and social assistance as opportunities. We begin by looking at poverty on each indicator individually – the dashboard approach.

We then move on to associations of poverty. The degree of interdependence between different dimensions of poverty can be presented in terms of the overlap between individuals identified as deprived under each criterion. For instance, if poverty were defined by indicators on three dimensions (such as education, health, and income), the dependency can be illustrated – at least in part – by the proportion of individuals that are deprived in all three dimensions, those that are deprived in (different) pairs of dimensions, or only in one (Ferreira and Lugo 2012).

Two large, nationally-representative surveys collected by Statistics Indonesia (*Badan Pusat Statistik*, or BPS) are used. The National Socioeconomic Survey (Susenas) began in 1963, was been conducted annually since the early 1990s, and quarterly since 2011. It is now representative at the district level and collects a range of demographic, health, education and other information on households and their members, and includes a consumption module. The Village Potential Census (Podes) collects information on village or neighbourhood[2] characteristics for the entire country three times a decade. (Table 1) summarises the available indicators used from each dataset. Unfortunately, indicators of child malnutrition, which is high in Indonesia (37% of children under five are stunted),[3] are not available from Susenas. Since the association analysis requires that all indicators are measured over the same households, we cannot use alternative data sources to examine this dimension. However, we do examine whether households are consuming sufficient calories.

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[2] We refer to *desa* (rural villages) and *kelurahan* (urban neighbourhoods) throughout the paper as villages.
[3] http://www.unicef.org/indonesia/children.html

Table 1: Indicators of Poverty and Data Sources

Opportunities	Indicator	Source
Health Access	Access to primary care	Podes
	Access to hospital	Podes
	Access to delivery facility	Podes
	Village has a midwife	Podes
	Health centre has a doctor	Podes
	Health centre has water	Podes
	Health centre has electricity	Podes
	Aggregate health access index	Podes, World Bank (2012a)
Education Access	Access to ECED	Podes
	Access to primary school (SD)	Podes
	Access to junior high (SMP)	Podes
	SD has qualified teachers	Podes
	SMP has laboratory	Podes
	SD and SMP have water	Podes
	SD and SMP have electricity	Podes
	Aggregate education access index	Podes, World Bank (2012a)
Transportation and Infrastructure	Main road is gravelled or asphalted	Podes
	Sufficient bridges	Podes
	Public transport to district office	Podes
Social Assistance	Subsidised Rice for the Poor (Raskin)	Susenas, World Bank (2012b)
	Health Fee Waivers for the Poor (Jamkesmas)	Susenas, World Bank (2012b)
	Unconditional Cash Transfer (BLT)	Susenas, World Bank (2012b)

Outcomes	Indicator	Source
Consumption	National poverty line	Susenas
	1.5 times the poverty line	Susenas
Health	Skilled birth delivery (<5 years)	Susenas
	Immunisation (<5 years)	Susenas
Education	Enrolment (7-12, 13-15, 7-15)	Susenas
	Primary school completion	Susenas
	Literacy	Susenas
Housing	Quality of building materials	Susenas
	Floor space per capita	Susenas
	Drinking water	Susenas
	Sanitation	Susenas
	Electricity	Susenas
	Phone	Susenas
Food Sufficiency	Caloric intake	Susenas, FAO, WHO and UNU

Drawing on two periods (2002 and 2011) of SUSENAS and PODES data, we develop a household-level dataset across all dimensions. Setting arbitrary but natural poverty lines for most indicators, we calculate deprivation on each indicator, of which there are a number per dimension. All results are presented as the percentage of children aged 0-15 years who are

deprived on a given indicator, except selected indicators which are age-specific, such as immunisation and enrolment.[4]

We then examine associations across dimensions by constructing multidimensional tables which capture the proportion of children in poverty according to different combinations of dimensions. Analysis of individual indicators and associations across dimensions is conducted at various levels of aggregation, including national, urban-rural, male-headed and female-headed households, by region, and by consumption decile. Data limitations prevent us from using many of the health and education access indicators before 2011, as well as food sufficiency.

Key Findings: Child Poverty by Dimension

General Trends

We first summarise general trends that hold for most dimensions. Although a number of indicators remain at high levels, poverty has fallen along many dimensions in Indonesia between 2002 and 2011,[5] including for most health, education, housing and consumption outcomes, and health and education opportunities.

Furthermore, we observe relatively small differences between the opportunities and most outcomes of children living in male and female-headed households; certainly by 2011, when most gaps had closed. The two main exceptions, discussed later, are with respect to consumption poverty (with children of female-headed households being disadvantaged), and social assistance (where children of female-headed households are considerably advantaged).

Rural children are more likely to be poor on many dimensions than urban children, often considerably so. This holds even more so for children from poorer consumption deciles compared to richer ones.

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[4] A full Data Annex of results for all dimensions and indicators are available from the authors.
[5] Maluku and Papua are not included in Susenas 2002. As they are some of the poorest regions in Indonesia, national, urban-rural and female-headed/male-headed household aggregates for 2002 are likely underestimated. However, since the populations in these regions are small, the degree of underestimation is not likely to be high. Full national results are included in the Data Annex for 2003, which include Maluku and Papua.

The following section turns to each dimension in detail, focusing on results which are specific or unusual to each dimension, as well as noting where a particular dimension deviates from the general trends.

Poverty of Child Opportunities

Health Access

Most children in Indonesia now have good access to primary and higher-level care facilities, although there are differences across locations. For example, in 2011, 6% of rural children lacked access to primary care, while almost no urban dwelling children lacked access.[6] 8% of rural children were born in a village without a midwife, compared to 2% of urban children.

Along with ready access to these facilities, primary care facilities were, for the most part, similarly well-equipped for service. At the national level, only 5% of children in the poorest consumption decile report living in a village where the Puskesmas does not have a doctor;[7] 7% and 5% of the poorest children live near a Puskesmas lacking water or electricity, respectively. At the critical referral care level, however, the deprivation of rural children is more apparent, with 30% of rural children lacking access to a hospital, relative to only 2% of urban children lacking this access (see Figure 1).

The rural-urban disparities are echoed along regional lines. In 2011, more than a quarter (26%) of the children living in Papua lacked access to a primary care facility and more than half (60%) lacked access to a hospital. 40% of Papuan children also lived in villages that lacked a midwife, contributing to the region's low rate of skilled attendance at birth (51%). Many children living in Maluku were similarly deprived of basic health care, with one of every ten children lacking access to a primary care facility, and 47% without easy access to a hospital (see Figure 2).

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[6] Easy access to primary care refers to the share of the population that cannot easily reach a Polyclinic, Puskesmas, Puskesmas Pembantu, or physician's practice.

[7] However, these indicators make no judgment on quality. Studies suggest that doctor and nurse absenteeism can be high – one study measured absenteeism at 40% at the Puskesmas level (Chaudhury, Hammer, Kremer, Muralidharan, and Rogers 2006)

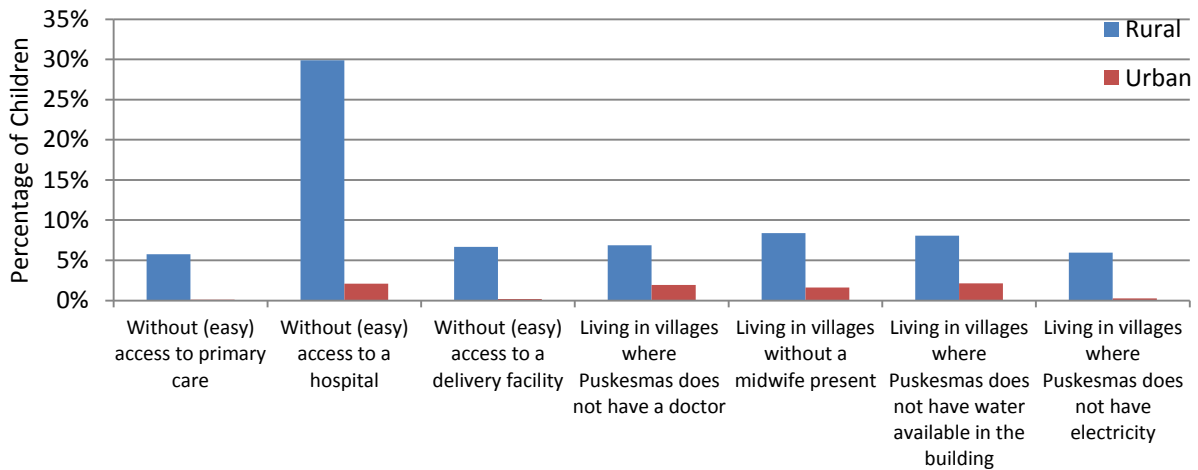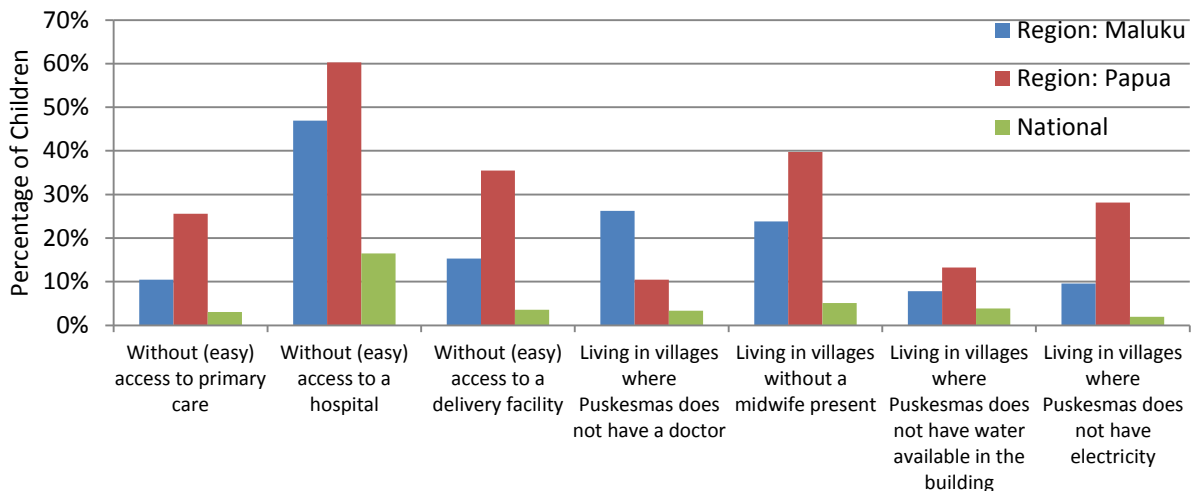*Figure 1: Selected Health Opportunities by Urban-Rural Locations, 2011*

Figure 2: Selected Health Opportunities: Papua, Maluku and the National Average

Education Access

Physical access to primary school was high for children living in both rural and urban settings. Nearly all children have a primary school within 1 km of their home, and only 5% of children lack access to an early childhood education and development (ECED) facility within 6 km of their home.

However, 36% of rural children lack access to a junior high school (SMP) within 1 km of their home, compared with 13% of their urban counterparts. 6% of rural children still lack access if we extend the range to 6 km, a not inconsiderable distance in rural settings.

As with health, progress in enfranchising students at the national level masks important regional disparities. Again Papuan children are the most deprived, with 51% of children lacking access to an ECED facility within 6 km of their home. 44% of Papuan children lack access to an SMP within 1km of their home, compared to 29% in Sulawesi, the second most deprived region in this regard. These rural-urban and regional disparities are consistent with disparities between richer and poorer households by per capita consumption (see Figure 3 and Figure 4).

Figure 3: No ECED within 1km of home
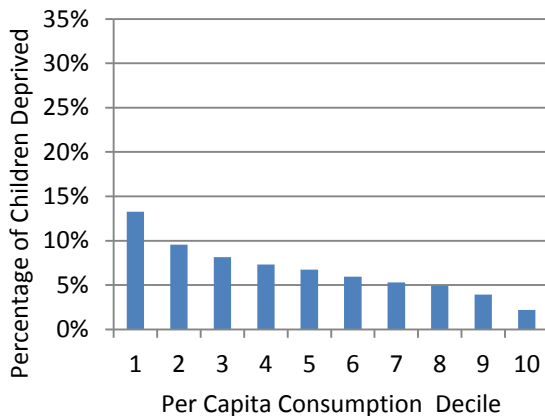
Figure 4: No SMP within 1km of home
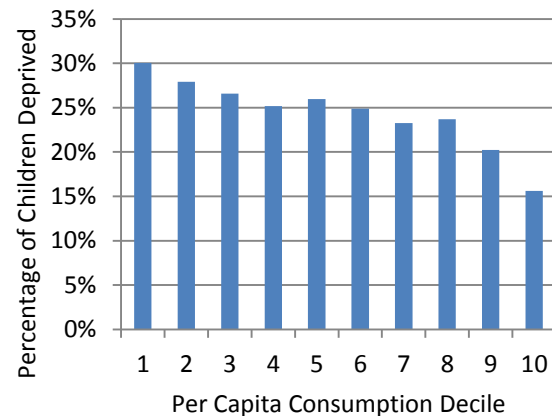
Moreover, the schools that are available in Indonesia's most deprived regions are often not properly equipped – 49% of the children in Maluku lack access to a primary school (SD) in their village with at least two teachers with a Bachelor's degree. A third (34%) of children in Maluku have SD and SMP schools with toilets that lack water, similar to the 30% for Papuan children.

Transportation Access

At the national level, children typically have mixed access to transportation. To explore their deprivation along this dimension, we look at their access to gravelled or asphalted roads, and the main transport infrastructure available in the village. Nationally, 5% of children live in a village with a main road that has not been covered in gravel or asphalt. 17% of children live in villages where more bridges are needed. 27% of children lack access to public transport with a fixed route to the head of district's office – a proxy for access to public transport in a village.

As with education and health, many regions in Eastern Indonesia have more significant transport challenges. There is a lack of good roads in Papua, with 37% of children living in villages where

the main road has not been gravelled or asphalted and is therefore subject to damage or impassibility from rain. Many children (17%) live in villages that need additional bridges, though children in Nusa Tenggara are the most deprived in this regard, with 34% of children living in villages facing a shortage of this critical infrastructure.

Social Assistance Access

Indonesia has five main social assistance programs: Subsdised Rice for the Poor (Raskin), Health Fee Waivers for the Poor (Jamkesmas), a temporary Unconditional Cash Transfer (BLT or BLSM), used in times of fuel price shocks, Cash Assistance for Poor Students (BSM) and a Conditional Cash Transfer (PKH). Before the introduction of the government's Unified Database in 2012, targeting of these programs included many errors. Of the three largest programs (Raskin, Jamkesmas and BLT), targeted at the poorest 30% of households, half of the target households were excluded, and half of all benefits went to non-target households (World Bank 2012).[8]

These national averages hide significant differences between rural and urban and male-headed and female-headed households (see Figure 5, Figure 6, and Figure 7). In contrast to most opportunities and outcomes examined in this paper, rural households are actually more likely to benefit from each of the three main social assistance programs, at any given level of consumption, than urban households. Similarly, while children in female-headed households generally have very similar results on most dimensions of poverty as those from male-headed households, with respect to social assistance, they are considerably more likely to receive social assistance at all points of the consumption distribution

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[8] Since 2012, all programs have been targeted with the new Unified Database, which is expected to significantly improve targeting. However, accurate results from survey data are not expected until early 2014.

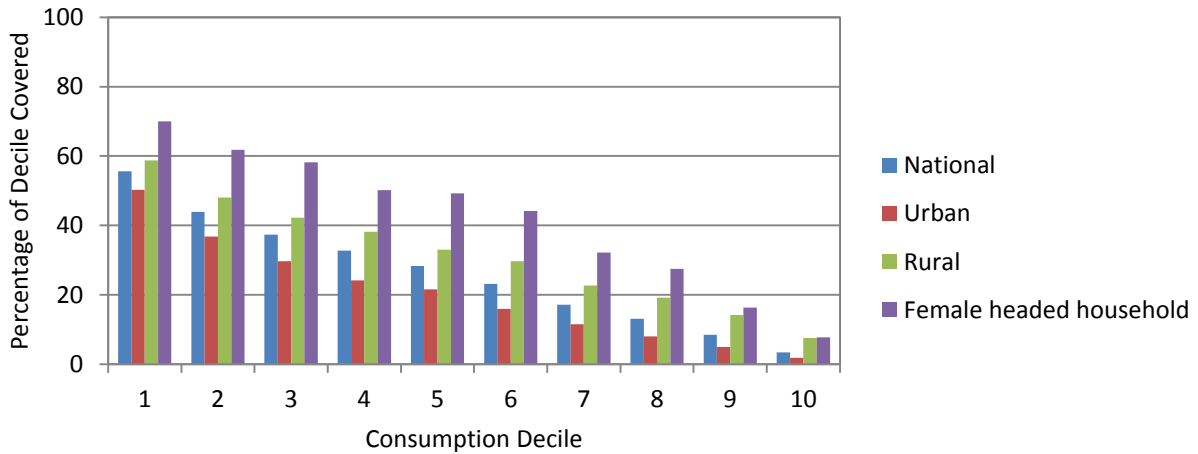*Figure 5: Coverage of BLT (2008-09) by Household Per Capita Consumption Decile*

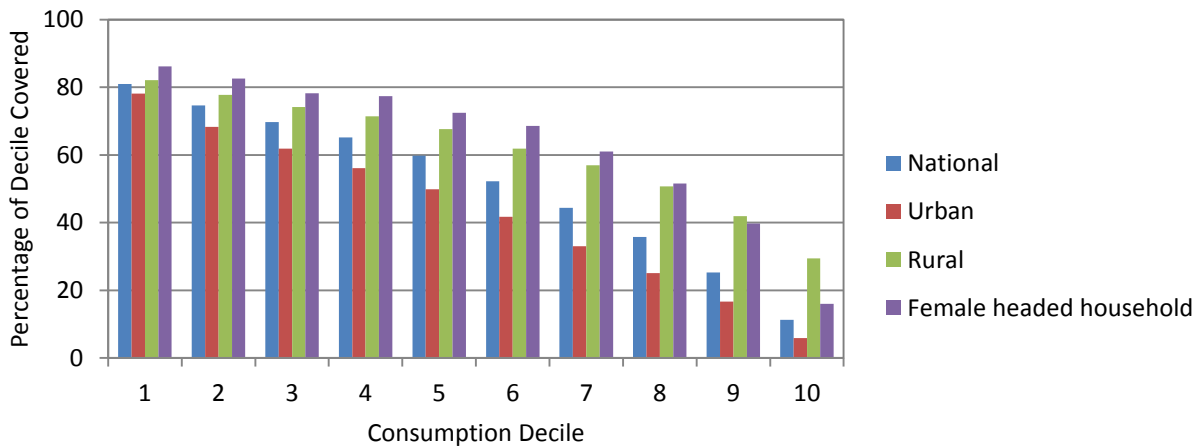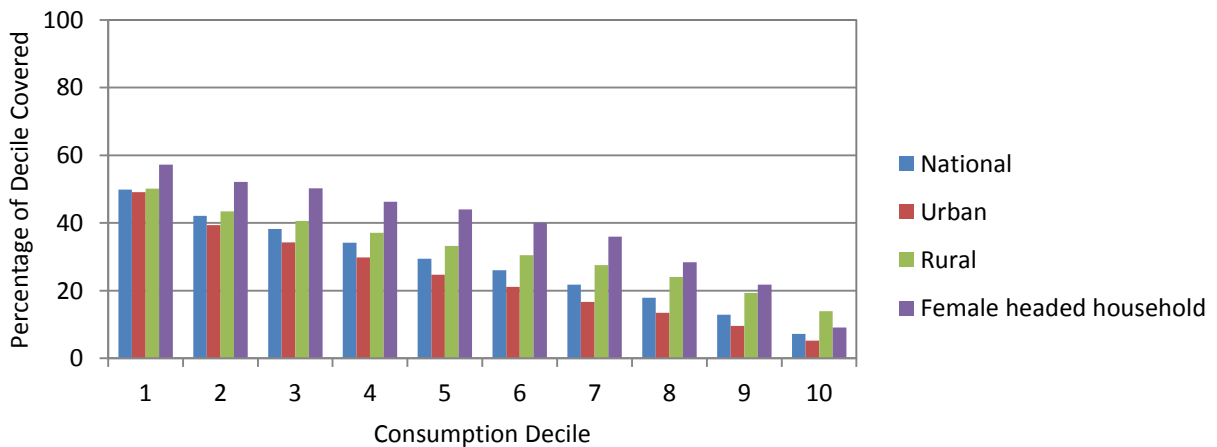*Figure 6: Coverage of Raskin (2009) by Household Per Capita Consumption Decile*

Figure 7: Coverage of Jamkesmas (2009) by Household Per Capita Consumption Decile

**Poverty of Child Outcomes**

Monetary (Consumption) Outcomes

Poverty in Indonesia is officially defined as living in a household with per capita consumption below the national poverty line, which in 2011 was Rp.233,740 per person per month.[9] Figure 8 presents the percentage of all Indonesians in poverty (national poverty) and that of children in poverty (child poverty). Both show the same pattern of decline between 2003 and 2011, from 17.4% of the total population to 12.5%, and from 21.7% of children to 15.5%. It is clear that the child poverty rate is higher than the national poverty rate, reflecting the well-known phenomenon that poor households are generally younger with more children than non-poor households (see World Bank 2011).

We also look at child vulnerability, using 1.5 times the poverty line as a threshold, a standard of living still below PPP$2 a day. Despite a similar decline in the past decade, levels of vulnerability remain very high, with 44% of children being vulnerable or poor in 2011.

Significant urban-rural differences exist (see Figure 9), with 11.8% of urban children living in poverty in 2011, compared to 19.0% of rural children. Regional patterns reflect other dimensions of poverty, with Eastern Indonesian provinces experiencing much higher levels of child poverty than the rest of the country. Gender differences are driven by differences in household demographics. Amongst the total population, similar numbers of poor live in female-headed households (13.4%) compared to male-headed ones (12.4%). However, this is driven by the larger household size of male-headed households, specifically the extra parent (number of children is similar across both). In fact more female-headed households are poor (15.9%) than male-headed ones (12.0%), and more children in female-headed households are poor (19.8%) than in male-headed ones (15.1%).

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[9] The official poverty line in Indonesia is based on obtaining 2,100 calories per day, plus a small allowance for non-food expenses such as education, health and housing. Separate urban and rural lines are constructed for each province by BPS. The national average poverty line in 2012 was around Rp.250,000 per capita per month.

Figure 8: Child Poverty Rates, 2002 and 2011   Figure 9: Child Poverty Rates by Household Type, 2011
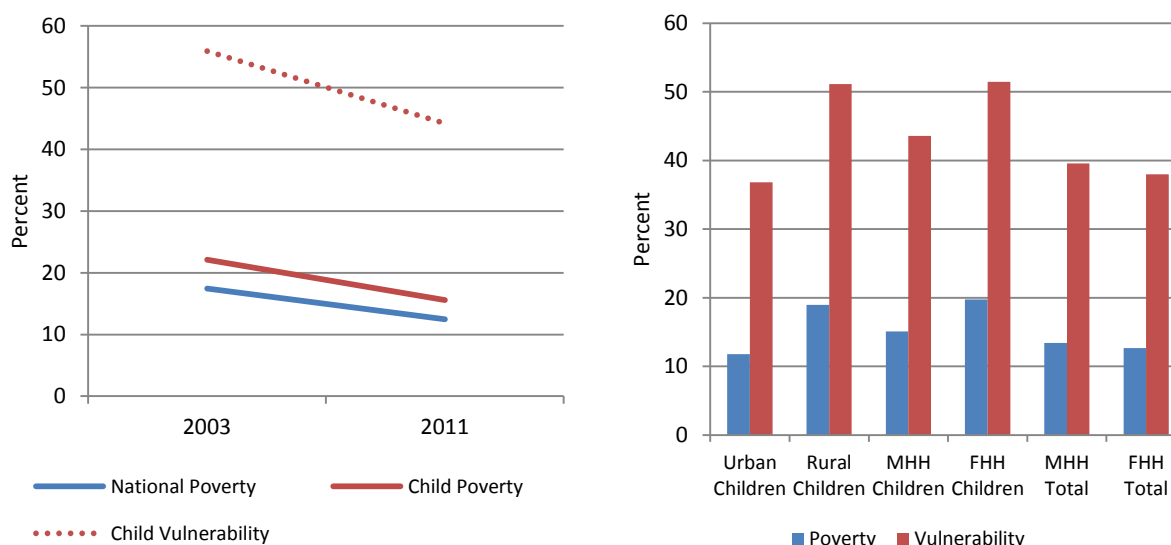
Health Outcomes

In 2002, 42% of children under five were delivered by unskilled workers, a rate which had improved to 24% nine years later. However, for children living in the poorest decile of the consumption distribution, 41% were delivered by an unskilled health worker.

The relatively high incidence of deliveries without skilled attendants is surprising, given good access to such attendants, at all income levels and most regions (Figure 10). Less than one out of ten children from the poorest decile lived in villages where a midwife was not present, suggesting that people preferred delivering without the support of a skilled health worker despite access to one. Moreover, only 6% of children living in households in the lowest decile reportedly were without easy access to primary care services; less than 1% of children living in the highest decile lacked easy access to a functioning primary health facility.[10] As with other indicators, children in Maluku and Papua are considerably worse off in this respect, worse even than children in the poorest decile nationally.

Immunisation is a mixed story. 94% of children under five have been at least partially immunised, with similar outcomes regardless of being urban or rural, or the gender of the head of

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[10] See Data Annex.

household, although Papua lags somewhat (82%). However, only 1% of children report a full set of vaccinations, and only 19% have received all but the last Hepatitis B shot.[11]

Figure 10: Skilled Birth Deliveries and Access to Midwives, 2011
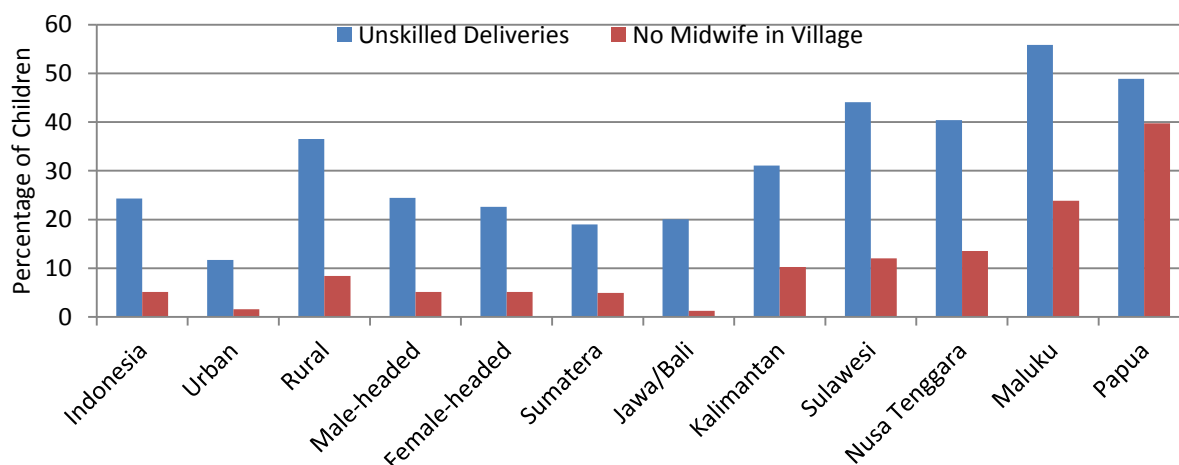
Education Outcomes

Indonesia has nine years of compulsory schooling (completion of junior high school). Between 2002 and 2011, the percentage of Indonesian children aged 7-15 not enrolled in school fell from 9% to 5%, driven mainly by a fall in unenrolled children aged 13-15 from 21% to 12%. Amongst the urban-rural, gender and regional distinctions we consider, only Papuan children differ significantly from the national average, with 23% of 7-15 year olds not being enrolled. This is reflected in a 26% illiteracy rate for children over 7 years old, compared to 4% nationally.

Housing Outcomes

The most severe deprivation of children in Indonesia is in housing conditions. Nationally in 2011, 56% of children live in housing with poor quality materials, 16% in overcrowded conditions,[12] 17% did not have access to clean drinking water, [13] and 41% did not have proper sanitation. When considered across all of these indicators, deprivation exists for all consumption deciles. 90% of children living in the poorest households were deprived on at least one indicator, and even 44% of children living in the most prosperous decile lacked ideal housing. This

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[11] If we consider just the original 6 diseases which have been traditionally vaccinated against – Diphtheria, Pertussis, Tetanus, Tuberculosis, Measles and Polio, but excluding Hepatitis B – complete immunisation rates remain low: only 23% nationally have had the full non-Hep B schedule of immunisations, although 88% have had at least one shot of each.

[12] Less than 6.5 square metres per person.

[13] Clean water defined as: piped water, protected well, protected spring, bottled water.

situation has only marginally improved since 2002. In both Maluku and Papua, 99% of children were deprived on at least one indicator; 98% of Sulawesi's children fared no better.

Poor access to clean water and sanitation is a key concern for children's health. In Indonesia, an estimated 63 million people practice open defecation, which is the second highest number worldwide (UNICEF and WHO 2012). Furthermore, diarrheal disease accounts for more than a quarter of the deaths that occur after the age of 1 month but before 5 years. According to the UN, provision of improved sanitation and higher quality drinking water could reduce diarrheal diseases by nearly 90% (UNICEF and WHO 2012).

Disparity of access to adequate sanitation specifically is alarmingly high, with 67% of children in the poorest households lacking proper sanitation, relative to 12% of children living in the top decile. A rural-urban divide is also evident (see Figure 11). In 2002, 38% of rural children were without access to clean drinking water; by 2011, their access had improved by ten percentage points, to 28%. In contrast, only 11% of urban children were without access to clean water in 2002; by 2011, the share of urban children without access to clean water had improved to 6%. The divide for sanitation is as alarming, with 58% of rural children without access to adequate sanitation, relative to 24% of urban children.

While Eastern Indonesia generally underperforms the rest of the country on most indicators, it is particularly deprived in this respect (see Figure 11). More than half of Papuan children, whether urban or rural, lacked access to clean drinking water (56%) or adequate sanitation facilities (64%). 61% of children in Nusa Tenggara were without access to adequate sanitation.

Figure 11: Access to Clean Drinking Water and Proper Sanitation, 2011
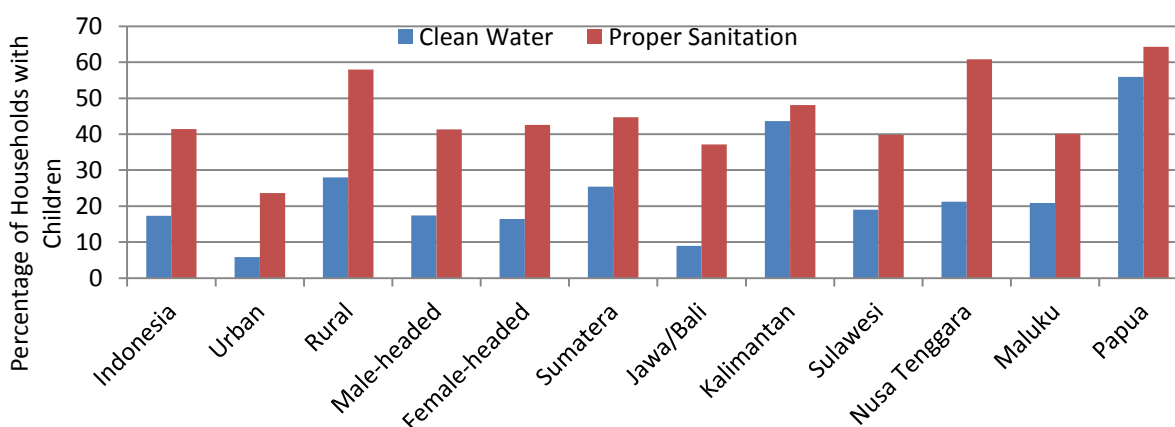
Despite the high incidence of substandard housing and poor water and sanitation, access to grid electricity (PLN) is generally good, with only 11% of children deprived, almost all of whom are rural. Unsurprisingly, Eastern Indonesia also lags considerably in this respect, with 34% of children in Maluku, 38% in Nusa Tenggara, and 62% in Papua without PLN electricity. The same pattern exists for phones. While nationally 17% of children live in a household which lacks a phone, this increases to 25% in rural areas, and over 40% in every region of Eastern Indonesia.

Food Sufficiency Outcomes

The Susenas data contain not only consumption of different food items, but also the total caloric intake for the household. We use the WHO standards for an intake sufficient for light and moderate activity, which vary by sex and age, and combine them with household demographics to determine which households are consuming insufficient calories.

7% of children live in a household with insufficient caloric intake for light activity, rising to 20% if we consider a moderate activity threshold. There are no head of household gender-based differences, and the usual Maluku and Papua disparity with the rest of the country remains. Urban children are more likely to live in a food deficient household than rural ones, with 22% deficiency using the moderate threshold (8% light) compared to 18% (6%), a reversal of the usual urban-rural divide, but not unexpected given the greater levels of self-production and access to food in rural areas.

The surprising results are with respect to consumption deciles. Children living in food-deficient households are much more common in poorer households than richer ones (Figure 12), as expected. However, only 20% of children living in the poorest consumption decile are in a food-deficient household according to the light activity definition, and only 46% by the moderate activity one. All households in the poorest consumption decile are below the official poverty line, and so are poor in a monetary sense. With the official poverty line being largely based on 2,100 calories per household member (with only a small non-food allowance),[14] we should expect almost all of the households in the poorest decile to be food-deficient.

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[14] The food component is over 80% of the average urban poverty line, and over 90% of the average rural one.

Figure 12: Children Living in Food-deficient Households by Consumption Decile, 2011
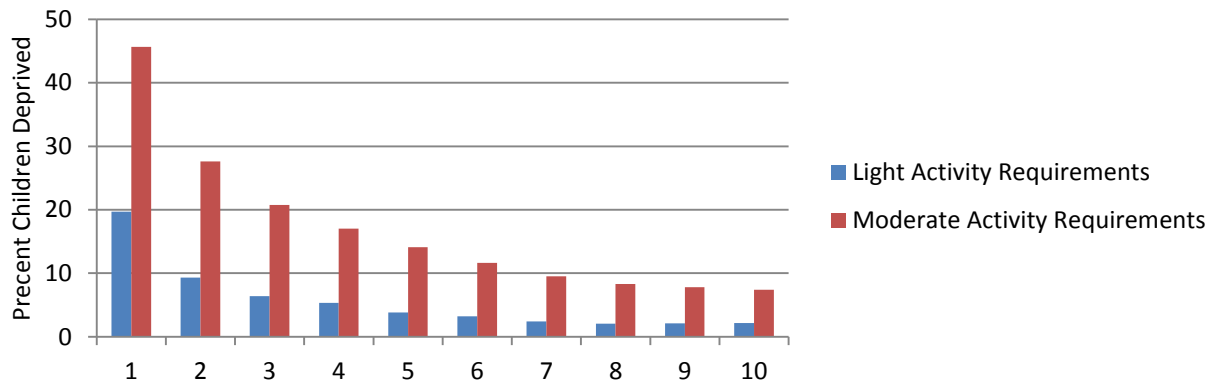
This result is probably driven by the differences in the implicit equivalence scale being used in the official poverty line, and that explicitly adopted the WHO caloric intake standards. The 2,100 calories per person assumed in the national poverty line is regardless of sex or age, meaning a household with two parents and two young children are required to consume enough food for four adults in order to not be considered officially poor, whereas the food-deficiency thresholds we applied take into account household demographics in estimating caloric needs. As a result, households with children are more likely to be considered poor than households without children.[15] Estimating poverty using alternative equivalence scales may not significantly change the overall poverty rate in Indonesia, but it may well change the profile of poor households.

The second surprising result from Figure 12 is that there are children living in non-poor households (above the first decile) which are nonetheless calorie deficient. This is true of both light and moderate activity caloric requirements, and extends across the entire distribution. It would appear that households which can afford sufficient food are choosing not to consume food at this level. An important area for future research is to understand why this is, and what they are choosing to consume instead. This result provides empirical support for anecdotal accounts of poor households choosing to eat less in order to afford to pay for cultural rites or tobacco (Banerjee and Duflo 2006). Whether this is a matter of the poor defining basic needs in a different sense than the government, or whether it reflects a lack of knowledge on food sufficiency remains to be seen.

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[15] Households with children also enjoy economies of scale in non-food consumption compared to smaller households, which is also not accounted for in the per capita approach of the official poverty line.

Key Findings: Associations across Dimensions of Poverty

Until now, we have looked at child deprivations of individual dimensions of opportunity and outcome. However, children who are deprived on one dimension are not necessarily the same ones who are deprived on another. We now explore exactly who is deprived across these multiple dimensions, to give a fuller picture of the multidimensionality of the poverty faced by individual children. For each set of associations, we select three different dimensions or indicators, and examine to what extent deprivation along each is borne by the same child. This is presented visually in a series of Venn diagrams, where the size of each circle is proportional to the degree of poverty on that indicator.[16]

The associations presented here have been selected from the many different combinations that can be explored. Those selected highlight how effective the associative approach can be in identifying previously unknown issues and raising important policy implications.

Health and Nutrition

The first association has been implicitly introduced already. We have noted that a surprising number of children live in households which are calorie deficient, but not below the poverty line. In fact, of all children who live in calorie deficient (for light activity) households, only 35% live below the poverty line, and the same is true for only 27% of those in calorie deficient (for moderate activity) households (see Figure 13). Even if we consider only children outside of the poorest 40% of Indonesia,[17] they still make up 38% of the light calorie deficiency, and 35% of the moderate deficiency (see Figure 14). This phenomenon repeats itself in both urban and rural settings, and as discussed previously, understanding it will have important policy implications for both poverty reduction and health and nutrition policy.

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[16] Full numerical results are available in Data Annex available from the authors.
[17] Note: 45% of children are in the poorest 40% of Indonesian households, because poorer households tend to be bigger.
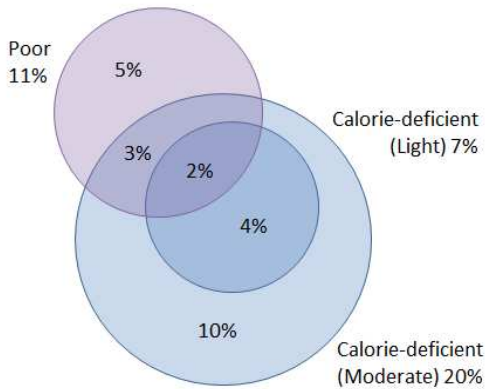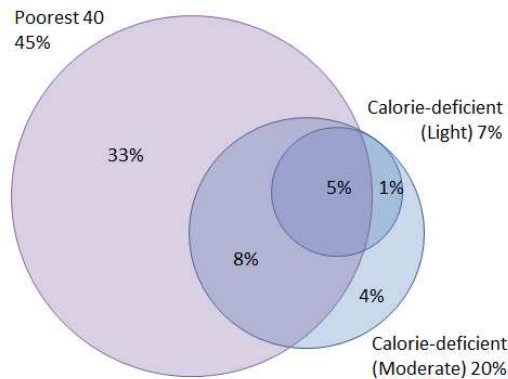
Figure 13: Poverty and Calorie Deficiency   *Figure 14: Vulnerability and Calorie Deficiency*

Housing, Water and Sanitation

Nationally, around 10% of children live in a house that has not only poor materials, but also lacks clean drinking water and proper sanitation (see Figure 15). An additional 18% of children suffer from both poor housing and improper sanitation, with a further 3% in poor housing and without clean water, and 2% who have proper housing but neither water nor sanitation. That is, a third of Indonesian children are deprived on at least two of these three dimensions. For poor and vulnerable children (those living in the poorest 40% of households), over half lack access to both clean water and sanitation, and two-thirds to at least one (see Figure 16). However, there is little difference in access to water, sanitation and suitable housing based on gender of household head.

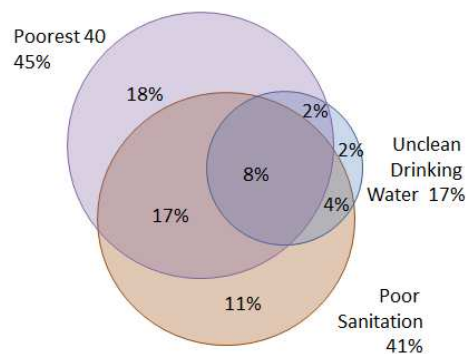*Figure 15: Housing, Water and Sanitation*   *Figure 16: Poverty, Water and Sanitation*
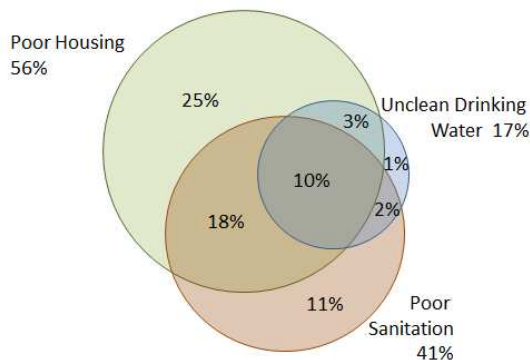
These results also mask a sharp urban-rural difference. Overall, 42% of urban children have adequate housing, and access to water and sanitation, compared to only 19% of rural children. Furthermore, urban children are much more likely to be poor on only one of the housing, water and sanitation indicators, compared to rural children; only 2% of urban children have poor

housing and lack clean water and sanitation, and another 13% are deprived on two of these indicators, compared to 18% of rural children deprived on all three, and another 32% on two (see Figures 17 and 18)
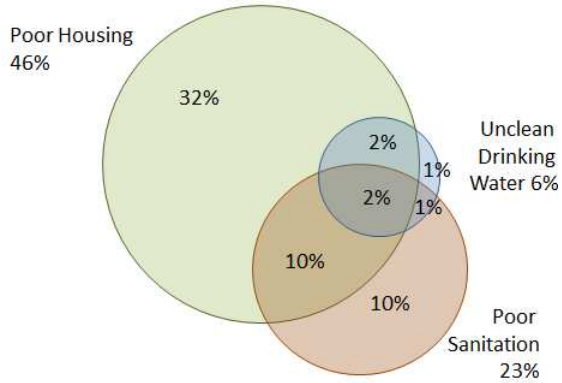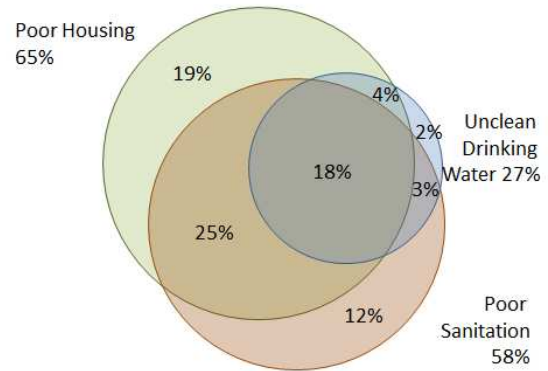
Figure 17 Urban Housing, Water and Sanitation   *Figure 18 Rural Housing, Water and Sanitation*

Urban and Rural Infrastructure

The concentration of rural poverty amongst the same children is also evident when we consider access to physical infrastructure. As Figures 19 and 20 indicate, not only are overall levels of deprivation considerably lower for urban children than rural ones when we look at access to health care, education and transportation, urban children who are poor on one indicator are highly unlikely to be poor on the other two (1%), whereas 20% of rural children are poor on all three dimensions.
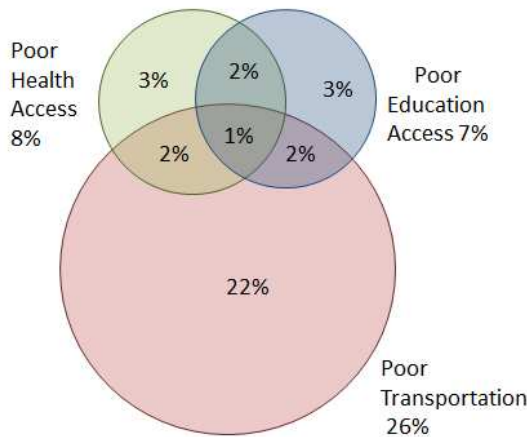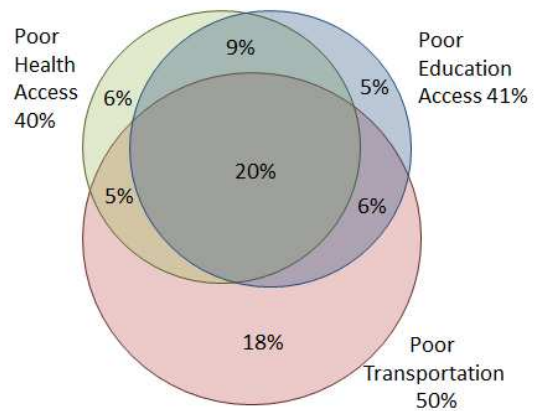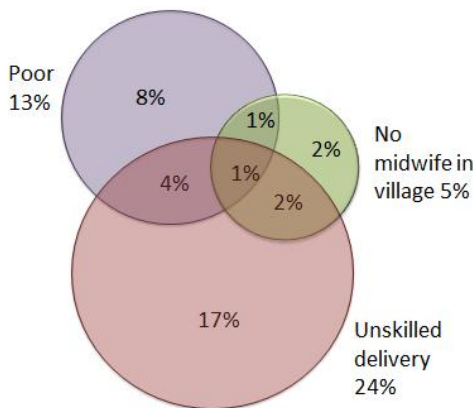
Figure 19: Urban Infrastructure   *Figure 20: Rural Infrastructure*

Poverty, Skilled Delivery and Access to Midwives

We observed earlier that Indonesia's 24% rate of unskilled delivery, a key driver of the country's high maternal mortality rate, is higher than one would expect given that only 5% of pregnant women do not have a midwife in the village. Could low income be a driver, through inability to afford informal user fees? Figure 21 indicates that the significant majority of unskilled deliveries come from families that have access to midwives and are not poor. In fact, a third of unskilled deliveries are still from families with access to midwives and that are not in the poorest 40% of the country. Nor is unskilled delivery strongly associated with low parents' education (see Figure 22); around two thirds of parents having unskilled deliveries have at least a primary education.

Figure 21: Poverty, Midwives and Births   *Figure 22: Education, Midwives and Births*
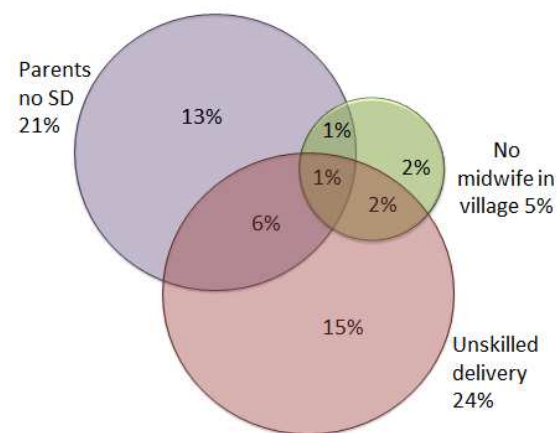
Poverty, Enrolment, Access to Education

In contrast to unskilled delivery, most of the children aged 13-15 who are not enrolled in school are also associated with poverty, lack of physical access, and low parents' education (see Figure 23 and Figure 24). Of the 12% unenrolled, less than one in six was not poor on any of these three dimensions, and over half were poor on at least two.
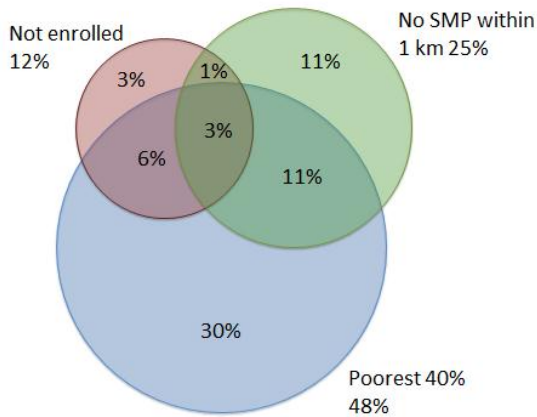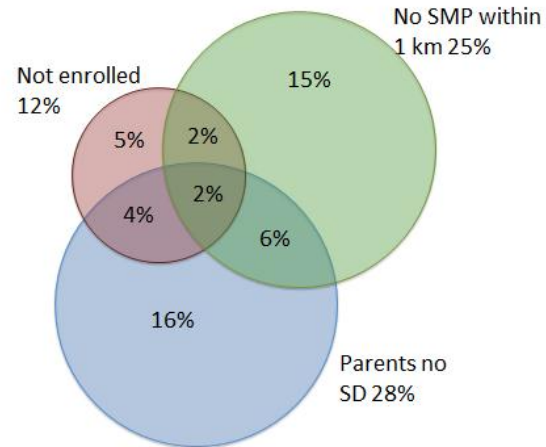
Figure 23: Enrolment, Access and Poverty   *Figure 24: Enrolment, Access and Parents' Education*

Sub-national: Focus on Maluku

In Maluku, as at the national level, poverty and lack of access to opportunities are correlated. Nonetheless, poverty does not fully explain many of the deprivations children face. 45% of children are poor or vulnerable, and three fifths of these lack access to sanitation, clean water or both (see Figure 25). However, a third of those without proper sanitation and half of those without clean water are not poor or vulnerable. The same children face many of the same deprivations due to lack of community infrastructure, regardless of income. Besides water and sanitation poverty, many children in Maluku also lack access to mains electricity; of the 33% without PLN electricity, only a quarter are not also poor with respect to water or sanitation (see Figure 26).

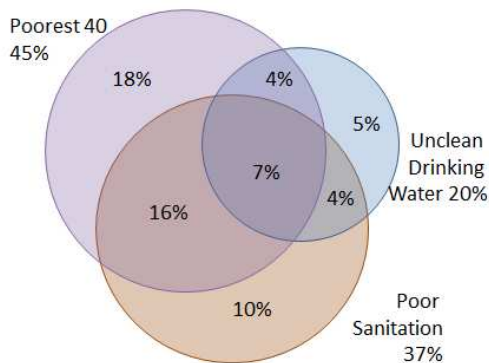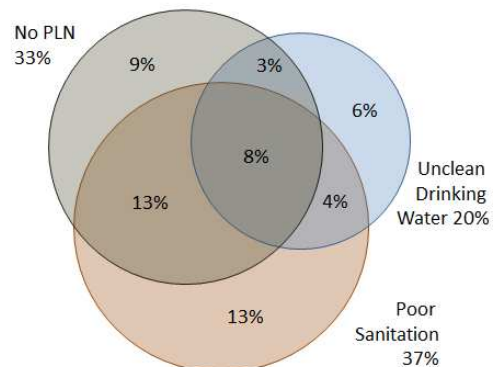*Figure 25: Poverty, Water and Sanitation*   *Figure 26: Electricity, Water and Sanitation*

Sub-national: Focus on Papua

As we have already seen, even more so than Maluku, Papua generally has the highest rates of child poverty across all indicators. 60% of children are poor or vulnerable, 64% lack proper sanitation, 56% clean water, and 62% PLN electricity. With such high poverty rates on each dimension, this unsurprisingly means many Papuan children are poor on most dimensions. 46% lack electricity, clean water and sanitation. 39% are poor or vulnerable, and also lack clean water, sanitation.   The very strong associations of poverty in Papua are strongly visible in Figures 27 and 28, where children not deprived on all three dimensions are the exception.

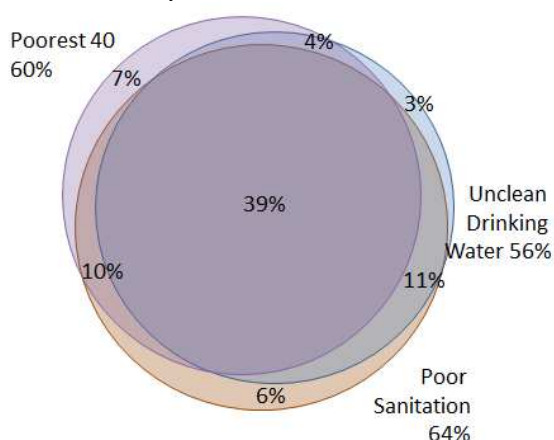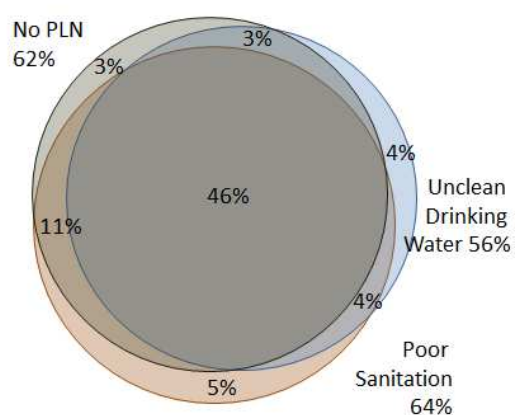*Figure 27: Poverty, Water and Sanitation*

Figure 28: Electricity, Water, and Sanitation

Conclusions and Policy Implications

What can we take from all of this? Some of the analyses simply confirm well-established facts about multi-dimensional poverty in Indonesia, albeit with a comprehensive focus on children that is less common. First, poverty and child poverty has been declining in Indonesia on most dimensions, and this progress has been shared by many different children, including those from female-headed households, living in urban and rural areas, and across many regions of Indonesia. Second, this progress has been uneven, with rural areas continuing to lag urban ones, and in particular, much of Eastern Indonesia being left behind on many dimensions. Third, despite significant advances in many areas, poverty levels across the country remain high on selected indicators, such as quality housing and access to proper sanitation, or higher than it should be (unskilled birth deliveries).

Beyond these uncontroversial findings, we would suggest four sets of conclusions, the first two substantive and the second two methodological. First, various results have implications for program design and targeting. Investments in infrastructure for health, education and transportation can be focused on pockets of poverty in rural areas. This is a potential role at the local level for the PNPM community development program. However, infrastructure development in urban areas will need a different approach, with deprivations on these three dimensions seldom being associated in the same children. For especially deprived regions, including Papua and Maluku, further investigations should explore how issues of access can be quickly and effectively addressed. Moreover, significantly greater investments in clean water and especially sanitation are needed to, in part, address Indonesia's high and non-decreasing stunting rates. In particular, many children in both urban and rural areas lack access to clean water *and* proper sanitation; addressing just one of these dimensions will be less effective in addressing malnutrition (amongst other public health issues), than addressing both at once.

Second, some findings raise new questions and point towards the need for further research. For example, what are food energy-deficient households who live (often far) above the poverty line consuming instead? What does the consumption patterns of poor and vulnerable households reveal about how they define basic needs for themselves, and how does this compare to the government's definition? At the same time, our results also suggest that the use of alternative equivalence scales in defining consumption poverty may change the profile of the poor from the commonly understood younger families with more children. In health, most households (with the notable regional exceptions) have adequate access to skilled providers of maternal care, yet nearly a quarter of deliveries are unskilled. Moreover, many unskilled deliveries are not associated with low incomes or poor education. Why do many pregnant women choose unskilled deliveries?

Third, with respect to methodology, most of our indicators are simple measures of access, and do not address issues of quality. For example, on access to education and enrolment rates, Indonesia has made strong progress. However, its relatively low position in international tests of students' ability and skills emphasises quality issues (see also World Bank 2013). No doubt quality of education and health services exhibit significant variation in Indonesia, and future research would benefit from incorporating measures of quality, in addition to strict access.

Finally, we believe the breadth of policy implications and new research questions raised underline the usefulness of this relatively simple but effective associative approach. A dashboard approach which examines each indicator independently fails to answer the fundamental question of whether it is the same people who are poor on each. It can be easily complemented (as we have here) with associative analysis. Alternatively, the associations can be easily conducted as part of an MPI. The standard MPI alone, while counting multiple deprivations (and measuring simultaneous deprivations as intensity), misses the many important ways different dimensions *interact* with each other. An associative approach which focuses on theoretically and empirically related dimensions can offer clearer policy implications, particularly where interactions of poverty affect program design and targeting.

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