



**Chronic Poverty**  
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## The effects of parental death and chronic poverty on children's education and health: evidence from Indonesia

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### What is Chronic Poverty?

The distinguishing feature of chronic poverty is extended duration in absolute poverty.

Therefore, chronically poor people always, or usually, live below a poverty line, which is normally defined in terms of a money indicator (e.g. consumption, income, etc.), but could also be defined in terms of wider or subjective aspects of deprivation.

This is different from the transitorily poor, who move in and out of poverty, or only occasionally fall below the poverty line.

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## Abstract

We estimate the short- and long-term effects of maternal and paternal death on children's school enrolment, educational attainment and health in Indonesia, and compare it with the effect of chronic poverty. We also investigate whether there are any gender dimensions of the effects. Using a sufficiently long-spanning longitudinal dataset, we find that young maternal orphans have worse educational outcomes compared with non-orphans, with the effect getting worse over time. However, we find no significant health effects of orphanhood. Meanwhile, chronically poor children have worse health and education outcomes. Among young children, the adverse effect of maternal orphanhood on education is significantly worse than that of chronic poverty. Lastly, chronically poor orphans do not suffer adverse effects beyond the effects of chronic poverty.

Keywords: orphans, chronic poverty, education, health, children, Indonesia, panel data

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## 1 Introduction

Disruption to schooling is one of many adverse effects that a child may experience when his or her parent dies. In the past decade, many studies have analysed whether this is the case, especially in countries that suffer from the AIDS pandemic. There is mixed evidence thus far, indicating that the condition may be country specific. In addition, several studies assert that it is important to relate orphanhood and children's outcomes with poverty. Case et al. (2004) state two reasons why orphanhood, poverty, and children's outcomes are interrelated and should be jointly examined.

Firstly, if orphans are more likely to be living in poor households, then not controlling for household wealth will result in a researcher attributing the effect of poverty on the outcomes to orphanhood.<sup>1</sup> As an example, after considering the three issues in tandem, Lloyd and Blanc (1996) do not find any evidence that orphans have lower educational outcomes.

The second reason is that if deaths are more prevalent among poor households, then the unobserved characteristic that causes such condition may also affect children's outcome. An example of the unobservable is the HIV/AIDS status of the parents, which is very likely to bias studies in Africa. After taking these issues into account, Case et al. (2004) and Case and Ardington (2006) find that orphans still have significantly lower school enrolment, which is contrary to the finding of Lloyd and Blanc (1996), although they do not find any gender differences in the effect. However, Beegle et al. (2007) state that the methodology used by Case et al. (2004) to control for household characteristics is unsatisfactory because of the cross-sectional nature of the dataset used; there is no way of knowing whether orphans' living condition is better or worse after the death of the parent. Case and Ardington (2006), however, use a panel dataset and still find a negative effect of orphanhood on children's education. Yamano and Jayne (2005), meanwhile, find that the negative effect of orphanhood is solely limited to poor children.

In addition to taking household wealth into account, an issue that is related to the orphans' living arrangements is attention given to the child. Even if he or she is living in a well-off household, adults in that household may give priority to their own children first. This means that the orphan may have an inferior educational outcome compared with non-orphan children in that household. Investigating this issue in South Africa, Case and Ardington (2006) find that a maternal orphan living in a household with other children whose mothers are still alive has 0.2 lower years of completed education, although there is no significant difference in school enrolment. Meanwhile, Yamano et al. (2006) use data from Uganda and find a similarly weak result on the effect of different living arrangements.

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<sup>1</sup> A similar bias would occur if an orphan is more likely to be found in non-poor households.



In a study that looks at non-African countries, Gertler et al. (2004) use pooled cross-sectional data from Indonesia. Employing propensity score matching, they find that children who have recently lost a parent have a 50 percent higher school dropout rate than non-orphans. In addition, they find no gender differences, either based on the child or the departed parent.

Using a cross-country dataset of 51 countries, meanwhile, Ainsworth and Filmer (2006) find that the effect of being an orphan on a child's schooling is country specific. Furthermore, they caution against simply prescribing traditional interventions to increase school enrolment, such as subsidising school fees, even if orphans in a particular country have a lower enrolment rate than non-orphans without investigating further its root cause.

In addition to educational disruptions, orphanhood may also affect children's health. Beegle et al. (2007) review the currently still relatively scarce literature, which so far mostly focus on African countries. The authors find that orphans have, in general, around one centimeter less permanent height. On the other hand, studies cited in their paper do not find any difference between the health status of orphans and non-orphans.

Virtually every study we mention above uses either cross-sectional or short-spanning longitudinal datasets. The weaknesses of cross-sectional datasets are well-known in this kind of investigation. Firstly, there is no way of distinguishing which event comes first: parental death or school dropout. Secondly, unobserved time-invariant characteristics could bias the results. Evans and Miguel (2007) find that excluding child fixed effects bias the effect of orphanhood on school enrolment towards zero. The third weakness, as stated by Case and Ardington (2006), is the inability of cross-sectional data to show whether the death was preceded by a long bout of illness by the parent concerned, which is especially important in studies in Africa where HIV/AIDS is prevalent.

By using a longitudinal dataset, time-invariant unobserved characteristics can be removed using fixed effects. Moreover, one can control for the characteristics of the child, such as his or her school enrolment, the condition of the household that the child had lived in, and the health of the parent concerned before death. Among studies using longitudinal datasets, however, most look at the short-term effect of orphanhood due to data limitations. According to Gertler et al. (2004), it is also important to look at the long-term effects. Indeed, ultimately it is more important to investigate whether orphanhood only affects a child's education outcome in the short term or if the effect lasts for the child's entire life.

In a recent and rare study that looks at the long-term impact of orphanhood, Beegle et al. (2007) retrace respondents of an old survey to measure the permanent impact of orphanhood on the education of children who lost at least one parent when they were between six and 15-years-old. The youngest batch of the retraced respondents were 19-years-old when they were re-interviewed. In general, the authors find that maternal orphans



have one year lower educational attainment and are two centimetres shorter than non-orphans, while paternal orphanhood does not seem to have any long-term effect. In that study, however, the authors do not control for the possibility that the respondents may lose their parents when they were between 15-years-old and the time of the interview, which if not taken into account could bias the results.

Given the background above, this study contributes to the literature in several ways. Firstly, we use a relatively long-spanning longitudinal dataset, which is rarely available in developing countries. This allows us to investigate both the short- and long-term effects of orphanhood. Secondly, the panel nature of our data allows us to control for potential biases inherent in studies using cross-sectional data. Thirdly, most of the literature on the effect of orphanhood on children look at issues related to education. In this paper, we look at the effect of parental death on a permanent health indicator, height, in addition to looking at the impact on education. To our knowledge, this is the first study that looks at the effect of orphanhood on children's health outside Africa. Fourthly, most of the studies on this subject use African data due to the extra interest in measuring the impact of HIV/AIDS. It is important to examine the effect of a parent's sudden death on children's [education and health](#) in developing countries in general due to, among others, lack of formal insurance mechanisms (Gertler et al., 2004). Fifthly, we investigate whether being poor over a relatively long period affects these outcomes differently. Studies above merely control for current household wealth or changes in household wealth, which may not be very accurate in reflecting poverty given the dynamic nature of poverty (Suryahadi and Sumarto, 2003). Lastly, we look at children from two age groups, two to six year olds and seven to year olds, separately to see whether orphanhood affects younger children differently from older children.

The rest of this paper is as follows. Section two discusses the dataset that we use. Section three provides our estimation strategy. Section four describes the statistics of the education and health outcomes of the orphans and non-orphans. Sections five, six and seven, respectively, present the estimation results on school enrolment, education attainment, and health status. Section eight concludes.

## 2 Data

We use data from the Indonesian Family Life Survey (IFLS), a longitudinal household socioeconomic and health survey that began in 1993. The second and third waves were done in 1997 and 2000. The sample represents about 83 percent of the Indonesian population living in 13 out of 33 provinces in Indonesia. Between IFLS1 and IFLS2, the attrition rate is 5.6 percent, while it is 5 percent between IFLS2 and IFLS3. Overall, 95.3



percent of households that participated in IFLS1 also participated in IFLS3 (Strauss et al., 2004a).

In this study, we limit our sample to children between 2 and 12-years-old in 1993 and follow them in the next two waves. Of 6,543 children in IFLS1, 6,402 are also observed in both IFLS2 and IFLS3, a 2.1 percent attrition rate. Out of this initial stock of observations, we limit our sample to children who had a complete set of parents in 1993. Then, given that we are interested in ascertaining both the short- and long-term effects of orphanhood, we focus only on those who lost their parents between 1993 and 1997. Thus, we remove samples who lost their parents either before 1993 or between 1997 and 2000. Next, we remove double orphans due to insufficient observation.<sup>2</sup> Our final sample size is 5,314 children, consisting of 34 maternal orphans, 118 paternal orphans, and 5,162 non-orphans.

### 3 Estimation method

In this section we discuss the econometric model that we estimate, the variables included in the model, and some possible sources of bias. The initial specification that we want to estimate is in Equation (1).

$$y_{ijt} = \beta_0 + \beta_1 PO_{it} + \beta_2 MO_{it} + \beta_3 poor_{jt} + \beta_4 female_t + \beta_5 X_{jt} + \alpha_i + v_{ijt} \quad (1)$$

where  $y_{ijt}$  is the education or health outcome of children  $i$  living in household  $j$  at time  $t$ , with  $t = 1$  is 1993,  $t = 2$  is 1997, and  $t = 3$  is 2000. Meanwhile,  $PO_{it}$  is a dummy variable that equals one if the child is a paternal orphan and zero otherwise. Similarly,  $MO_{it}$  equals one if the child is a maternal orphan. Hence, the coefficients  $\beta_1$  and  $\beta_2$  compare the health or education outcome of paternal and maternal orphans respectively with a child who is not an orphan. The next two variables, meanwhile, are dummy variables which equal one if the child lives in a chronically poor household and if the child is female, respectively. To define poverty, we use the poverty lines used in an IFLS official publication (Strauss et al., 2004b), which calculates the poverty line for 2000. For 1993 and 1997, we use the deflated 2000 poverty line calculated by Widyanti et al. (2008). We define a household to be chronically poor if it is poor at least twice in the three waves.<sup>3</sup> The variable,  $X_{jt}$ , is a vector of household control variables, which include household and household head characteristics. For the final two variables,  $\alpha_i$  is the child's time-invariant unobserved characteristics and  $v_{ijt}$  is idiosyncratic

<sup>2</sup> There are only two such children in our sample. The small number of double orphans is also reported by, among others, Ainsworth and Filmer (2006), Beegle et al. (2007), and Evans and Miguel (2007).

<sup>3</sup> Using three times poor as an alternative definition of chronic poverty produces similar results.



error. Finally, we include a dummy for year and the complete set of age dummies in each estimation.

We measure the effect of orphanhood on three outcomes: school enrolment, years of completed schooling and height. The reason for choosing height as the health indicator is because it is shown in several studies that a person's final height is correlated with his or her health during childhood (Alderman et al., 2006). Moreover, Schultz (2002) uses height as an indicator of lifetime health. Similarly, Pradhan et al. (2003) argue that height is a better health indicator than morbidity, mortality and life expectancy. Lastly, Behrman and Hoddinott (2005) and Dinda et al. (2006), among others, also find that a person's height is positively correlated with income.

To measure the short-term effect of orphanhood, we focus on the first two survey waves, while for measuring the long-term effect we use data from the first and third waves. Therefore, in both cases our dataset consists of a two-period panel data. Finally, we only investigate the effect of orphanhood on health in the long-term because IFLS2 does not contain anthropometric data.

We estimate the model using the fixed effects method for panel data, allowing us to remove  $\alpha_i$ , which would bias the estimation if left untreated.<sup>4</sup> A consequence of using the fixed effects is that we can only estimate the linear probability model, which means our results are marginal effects at the mean. Lastly, in order not to lose the child's sex in the estimation, we interact it with the year dummy. Furthermore, we introduce interactions between sex of the child and orphanhood, between sex of the child and chronic poverty, and between orphanhood and chronic poverty to see whether these conditions have a further effect on the outcomes that we are investigating. This is partly motivated by the fact that the studies we mention earlier find mixed results on gender differences. Moreover, it is plausible that there is a compound effect of both living in a chronically poor household and being an orphan. Appendices 1 and 2 provide the mean and standard deviation of variables that we use for estimating the short-term and long-term effects of orphanhood for each respective age group.

### 3.1 Possible bias

Although having a longitudinal dataset enables us to remove many of the biases that plague cross-sectional studies, time-varying unobservables could bias our estimations. One such

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<sup>4</sup> We do not conduct a Hausman Test for choosing between fixed or random effects because it is very plausible that there are unobserved and time-invariant characteristics that affect a child's health and education outcome. An example is a child's innate health condition or cognitive ability.



potential unobservable is children's living arrangement, which we have no good data on.<sup>5</sup> To the extent that living arrangements affect educational outcomes through household wealth, we do control for it using several household characteristics, such as poverty status, dependency ratio, whether the household head is working, and the condition of the house that the household dwells in. However, if different living arrangements also provide different intangible attributes, such as support and care that the orphan receives, and if these attributes vary over time, then we cannot directly control for it other than using the educational attainment of the household head as a proxy.

Another potential source of bias is if the observations which drop out between IFLS waves are significantly different from those that we fully observe through the three waves. Related to the discussion in the previous paragraph, despite IFLS's comprehensive retracing procedures (Strauss et al., 2004a), it does not retrace individuals who moved to a province that is outside IFLS coverage. However, the very low attrition rate indicates that this is not a worrying problem in IFLS data.

Finally, if the characteristics in the previous paragraph are correlated with probability to be orphans, then our sample may be biased. However, unlike the case in Africa, orphanhood in Indonesia is most likely caused by random events, shown by the relative similarity in the health conditions between parents who passed away between 1994 and 1997 and those who did not (Gertler et al., 2004).

## 4 Orphanhood, education and health: descriptive statistics

According to Statistics Indonesia (2006), primary (grades 1-6) and junior secondary (grades 7-9) school net enrolment rates in Indonesia were 97.1 percent and 84.0 percent, respectively, in 2005. Between the genders, the net enrolment rates among females is slightly higher at both levels. Moreover, school enrolment among the poor is relatively high compared with other developing countries (Ainsworth and Filmer, 2006). This could be due to the massive primary school construction programme in the 1970s and 1980s and the compulsory schooling programmes enacted by the government in 1984 (for primary level) and 1994 (for junior secondary level).

Educational attainment among adults, meanwhile, has also increased rapidly. The Indonesian National Labour Force Survey data record that as of 2004 around 45.9 percent of

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<sup>5</sup> Theoretically, living with the remaining parent can either have a positive or negative effect. Hence, it is an empirical issue.

the Indonesian labour force had at least nine years of education, while in 1986 only 19.1 percent of the labour force attained that level of education.

For orphans, meanwhile, Gertler et al. (2004) provide the grade-by-grade enrolment rate of orphans and non-orphans who are otherwise considered equal with the orphans. They find that orphans have a significantly lower enrolment rate in all grades except grades 11 and 12. The largest difference is in grade 9, while the smallest is in grade 1.

Table 1 shows enrolment rates in 1993, 1997 and 2000 of the sample who were between seven and 12-years-old in 1993, the official age used to calculate the primary school net enrolment rate in Indonesia. The 1993 net enrolment rates, the period prior to the orphans losing their parents, show that the differences between the three orphanhood status are not statistically significant. This is also true when we compare enrolment rates among boys and girls separately. Similarly, there are no significant differences in 1997. In 2000, meanwhile, paternal orphans had a significantly lower enrolment rate compared with non-orphans, although the difference disappears when disaggregated by sex.

Orphanhood Status	1993					
	Boys		Girls		Total	
	%	N	%	N	%	N
Not an orphan	93.4	1415	93.3	1342	93.3	2757
Maternal orphan	84.6	13	90.0	10	87.0	23
Paternal orphan	97.4	39	91.7	36	94.7	75
Total	93.4	1467	93.2	1388	93.3	2855
	1997					
	Boys		Girls		Total	
	%	N	%	N	%	N
Not an orphan	83.0	1415	86.7	1342	84.8	2757
Maternal orphan	76.9	13	100.0	10	87.0	23
Paternal orphan	79.5	39	80.6	36	80.0	75
Total	82.8	1467	86.6	1388	84.7	2855
	2000					
	Boys		Girls		Total	
	%	N	%	N	%	N
Not an orphan	58.9	1415	63.1	1342	60.9	2757
Maternal orphan	69.2	13	60.0	10	65.2	23
Paternal orphan	43.6	39	47.2	36	45.3	75
Total	58.6	1467	62.7	1388	60.6	2855

Note: \*\* 1% significance, \* 5% significance; the t-test is conducted between orphans and non-orphans; children were between 7-12-years-old in 1993.



Meanwhile, Table 2 compares the average height of children in 1993 and 2000. The height differences are largely not statistically significant, except in two instances. Among those who were between two and six-years-old, the average heights of male maternal orphans were significantly different from non-orphans in both 1993 and 2000. Meanwhile, male paternal orphans of seven to 12-years-old were significantly taller than non-orphans in 1993, although the gap's statistical significance disappeared altogether in 2000.

There is one final note regarding the largely statistically insignificant differences in the health and education outcomes between orphans and non-orphans in 1993, when all of them still had complete sets of parents. It pertains to the fact that this enables us to argue that any outcome differences between orphans and non-orphans in 1997 and 2000 are caused by orphanhood.<sup>6</sup>

Table 2. Average Height by Orphanhood Status, 1993 & 2000 (cm)

Age in 1993 and Orphanhood Status	1993			2000		
	Boys	Girls	Total	Boys	Girls	Total
<u>2-6 years old</u>						
Not an orphan	97.3	96.4	96.9	132.5	134.0	133.2
Maternal orphan	82.5	** 96.3	94.8	116.5	** 131.9	130.2
Paternal orphan	97.1	97.9	97.4	130.7	133.4	131.9
<u>7-12 years old</u>						
Not an orphan	124.3	124.0	124.2	158.7	150.3	154.6
Maternal orphan	124.1	125.2	124.2	160.0	146.7	154.2
Paternal orphan	130.1	** 123.2	126.6	160.9	148.8	154.8

Note: \*\* 1 percent significance, \* 5 percent significance; the mean comparison tests are two-tailed and conducted between orphans and non-orphans.

## 5 Effects of orphanhood and chronic poverty on school enrolment

Table 3 provides the effect of orphanhood on school enrolment. By 1997, the young children should all have been in primary school. The first column provides the short-term estimation result without the interaction terms between orphanhood and chronic poverty. Being an orphan does not seem to cause any statistically significant effect. Given that we control for chronic poverty status, our result is contrary to the finding of Case and Ardington (2006).

<sup>6</sup> This is also the route used by Case and Ardington (2006) and Beegle et al. (2007) to argue for causality between orphanhood and children's outcome.



Meanwhile, living in a chronically poor household reduces a young child's probability of being enrolled in school by 6.0 percentage points. After introducing the interaction effects, as shown in Column 2, there are still no statistically significant effects other than the poverty measure.<sup>7</sup>

Moving on to long-term effects of orphanhood, Column 3 shows that there are still no statistically significant effects of orphanhood, and the effect of poverty on school enrolment disappears. After including the interaction terms in the estimation, as shown in Column 4, the effect of orphanhood on school enrolment is also not statistically significant.

Moving to older children, who most likely had already been in school prior to the death of the parent, the fifth and sixth columns of Table 3 show no negative short-term effect of orphanhood on school enrolment. However, children from chronically poor households have a lower likelihood of being in school. Lastly, there is no long-term effect of either orphanhood or poverty in this age group.

Looking at both age groups, we find that there does not seem to be any effect of orphanhood. Moreover, there do not seem to be any gender differences and poor orphans do not experience any additional effects. Compared with other studies, our finding corroborates Lloyd and Blanc (1996), but is different from the majority of other studies, such as Yamano and Jayne (2005) and Case and Ardington (2006). Moreover, we also find different results to Gertler et al. (2004), who also investigate orphanhood in Indonesia but using different datasets and methods.

Table 3. Short and Long Term Effect of Orphanhood on School Enrolment

Young Children	Short Term		Long Term	
	(1)	(2)	(3)	(4)
Paternal orphan	0.007 (0.069)	-0.054 (0.106)	0.032 (0.051)	0.023 (0.062)
Maternal orphan	-0.158 (0.170)	0.025 (0.390)	-0.113 (0.182)	-0.008 (0.435)
Chronic Poor	-0.060 (0.022)	** -0.065 (0.033)	* -0.010 (0.021)	-0.005 (0.030)
Female	0.017 (0.016)	0.013 (0.018)	-0.002 (0.014)	-0.001 (0.015)
Poor * Paternal orphan		0.098 (0.119)		-0.032 (0.122)
Poor * Maternal orphan		-0.425		-0.082

<sup>7</sup> An interesting extension would be to see whether there is an added effect experienced by female maternal orphans living in a poor household. However, the number of observations do not permit further disaggregation to that level.



		(0.335)		(0.375)
Female * Poor		0.012		-0.008
		(0.044)		(0.040)
Female * Paternal orphan		0.062		0.049
		(0.116)		(0.102)
Female * Maternal orphan		0.065		-0.083
		(0.362)		(0.403)
Household characteristics	Yes	Yes	Yes	Yes
Number of panel observations	2,457	2,457	2,459	2,459
Older Children	Short Term		Long Term	
	(5)	(6)	(7)	(8)
Paternal orphan	-0.028	0.007	-0.051	-0.03
	(0.056)	(0.080)	(0.051)	(0.076)
Maternal orphan	0.122	0.026	0.163	0.128
	(0.076)	(0.125)	(0.105)	(0.103)
Chronic Poor	-0.077	** -0.094	** -0.076	** -0.058
	(0.023)	(0.032)	(0.026)	(0.035)
Female	0.017	0.011	-0.016	-0.006
	(0.014)	(0.014)	(0.017)	(0.018)
Poor * Paternal orphan		-0.068		-0.026
		(0.11)		(0.112)
Poor * Maternal orphan		0.262		0.382
		(0.159)		(0.24)
Female * Poor		0.035		-0.046
		(0.046)		(0.050)
Older Children	Short Term		Long Term	
	(1)	(2)	(3)	(4)
Female * Paternal orphan		-0.032		-0.032
		(0.099)		(0.103)
Female * Maternal orphan		0.063		-0.146
		(0.128)		(0.21)
Household characteristics	Yes	Yes	Yes	Yes
Number of panel observations	2,854	2,854	2,855	2,855

Note: \*\* 1% significance, \* 5% significance; dependent variable is enrolled in school = 1; robust standard errors in parentheses; young children were 2-6 years-old in 1993, while older children were 7-12 years old; estimations also include a year dummy, age dummies, and region dummies.

## 6 Effects of orphanhood and chronic poverty on educational attainment

In this section we measure the effect of orphanhood on the second education indicator, educational attainment. Using this variable as a measure of education outcome is unsuitable

if there is high repetition rate in the school system. However, this is not the case in Indonesia (UNESCO, 2007). Thus, we estimate the same model as in the previous section, only with a different dependent variable. Table 4 provides the results.

The first to fourth columns of Table 4 provide the results for children who were between two and six-years-old in 1993. There is a statistically significant negative effect of orphanhood on the educational attainment of young children, both in the short- and long-term. This finding is the same as Case and Ardington (2006), who find a negative effect in the short-term. In the short-term, maternal orphans have between 0.6 to 1.7 less years of completed schooling, and in the long term the gap increases to as much as 3.2 years. Given that there are no significant effects on school enrolment, it is very likely that young maternal orphans enrol in school later than non-orphans. The effect of chronic poverty, meanwhile, is also negative and statistically significant, ranging from 0.3 to 0.4 years of schooling in the short- and long-term respectively. Comparing the effects, it seems that being a maternal orphan is, *ceteris paribus*, worse than living in a chronically poor household.

Looking at the interaction terms, we find no gender differences or additional effects on chronically poor orphans. This result is different from the finding of Yamano and Jayne (2005), although the same as Gertler et al. (2004).

Table 4. Short and Long Term Effect of Orphanhood on Education Attainment

Young Children	Short Term		Long Term	
	(1)	(2)	(3)	(4)
Paternal orphan	-0.075 (0.199)	0.061 (0.290)	0.012 (0.282)	0.050 (0.413)
Maternal orphan	-0.676 * (0.270)	-1.701 ** (0.544)	-1.153 * (0.557)	-3.270 ** (0.931)
Chronic Poor	-0.268 ** (0.053)	-0.270 ** (0.073)	-0.463 ** (0.091)	-0.446 ** (0.127)
Female	0.062 (0.045)	0.064 (0.051)	0.149 (0.076)	0.158 (0.087)
Poor * Paternal orphan		-0.065 (0.367)		0.012 (0.596)
Poor * Maternal orphan		0.699 (0.459)		1.694 (0.943)
Female * Poor		-0.003 (0.104)		-0.058 (0.180)
Female * Paternal orphan		-0.255 (0.350)		-0.096 (0.579)
Female * Maternal orphan		0.886 (0.525)		1.650 (0.884)
Household characteristics	Yes	Yes	Yes	Yes
Number of panel observations	2,457	2,457	2,459	2,459



Older Children	Short Term		Long Term	
	(5)	(6)	(7)	(8)
Paternal orphan	0.168 (0.201)	0.028 (0.270)	0.306 (0.299)	0.085 (0.475)
Maternal orphan	0.067 (0.315)	0.635 (0.355)	0.201 (0.513)	0.840 (0.574)
Chronic Poor	-0.186 * (0.080)	-0.189 (0.112)	-0.469 ** (0.128)	-0.424 * (0.178)
Female	0.175 ** (0.060)	0.181 ** (0.067)	0.290 ** (0.100)	0.330 ** (0.113)
Poor * Paternal orphan		0.310 (0.383)		0.837 (0.624)
Poor * Maternal orphan		-0.555 (0.810)		-0.267 (1.358)
Female * Poor		0.003 (0.156)		-0.151 (0.248)
<hr/>				
Older Children	Short Term		Long Term	
	(1)	(2)	(3)	(4)
Female * Paternal orphan		0.116 (0.337)		-0.027 (0.571)
Female * Maternal orphan		-0.972 (0.606)		-1.292 (1.035)
Household characteristics	Yes	Yes	Yes	Yes
Number of panel observations	2,854	2,854	2,855	2,855

Note: \*\* 1 percent significance, \* 5 percent significance; dependent variable is years of completed schooling; robust standard errors in parentheses; young children were 2-6 years old in 1993, while older children were 7-12 years old; estimations also include a year dummy, age dummies, and region dummies.

Among older children, meanwhile, there does not seem to be any short- or long-term impact of orphanhood, shown by the largely insignificant coefficients in Columns 6 and 8. Specifically for the long-term effect, our finding is different from the only other study on long-term effects of orphanhood (Beegle et al., 2007). Meanwhile, chronic poverty has a negative and statistically significant effect in the long-term.

In conclusion, our results on young children support the finding of Gertler et al. (2004), who also find that orphans tend to fall behind in educational attainment. Meanwhile, we do not find any effect of orphanhood on older children's educational attainment.

According to the literature, two reasons why school enrolment is not affected during shocks are informal and formal insurance mechanisms. Townsend (1994) discusses the former, which could be relevant although he does not specifically discuss orphanhood. For the issue of formal insurance mechanisms, meanwhile, Sparrow (2007) finds that the government's

school scholarship programme indeed helped households in smoothing consumption, enabling them to keep children in school during the Indonesian crisis. Although there is no formal school scholarship programme for orphans, these two channels remain as plausible explanations.

Finally, in this section we find that the orphanhood only affects the educational attainment of children who lost their parents at a young age. This corroborates the finding of Thomas et al. (2004), which finds that poor households sacrifice the education of younger children in order to keep the older children from dropping out of school.

## 7 Effects of orphanhood and chronic poverty on health

We now turn to the impact of orphanhood on health, as proxied by height. As we mention earlier, the data do not have an anthropometric measure in 1997, thus in this section we only look at the long-term effects. Table 5 provides the results for both age groups.

Table 5. Long Term Effects of Orphanhood on Health

Explanatory Variable	Young Children		Older Children		
	(1)	(2)	(3)	(4)	
Paternal orphan	-0.915 (1.421)	-1.035 (1.750)	-0.317 (1.352)	-2.084 (1.713)	
Maternal orphan	-0.992 (1.168)	-4.695 (2.646)	1.868 (1.590)	3.590 (2.234)	
Chronic Poor	-2.415 (0.453)	** -1.971 (0.622)	** -0.382 (0.497)	-2.102 (0.759)	**
Female	2.467 (0.380)	** 2.650 (0.437)	** -8.546 (0.325)	** -9.049 (0.352)	**
Poor * Paternal orphan		0.341 (3.169)		5.899 (3.636)	
Poor * Maternal orphan		1.795 (2.540)		-0.557 (5.009)	
Female * Poor		-0.942 (0.886)		3.273** (0.953)	
Female * Paternal orphan		-0.041 (2.905)		0.695 (2.447)	
Female * Maternal orphan		3.140 (1.665)		-3.806 (3.142)	
Household characteristics	Yes	Yes	Yes	Yes	
Number of panel observations	2,443	2,443	2,805	2,805	

Note: \*\* 1% significance, \* 5% significance; dependent variable is height in centimetres; robust standard errors in parentheses; age classification is based on the child's age in 1993; estimation also includes a year dummy, age dummies, and region dummies.



The effects on younger children are in Column 2, while Column 4 provides the results for older children. It seems that orphanhood does not significantly affect health in the long-term. This result is different from that found by Beegle et al. (2007) in Tanzania, however it supports other African studies cited by the aforementioned authors in their study.

Looking at the effects of poverty, meanwhile, children from chronically poor families are between 1.9 to 2.4 centimetres shorter than children from non-chronically poor families. This result supports findings from other countries, such as Case and Paxson (2006).

## 8 Conclusion

Investigating the impact of orphanhood on children's outcomes is rarely done outside Africa. Moreover, this type of study is problematic to do, in most cases due to data limitations. Using a relatively long-spanning longitudinal dataset from Indonesia, we investigate the effect of maternal and paternal orphanhood jointly with chronic poverty on children's education and health outcomes. Given our rich data, we are able to look at both short- and long-term effects on younger children, who were not yet of school-age in the baseline, and on older children, who were of primary school-age in the baseline.

We find negative and statistically significant effects of orphanhood on educational attainment, but not on school enrolment or health outcomes. Similar to findings in Africa, maternal orphans have lower educational attainment than non-orphans. This pertains especially to the younger cohort in the short-term. In addition, we do not find gender differences in the effect of orphanhood on children in Indonesia. This is also the result of the only other study that investigates Indonesian children using a different method and data.

Examining the effect of chronic poverty, it is mostly statistically significant and always negative. The only occurrence where the effect of chronic poverty is not worse than orphanhood is among young children's education attainment, where maternal orphans have a worse outcome than chronically poor children.

Finally, we also interact orphanhood with the chronic poverty status of the household that the children are living in. In all cases, we find no additional impact on orphans who are living in chronically poor households. These findings imply that the government should focus on helping chronically poor households to invest in their human capital.

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## Appendix

Appendix 1. Mean and Standard Deviation of Variables, 2-6 Year Old Age Group

	Short Term		Long Term		Dummy Variable
	Mean	Std. Dev.	Mean	Std. Dev.	
Enrolled in School	0.501	0.500	0.533	0.498	Yes
Years of Completed Schooling	0.692	1.218	1.768	2.267	
Height	-	-	96.925	12.007	
Female	0.238	0.425	0.238	0.425	Yes
Working	0.003	0.061	0.011	0.107	Yes
Orphanhood Status					
Paternal Orphan	0.008	0.094	0.008	0.094	Yes
Maternal Orphan	0.002	0.052	0.002	0.052	Yes
Household Characteristics					
Chronically Poor	0.103	0.305	0.103	0.305	Yes
Household size	5.222	1.604	5.283	1.663	
Number of household members working	1.528	0.748	1.741	0.909	
Number of other household members in school	1.053	1.016	1.086	0.992	
Dependency ratio	1.274	0.707	1.204	0.713	
House floor made from dirt	0.185	0.389	0.172	0.377	Yes
Rural	0.596	0.490	0.594	0.491	Yes
Per capita expenditure quintile 1	0.218	0.412	0.217	0.413	Yes
Per capita expenditure quintile 2	0.194	0.395	0.201	0.401	Yes
Per capita expenditure quintile 3	0.195	0.396	0.196	0.397	Yes
Per capita expenditure quintile 4	0.201	0.401	0.194	0.395	Yes
Household Head Characteristics					
Years of Completed Schooling	6.033	4.343	5.825	4.309	
Working	0.946	0.224	0.948	0.221	Yes
Interaction terms					
Poor * Paternal orphan	0.003	0.060	0.003	0.060	Yes
Poor * Maternal orphan	0.001	0.038	0.001	0.038	Yes
Female * Poor	0.050	0.219	0.050	0.219	Yes
Female * Paternal orphan	0.004	0.065	0.004	0.065	Yes
Female * Maternal orphan	0.002	0.048	0.002	0.048	Yes



Appendix 2. Mean and Standard Deviation of Variables, 7-12 Year Old Age Group

	Short Term		Long Term		Dummy Variable
	Mean	Std. Dev.	Mean	Std. Dev.	
Enrolled in School	0.878	0.326	0.757	0.429	Yes
Years of Completed Schooling	3.551	2.877	4.413	3.783	
Height	-	-	126.974	10.782	
Female	0.241	0.427	0.241	0.427	Yes
Working	0.029	0.170	0.115	0.319	Yes
Orphanhood Status					
Paternal Orphan	0.013	0.114	0.013	0.114	Yes
Maternal Orphan	0.005	0.073	0.005	0.073	Yes
Household Characteristics					
Chronically Poor	0.085	0.279	0.085	0.279	Yes
Household size	5.286	1.612	5.272	1.685	
Number of household members working	1.637	0.849	1.914	1.065	
Number of other household members in school	1.063	0.979	1.034	0.978	
Dependency ratio	1.102	0.719	0.939	0.730	
House floor made from dirt	0.169	0.375	0.155	0.362	Yes
Rural	0.528	0.499	0.522	0.500	Yes
Per capita expenditure quintile 1	0.184	0.387	0.185	0.388	Yes
Per capita expenditure quintile 2	0.205	0.404	0.199	0.399	Yes
Per capita expenditure quintile 3	0.204	0.403	0.203	0.402	Yes
Per capita expenditure quintile 4	0.199	0.399	0.206	0.404	Yes
Household Head Characteristics					
Years of Completed Schooling	5.627	4.191	5.443	4.133	
Working	0.931	0.252	0.924	0.266	Yes
Interaction terms					
Poor * Paternal orphan	0.004	0.061	0.004	0.061	Yes
Poor * Maternal orphan	0.001	0.033	0.001	0.033	Yes
Female * Poor	0.038	0.192	0.038	0.192	Yes
Female * Paternal orphan	0.006	0.079	0.006	0.079	Yes
Female * Maternal orphan	0.002	0.047	0.002	0.047	Yes



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