

Comparing the Effects of Parental Death and Chronic Poverty on Children's Education and Health:  
Evidence from Indonesia

Daniel Suryadarma, Yus Medina Pakpahan, and Asep Suryahadi

*SMERU Research Institute, Jakarta*

31 January 2008

**Abstract**

We estimate the short and long term effect of maternal and paternal death on children's school enrolment, education attainment, and health in Indonesia, then compare it to the effect of chronic poverty. We also investigate whether there are any gender dimensions on the effects. Using a sufficiently long-spanning longitudinal dataset, we find that young maternal orphans have worse educational outcomes compared to 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: orphanhood, chronic poverty, education, health, Indonesia.

JEL Classification: I10, I21, I31

**I. Introduction**

Disruptions 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 suffers 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, Paxson, and Ableidinger (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 education outcomes.

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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.

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 outcome. An example of the unobservable is HIV/AIDS status of the parents, which is very likely to bias studies in Africa. After taking these issues into account, Case, Paxson, and Ableidinger (2004) and Case and Ardington (2006) find that orphans still have significantly lower school enrolment, which is opposite to the finding of Lloyd and Blanc (1996), although they do not find any gender differences in the effect. However, Beegle, De Weerd, and Dercon (2007) state that the methodology used by Case, Paxson, and Ableidinger (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-off or worse-off 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 related to 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 education outcome compared to 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, Shimamura, and Sserunkuuma (2006) use data from Uganda and find a similarly weak result on the effect of different living arrangements.

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

Using cross-country dataset of 51 countries, meanwhile, Ainsworth and Filmer (2006) find that the effect of being an orphan to 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 there without investigating further its root cause.

In addition to education disruptions, orphanhood may also affect children's health. Beegle, De Weerd, and Dercon (2007) reviews the currently thin 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 (2004), is the inability of cross-sectional data to see whether the death was preceded by a long bout of illness by the parent in concern, which is especially important in studies in Africa where HIV/AIDS is prevalent.

By using a longitudinal dataset, time-invariant unobserved characteristics could 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 in concern before death. Among studies using longitudinal datasets, however, most look at the short term effect of orphanhood due to data limitations. According to Gertler, Levine, and Ames (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, De Weerdt, and Dercon (2007) retrace respondents of an old survey to measure the permanent impact of orphanhood on the education of children who lost at least a parent when they were between 6 - 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 education attainment and are two centimetres shorter compared to 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, Levine, and Ames, 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, 2-6-year olds and 7-12-year olds separately, to see whether orphanhood affects smaller children differently from older children.

The rest of this paper is as follows. Section II discusses the dataset that we use. Section III provides our estimation strategy and Section IV describes the statistics of the education and health outcomes of the orphans and non-orphans. Sections V, VI, and VII respectively present the estimation results on school enrolment, education attainment, and health status. Section VIII concludes.

## **II. 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% of the Indonesian population living in 13 provinces in Indonesia. Between IFLS1 and IFLS2, the attrition rate is 5.6%, while it is 5% between IFLS2 and IFLS3. Overall, 95.3% 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. Out of 6,543 children in IFLS1, 6,402 are also observed in both IFLS2 and IFLS3, a 2.1% 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 effect of orphanhood, we focus 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.

### III. 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.

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

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 to one if the child is a paternal orphan and zero otherwise. Similarly,  $MO_{it}$  equals to 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 to a child who is not an orphan. The next two variables, meanwhile, are dummy variables which equal to one if the child lives in a chronically poor household and if the child is female respectively. To define poverty, we use the same 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 the 2000 poverty line calculated by Widyanti, Suryahadi, and Sumarto (2008). We define a household to be chronically poor if it is poor at least twice in the three waves. The next set of 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 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, Hoddinott, and Kinsey, 2006). Moreover, Schultz (2002) uses height as an indicator of lifetime health. Similarly, Pradhan, Sahn, and Younger (2003) argue that height is a better health indicator than morbidity, mortality, and life expectancy. Lastly, Behrman and

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<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, De Weerd, and Dercon (2007), and Evans and Miguel (2007).

Hoddinott (2005) and Dinda et al. (2006), among others, also find that a person's height is positively correlated with income.

For measuring 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>3</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 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.

### *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 potential unobservable is children's living arrangement, which we have no good data of.<sup>4</sup> To the extent that living arrangements affect education 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 education attainment of the household head as a proxy.

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<sup>3</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.

<sup>4</sup> Theoretically, living with the remaining parent can either have a positive or negative effect. Hence, it is an empirical issue.

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 previous paragraph, despite IFLS' 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 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, Levine, and Ames, 2004).

#### **IV. Orphanhood, Education, and Health: Descriptive Statistics**

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

Education attainment among adults, meanwhile, has also increased rapidly. The Indonesian National Labour Force Survey data record that as of 2004 around 45.9% of the Indonesian labour force had at least nine years of education, while in 1986 only 19.1% of the labour force attained that level of education.

For orphans, meanwhile, Gertler, Levine, and Ames (2004) provide the grade-by-grade enrolment rate of orphans and the 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 7 to 12 years old in 1993, the official age to calculate 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 to non-orphans, although the differences disappear when disaggregated by sex.

Table 1. Enrolment rates by Orphanhood Status, 1993-2000 (%)

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

  

Orphanhood Status	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

  

Orphanhood Status	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 occasions. Among those who were between 2-6 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 7-12 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>5</sup>

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

	1993			2000		
	Boys	Girls	Total	Boys	Girls	Total
<u>2-6 years old in 1993</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 in 1993</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% significance, \* 5% significance; the mean comparison tests are two-tailed and conducted between orphans and non-orphans.

## V. 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 opposite to the finding of Case and Ardington (2006). Meanwhile, living in a chronically poor household reduces a young child's probability to be enrolled 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>6</sup>

Moving on to long term effects of orphanhood, Column 3 shows that there is 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 shows no negative short term effect of orphanhood on

<sup>5</sup> This is also the route used by Case and Ardington (2006) and Beegle, De Weerd, and Dercon (2007) to argue for causality between orphanhood and children's outcome.

<sup>6</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.

school enrolment. However, children from chronically poor households have a lower likelihood to be in school. Lastly, there is no long term effect of either orphanhood or poverty in this age group.

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

<u>Young Children</u>	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 (0.335)		-0.082 (0.375)
Female * Poor	-	0.012 (0.044)		-0.008 (0.040)
Female * Paternal orphan	-	0.062 (0.116)		0.049 (0.102)
Female * Maternal orphan	-	0.065 (0.362)		-0.083 (0.403)
Household characteristics	Yes	Yes	Yes	Yes
Number of panel observations	2457	2457	2459	2459

  

<u>Older Children</u>	Short Term		Long Term	
	(5)	(6)	(7)	(8)
Paternal orphan	-0.028 (0.056)	0.007 (0.080)	-0.051 (0.051)	-0.03 (0.076)
Maternal orphan	0.122 (0.076)	0.026 (0.125)	0.163 (0.105)	0.128 (0.103)
Chronic Poor	-0.077** (0.023)	-0.094** (0.032)	-0.076** (0.026)	-0.058 (0.035)
Female	0.017 (0.014)	0.011 (0.014)	-0.016 (0.017)	-0.006 (0.018)
Poor * Paternal orphan		-0.068 (0.11)		-0.026 (0.112)
Poor * Maternal orphan		0.262 (0.159)		0.382 (0.24)
Female * Poor		0.035 (0.046)		-0.046 (0.050)
Female * Paternal orphan		-0.032 (0.099)		-0.032 (0.103)
Female * Maternal orphan		0.063 (0.128)		-0.146 (0.21)
Household characteristics	Yes	Yes	Yes	Yes
Number of panel observations	2854	2854	2855	2855

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.

Looking at both age groups, we find that there does not seem to be any effect of orphanhood. Moreover, there does not seem to be any gender differences and poor orphans do not experience any additional effects. Compared to other studies, our finding corroborates Lloyd and Blanc (2005), 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 compared to Gertler, Levine, and Ames (2004), who also investigate orphanhood in Indonesia despite using different datasets and methods.

## **VI. Effects of Orphanhood and Chronic Poverty on Education Attainment**

In this section we measure the effect of orphanhood on the second education indicator, education 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 are statistically significant negative effect of orphanhood on the education 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. The former result is different from the finding of Yamano and Jayne (2005), although it is the same with Gertler, Levine, and Ames (2004).

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, De Weerdt, and Dercon, 2007). Meanwhile, chronic poverty has a negative and statistically significant effects in the long term.

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

<u>Young Children</u>	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	2457	2457	2459	2459
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<u>Older Children</u>	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)
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	2854	2854	2855	2855

note: \*\* 1% significance, \* 5% 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.

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

## VII. 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	2443	2443	2805	2805

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 to that Beegle, De Weerd, and Dercon (2007) find 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).

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

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 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.

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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
<i>Orphanhood Status</i>					
Paternal Orphan	0.008	0.094	0.008	0.094	Yes
Maternal Orphan	0.002	0.052	0.002	0.052	Yes
<i>Household Characteristics</i>					
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
<i>Household Head Characteristics</i>					
Years of Completed Schooling	6.033	4.343	5.825	4.309	
Working	0.946	0.224	0.948	0.221	Yes
<i>Interaction terms</i>					
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
<i>Orphanhood Status</i>					
Paternal Orphan	0.013	0.114	0.013	0.114	Yes
Maternal Orphan	0.005	0.073	0.005	0.073	Yes
<i>Household Characteristics</i>					
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
<i>Household Head Characteristics</i>					
Years of Completed Schooling	5.627	4.191	5.443	4.133	
Working	0.931	0.252	0.924	0.266	Yes
<i>Interaction terms</i>					
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