

**WORKING PAPER**

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and Chronic Poverty on  
Children's Education and Health:  
Evidence from Indonesia**

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## ABSTRACT

### **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\*

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

Keywords: orphanhood, chronic poverty, education, health, children, Indonesia  
JEL Classification: I10, I21, I31

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## I. 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 analyzed 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.

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 outcomes. An example of the unobserved characteristics is the 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 enrollment, 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 were better or worse after the death of the parent. Case and Ardington (2006), however, use a panel dataset and still find that orphanhood has a negative effect on children's education. Yamano and Jayne (2005), however, find that the negative effect of orphanhood is solely limited to poor children.

In addition to accounting for household wealth, another issue related to orphans' living arrangements is attention given to the child. Even if the orphan is living in a well-off household, adults in that household may give priority to their own children. This means that the orphan may have inferior educational outcomes compared to non-orphan children in the same 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 enrollment. 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 rare study that looks at a non-African country, Gertler, Levine, and Ames (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% higher dropout rate than non-orphans. In addition, they find no gender differences, based on either the child or the departed parent.

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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.

Using a cross-country dataset of 51 countries, Ainsworth and Filmer (2006) find that the effect of orphanhood on a child's schooling is country specific. Furthermore, they caution against simply prescribing traditional interventions to increase school enrollment, such as subsidising school fees, without further investigating the root cause of orphans' lower enrollment rate.

In addition to educational disruptions, orphanhood may also affect children's health. Beegle, De Weerdt, and Dercon (2007) review the as yet scarce literature on this topic, which mostly focus on African countries. The authors find that in general orphans have 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 biases the effect of orphanhood on school enrollment towards zero. The third weakness, as stated by Case and Ardington (2006), is the inability of cross-sectional data to indicate 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 enrollment, the condition of the household in which the child had lived, and the health of the relevant parent before death. However, due to data limitations most studies using longitudinal datasets look at the short term effects of orphanhood. 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 educational outcomes in the short term or if the effects last 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 respondents were 19 years old when they were re-interviewed. The authors find that in general, maternal orphans' educational attainment is one year lower, and average height two centimetres shorter than non-orphans, while paternal orphanhood does not seem to have any long term effect on education and health. However in that study, the authors do not control for the possibility that the respondents may have lost their parents between the age of 15 and the time of the interview, which could bias the results.

Given this background, this study contributes to the literature in several important 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 looks 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. Fourth, most of the studies on this subject use African data due to the particular 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 a lack of formal insurance mechanisms, amongst other things (Gertler, Levine, and Ames, 2004). Fifth, we investigate whether being poor over a relatively long period affects these outcomes differently. The studies above merely control for current household wealth or changes in household wealth, which may not be very accurate in reflecting poverty given its dynamic nature (Suryahadi and Sumarto 2003). Finally, we look at children from two age groups, 2–6-year-olds and 7–12-year-olds, separately, to see whether the effects of orphanhood for younger and older children are different.

The rest of this paper is as follows. Section II discusses the dataset that we use. Section III provides our estimation strategy. 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 enrollment, 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 out of 33 provinces in Indonesia. The attrition rate between IFLS1 and IFLS2 is 5.6%, and 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 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.

## 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).

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

where  $y_{ijt}$  is the education or health outcome of children  $i$  living in household  $j$  at time  $t$ , with  $t = 1$  being 1993,  $t = 2$  being 1997, and  $t = 3$  being 2000. Meanwhile,  $PO_{it}$  is a dummy variable that is equal to one if the child is a paternal orphan and is zero otherwise. Similarly,  $MO_{it}$  is equal to

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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 several authors, including Ainsworth and Filmer (2006), Beegle, De Weerd, and Dercon (2007), and Evans and Miguel (2007).



one if the child is a maternal orphan. Hence, the coefficients  $\beta_1$  and  $\beta_2$  compare the health or education outcomes of paternal and maternal orphans respectively to children who are not orphans. The next two variables, meanwhile, are dummy variables, with  $poor_{jt}$  equal to one if the child lives in a chronically poor household and  $female_i$  equal to one if the child is female. 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 2000 poverty line calculated by Widyanti et al. (2009). We define a household to be chronically poor if it is poor at least twice in the three waves.<sup>3</sup> 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,  $a_i$  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 enrollment, years of completed schooling, and height. We choose height as the health indicator because several studies have shown in 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 Hoddinott (2005) and Dinda et al. (2006), among others, also find that a person's height is positively correlated with income.

In measuring the short term effects of orphanhood, we focus on the first two survey waves, while in measuring the long term effects 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  $a_i$ , which would bias the estimation if left untreated.<sup>4</sup> A consequence of using the fixed effects method is that we can only estimate the linear probability model, which means our results are marginal effects at the mean. Finally, so that it is not lost in the estimation, we interact the child's sex with the year dummy. Furthermore, we introduce interactions between sex of the child and orphanhood, between the sex of the child and chronic poverty, and between orphanhood and chronic poverty to see whether these conditions have further effects 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 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, on which we have no good data.<sup>5</sup> We

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<sup>3</sup>Alternatively, if chronic poverty is defined as being poor three times in the three waves, similar results are produced.

<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.

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

do control for the effect living arrangements have on education outcomes through household wealth, by using several household characteristics, such as poverty status, dependency ratio, whether the head of the household is working, and the condition of the house in which the household resides. 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.

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 the probability of being an orphan, 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, 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 enrollment rates in Indonesia in 2005 were 97.1% and 84.0% respectively. Between genders, the net enrollment rate for females is slightly higher at both levels. Moreover, school enrollment 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. According to Indonesian National Labour Force Survey data, as of 2004 around 45.9% of the Indonesian labour force had at least 9 years of education, while in 1986 only 19.1% of the labour force had attained that level of education.

For orphans, Gertler, Levine, and Ames (2004) provide grade-by-grade enrollment rates of orphans and the non-orphans otherwise considered their equal. They find that orphans have a significantly lower enrollment 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 the 1993, 1997, and 2000 enrollment rates of the sample who were between 7 and 12 years old in 1993, the official age to calculate the primary school net enrollment rate in Indonesia. The net enrollment rates for 1993, the period prior to the orphans losing their parents, show that the differences between the three orphanhood statuses are not statistically significant. This is also true when we compare enrollment rates among boys and girls separately. Similarly, there are no significant differences in 1997. In 2000, on the other hand, paternal orphans had a significantly lower enrollment rate than non-orphans, although the differences disappear when disaggregated by sex.

**Table 1. Enrollment Rates by Orphanhood Status, 1993-2000 (%)**

Orphanhood Status	1993					
	Boys		Girls		Total	
	%	N	%	N	%	N
Not an orphan	93.4	1,415	93.3	1,342	93.3	2,757
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	1,467	93.2	1,388	93.3	2,855
	1997					
	Boys		Girls		Total	
	%	N	%	N	%	N
Not an orphan	83.0	1,415	86.7	1,342	84.8	2,757
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	1,467	86.6	1,388	84.7	2,855
	2000					
	Boys		Girls		Total	
	%	N	%	N	%	N
Not an orphan	58.9	1,415	63.1	1,342	60.9	2,757
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	1,467	62.7	1,388	60.6	2,855

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>6</sup>

<sup>6</sup>This is also the approach used by Case and Ardington (2006) and Beegle, De Weerd, and Dercon (2007) in arguing for causality between orphanhood and children’s outcome.

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

Age in 1993 and Orphanhood Status	1993			2000		
	Boys	Girls	Total	Boys	Girls	Total
<b>2–6 years old</b>						
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
<b>7–12 years old</b>						
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 ENROLLMENT

Table 3 provides the effect of orphanhood on school enrollment. 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 have 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 of being 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>7</sup>

Moving on to the 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 enrollment disappears. After including the interaction terms in the estimation, as shown in Column 4, the effect of orphanhood on school enrollment 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 school enrollment. However, children from chronically poor households have a lower likelihood to be in school. Finally, both orphanhood and poverty have no long term effect for this age group.

Looking at both age groups, we find that orphanhood does not seem to have any effect. Moreover, there do 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 differs 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, Levine, and Ames (2004), who also investigate orphanhood in Indonesia using different datasets and methods.

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

**Table 3. Short and Long Term Effects of Orphanhood on School Enrollment**

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 (0.335)		-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	2,457	2,457	2,459	2,459
Older Children	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	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

## VI. EFFECTS OF ORPHANHOOD AND CHRONIC POVERTY ON EDUCATION 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 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 2 and 6 years old in 1993. Orphanhood has a statistically significant negative effect 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 enrollment, it is very likely that young maternal orphans enroll in school later than non-orphans. Meanwhile the effect of chronic poverty 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).

**Table 4. Short and Long Term Effects 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

Continued

Tabel 4. Continued

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)
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% 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

However, orphanhood does not seem to have any short or long term impacts on older children, which is shown by the largely insignificant coefficients in Columns 6 and 8. For the long term effects, our finding is different from the only other study on long term effects of orphanhood (Beegle, De Weerd, and Dercon, 2007). Meanwhile, chronic poverty has negative and statistically significant effects in the long term.

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 that orphanhood has any effect on older children's educational attainment.

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

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

## VII. EFFECTS OF ORPHANHOOD AND CHRONIC POVERTY ON HEALTH

We now turn to the impact of orphanhood on health, as proxied by height. As mentioned earlier, the data do not have an anthropometric measure for 1997, so 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 differs to that of Beegle, De Weerd, and Dercon (2007) relating to Tanzania; however it supports other African studies cited by these authors in their study.

Looking at the effects of poverty, 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 undertake, in most cases due to data limitations. Using a relatively long-spanning longitudinal data from Indonesia, we investigate the effects of maternal and paternal orphanhood and 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 enrollment or health outcomes. Similar to the findings in Africa, maternal orphans have a lower educational attainment than non-orphans. This especially pertains to the younger cohort in the short term. In addition, unlike studies that find gender differences in the effect of orphanhood on children, we do not find this to be the case in Indonesia. This is also the result of the only other study that investigates Indonesian children using a different method and data.

The effect of chronic poverty is mostly statistically significant and always negative. The only occurrence where the effect of chronic poverty is less than orphanhood is among young children's educational attainment, where maternal orphans have worse outcomes than chronically poor children.

Finally, we also interact orphanhood with the chronic poverty status of the household in which the children are living. 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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# APPENDICES

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