Can Orphanhood Explain Nutritional & Educational Disparities? Empirical Evidence from India

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Abstract

Absence of biological parents is expected to negatively impact their orphaned children's health outcomes through channels of depressed household incomes and lack of parental care and support. Our research study explores this hypothesis by engaging in a comparative analysis of health outcomes of Paternal orphans, Maternal orphans and Double orphans (as classified by UNICEF) relative to non-orphans in India. Using data from Round 5 of the National Family Health Survey, we explore whether there are differences in indicators of stunting, wasting, malnutrition and years of schooling across these three types of orphans. Our paper engages a causal framework by restricting our sample to "blended" households, those with both orphans and non-orphans, and controlling for household-fixed effects. We observe that at large, orphans are at a disadvantage relative to non-orphans, the effects being confounded by poverty and other household characteristics. Their living arrangements are also significant and we observe that Double orphans fare better than Maternal, Paternal and non-orphans in certain settings, pointing towards compensating factors like robust extended familial ties.

Keywords: Orphanhood, intra-household analysis, nutrition, education, caregivers, Hamilton's rule.

1 Introduction

According to a UNICEF report in 2020, almost 10,000 children become orphans every day. The likelihood of individuals becoming orphaned is often exacerbated with poverty, especially in regions facing healthcare limitations, high disease burdens or conflicts. Conversely, the absence of parental support can hinder orphans from accessing stable housing, healthcare, and jobs, potentially perpetuating economic hardship. The high correlation between socioeconomic poverty and orphanhood makes it challenging to discern the effects of each on children growing up in these circumstances.

The loss of a parent can profoundly affect multiple aspects of a child's life. Health vulnerabilities arise as access to healthcare and proper nutrition diminishes, potentially impacting overall well-being. Education becomes challenging due to disruptions caused by the loss of parental guidance and financial stability, leading to irregular attendance, early dropout, and limited access to higher education. Transitioning into adulthood and the workforce becomes more arduous, with orphaned children often lacking support networks and struggling to acquire necessary skills for stable employment. Consequently, they may face lower income levels, housing difficulties, and an overall reduced standard of living compared to their peers with intact familial support systems.

For all statistical purposes, the UNICEF Data on orphans defines orphans to be those children under 18 who have lost one or both of their parents, further sub-categorising them into:

- **Single orphan** - A child who has lost one of his/her parents.
- **Maternal orphan** - The child has lost his mother, however, the father is still alive.
- **Paternal orphan** - The child has lost his father, however, the mother is still alive.
- **Double orphan** - A child who has lost both of his/her parents.

In this paper, we have explored how the shock of orphanhood impacts child health and education outcomes. While seminal work has previously been conducted in this regard, especially in the African context, our paper adds to the literature by studying these outcomes across the categories of Paternal, Maternal and Double orphans. We have used the nutritional indicators for stunting, malnutrition and wasting, and mean years of schooling as the indicator for education. In the first part of our analysis, we compare these outcomes across orphans and non-orphans in the entire sample after controlling for demographic characteristics and other relevant individual-level variables. Our paper's novelty lies in extending this comparative analysis to Maternal, Paternal and Double orphans where outcomes are relative to the base category of non-orphans. In the second half of the paper, we explore our hypothesis that orphans are worse off than non-orphans even within the same households.

This causal estimation is done by restricting our sample to households with at least one orphan and one non-orphan and accounting for household-level fixed effects. We repeat the same analysis for the three orphan categories.

To understand how demographic characteristics and poverty confound orphanhood in impacting children's outcomes, we have included extensive descriptive tables. To study their living arrangements and the role of familial structures, we document the relationship of orphans to the head of their household. The role of caregivers is understood through Hamilton's rule, and other channels that support our results are explained in the Discussion section.

2 Background

Out of the 140 million orphans in the world, 52 million belong to Africa. Humanitarian crises resulting from natural disasters, wars and diseases are the most pressing reason for children losing their parents (Gail et al., 437). The significance of the AIDS pandemic's rapid spread during the late 1990s and early 2000s, and the devastating repercussions it inflicted specifically within the Sub-Saharan region, cannot be overstated in this context. Home to 10% of the world's population but 70% of HIV infections, 13 million children younger than 15 years of age had lost one or both parents to AIDS by 2005. As of now, around 20% of the population in this region under the age of 18 is orphaned.

This highly skewed distribution of orphans in Africa is reflected in the vast majority of literature on orphanhood coming from the continent. As these studies on orphans focuses on the AIDS related orphan crises in Sub-Saharan regions, the findings are often tough to apply to other contexts. By looking at rates of orphanhood, their demographic characteristics, living arrangements and outcomes in India, where large scale orphanhood neither exists nor attributed to a single factor like AIDS, our findings can be more generalizable to other settings. Additionally, our analysis looks at Maternal, Paternal, and Double orphan categories, a dimension largely unexplored in large-scale surveys of mapping orphans and their outcomes in India. Another distinct aspect of our research is examining potential discrimination within households against orphans. Our research fills critical gaps in the existing literature by examining these aspects within the Indian context, shedding light on the complexities of orphanhood and its impact on health, education, and household dynamics in India.

2.1 Review of Literature

Our study builds upon previous work such as the one by Panpanich et al. in Malawi where health outcomes of orphans in the village, orphans in orphanages and non-orphans were

compared. Malnutrition, wasting, and stunting were identified by utilising set thresholds for Weight-for-Age, Weight-for-Height, and Height-for-Age, respectively. Findings revealed higher malnutrition prevalence in younger orphanage children, with increased stunting and lower Height-for-Age scores. Notably, no significant nutritional disparity was found between village orphans and non-orphans underscoring how extended families can provide appropriate care for orphaned children.

Educational outcomes are studied in the paper by Case et al. on the impact of orphanhood on child schooling enrollment rates in 10 Sub-Saharan African countries. The results showed that although poorer children in Africa are less likely to attend school, the lower enrollment of orphans is not accounted for solely by their poverty. It is, in fact, the conditions of the household in which they live which determine their poor enrollment rates when compared to non-orphaned children of the same age. Theoretically, this is supported by the Hamilton's rule (Case et al., 484) which states that closeness of biological ties governs altruistic behaviour, and thereby, outcomes for orphans depend on the relatedness of orphans to their household heads.

Another study by Chuong and Operario in South Africa looked at educational delay— operationalized as being behind proper grade level in school and found that orphaned children have a 35% greater chance of being behind at school. The interesting insight is that this educational delay correlated directly with one's connection to the head of the household. 30% of those without a direct linear relationship (son or daughter) to the head were below the expected grade level, while only 19% of children with a direct linear relationship faced the same issue.

2.2 Data and Descriptive Statistics

Our study uses the data source of the fifth round of the National Family Health Survey, India, 2019–21 (NFHS-5) as provided by the Demographic and Health Surveys Program. This survey was conducted by the International Institute for Population Sciences, Mumbai. Our research focuses on data for children below 18 years (0–17) of age. Since the data is from a household survey, institutionalized orphans or children not living in households cannot be included in the analysis.

To construct the *Orphan*, *Maternal orphan* and *Paternal orphan* variables for children aged 0-17 years, the following questions from the NFHS-5 questionnaire were used for the analysis:

- Is (Name)'s natural mother alive?
- Is (Name)'s natural father alive?

Orphan type	Count (N)
Double Orphan	3810
Maternal Orphan	12184
Paternal Orphan	28444
Non-Orphan	875137
Total	919575

Source: Authors' Calculations from NFHS-5 Data.

Table 1: Children (aged 0-17) by Orphanhood

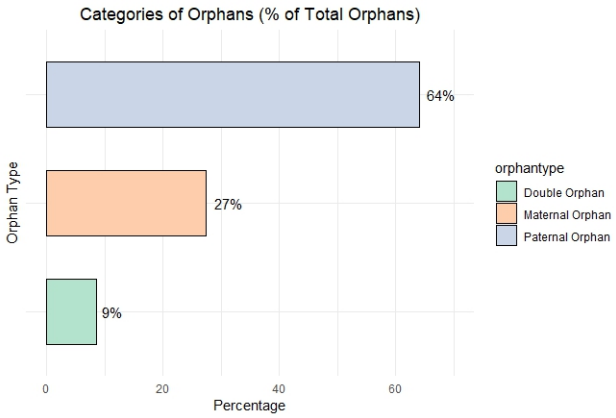

Figure 1: Distribution of Orphan Types

We use data available from NFHS-5 to generate various summarized statistics. Table 1 shows the total number of children (aged 0-17) that we have considered for our study, sub-categorised across Double orphans, Maternal orphans, Paternal orphans and Non-orphans. Out of the total sample size (N) of 919575, the majority are non-orphans (=875137) representing 95.16% of the total sample size. Within the orphan population, the majority are paternal orphans (=28444), followed by maternal orphans (=12184) and double orphans (=3810). Their percent distribution is illustrated in Figure 1 with Paternal, Maternal and Double orphans forming 64% , 27% and only 9% of the orphan category respectively. The large discrepancy between paternal and maternal orphans is consistently seen in all other countries and can be explained by the higher age-specific mortality among men and the tendency for women to typically marry older men as also discussed in the World Bank report *Poverty, AIDS, and Children's Schooling* by Ainsworth et al.

2.2.1 Demographic Characteristics

To understand the background characteristics of orphaned children versus non-orphaned children, they were stratified into different groups based on wealth index, caste group, the place where they reside, sex, and the highest level of education attained (see Table 2).

It is important to note that there is a higher proportion of orphaned children among low income households, with 35.34% of all orphans belonging to the poorest households and 25.15% of all orphans belonging to the poorer household income class. For non-orphans, their distribution was more evenly spread out among the different economic stratas. Another interesting point to be explored is that there were more orphaned children belonging to the non-creamy layer (OBC, SC, ST) than from the General caste. Only around 14.59% of all orphaned children belonged to the general caste while the remaining belonged to the lower caste and tribal groups. This was also observed for non-orphaned children, however, the proportion of non-orphaned children belonging to the general castes was significantly higher, standing at 18.14% as compared to 14.59% for orphaned children.

Table 2: Percent distribution of Orphans and Non-Orphans by Background Characteristics

	Orphans (% of total)	**Non-Orphans** (% of total)
Wealth Index		
Poorest	35.34	26.91
Poorer	25.15	23.51
Middle	18.28	19.52
Richer	13.5	16.51
Richest	7.74	13.54
Caste		
General	14.59	18.14
Scheduled Caste	22.84	21.66
Scheduled Tribe	27.26	20.66
OBC	35.32	39.55
Place of Residence		
Rural	82.36	80.53
Urban	17.64	19.47
Sex		
Male	51.34	51.56
Female	48.66	48.44
Highest Level of Education attained		
No Education	14.97	31.15
Primary	38.74	40.36
Secondary	46.18	28.44
Higher	0.11	0.05

With regards to the highest level of education attained, we note that more orphans have attained a higher level of education than non-orphaned children. It was observed that there was a higher proportion of orphaned children who had attained education up till the secondary level (46.18%) when compared to their non-orphaned counterparts (28.44%). While they might appear surprising, they can be corroborated by evidence finding positive correlation of age of child with both probability of being orphaned (increased risk of parental death with their age) and years of schooling in all the country-years studied by Case et al. Thus, the table indicates that on an average, orphans are older and thus have completed higher levels of education.

2.2.2 Living Arrangements

Table 3: Percent distribution of Indian Orphans (aged 0–17) and their Living Arrangement

Type of Orphan	**Living with (%)**					
	Either Parent		**Grandparent(s)**	**Other Relatives**	**Adopted/Foster Home**	**Other Households**
	Father	Mother				
Maternal Orphan	60.33	-	27.23	10.51	1.63	0.30
Paternal Orphan	-	65.13	24.12	9.79	0.62	0.34
Double Orphan	-	-	46.90	41.98	8.01	3.12

N = 43963

Since our paper delves deep into how familial structures interact with orphan status in determining outcomes for children, we have involved living arrangements to be one of the main descriptive points of our study. To understand with whom the orphans were living after the death of one or both of their parents, we considered the orphan's relationship with the head of the household. Orphan's relationships with the head of the household have been assigned the following 5 divisions — either parent (includes the subdivisions of father and mother, whosoever is alive), grandparents (includes grandmother or grandfather, whosoever is alive), other relatives (includes uncle, aunt, brother, sister, cousin, other extended family members, et al.), adopted/foster home, other households (where there was no blood relation).

The blood relation aspect has been found to be important as the section on the Hamilton's rule discusses later on. In particular, the large percentage of Double orphans living with grandparents can have significant implications as previous literature has shown that children living with their pension-receiving grandparents benefit from the social and economic support given by them as well as the caregiving itself (Ardington & Leibbrandt and Mthembu et al.)

2.2.3 Nutritional Outcomes

Table 4 depicts summarised statistics for our dependent variables (ZHFA, ZWFA, ZWFH) for non-orphans and for each orphan type and shows their means, standard deviations, minimum and maximum values and the number of observations in each. Since these variables

are recorded in the children's Recode in NFHS, we have limited nutritional outcomes only for children aged 0-5 years.

Table 4: Nutritional Outcomes Summary Statistics by Orphan Type Groups

	Mean	SD	Min	Max	N
Double Orphan					
Height-for-Age Z Score	-1.29	1.97	-5.82	5.88	952
Weight-for-Age Z Score	-1.39	1.37	-5.80	4.58	974
Weight-for-Height Z Score	-0.75	1.52	-4.97	4.76	927
Maternal Orphan					
Height-for-Age Z Score	-1.41	1.83	-5.96	5.93	2653
Weight-for-Age Z Score	-1.49	1.35	-5.90	4.58	2722
Weight-for-Height Z Score	-0.84	1.50	-4.98	4.75	2597
Paternal Orphan					
Height-for-Age Z Score	-1.45	1.84	-5.99	6.00	5950
Weight-for-Age Z Score	-1.49	1.35	-5.93	4.85	6084
Weight-for-Height Z Score	-0.84	1.50	-4.98	4.89	5832
Non-Orphan					
Height-for-Age Z Score	-1.36	1.83	-6.00	6.00	358300
Weight-for-Age Z Score	-1.43	1.34	-6.00	5.00	365503
Weight-for-Height Z Score	-0.80	1.52	-5.00	5.00	350587

Note: Nutritional outcomes analysis is restricted to sample of 0-5 year old children.
Source: Authors' Calculations from NFHS-5 [2019-21] Data.

3 Methodology

We test our hypothesis that orphans are significantly worse off than non-orphans across nutritional and educational indicators. Our analysis has two sections. The first part looks the the entire sample of households (Tables 5-6) to test for overall differences. To test for discrimination within the same households, we study a restricted sample of "blended" households where both non-orphans and orphans cohabit in Tables 7-8. Further, to account for differences across categories of orphans, we also compare Maternal orphans, Paternal orphans and Double orphans with Non-orphans. Our outcomes of interest are indicators for stunting(Z score of Height-for-Age), malnutrition(Z score for Weight-for-Age), wasting(Z score for Weight-for-Height) and years of education.

Our main causal framework of orphanhood affecting nutritional and educational outcomes works through an intra-household level analysis of the outcome variables across orphans, non-orphans and different categories of orphans. It could be argued that households with orphans are inherently different than households with only non-orphans. This difference could be present both before and after the shock. Children in households afflicted with high

poverty or illnesses could be more likely to experience the death of a parent, or conversely the orphanhood shock might make these households worse off. This would mean that orphans might simply fare worse than non-orphans due to being characteristically different. We account for this by restricting our sample to households that have at least 1 orphan and 1 non-orphan. The rationale behind this is that post this sample restriction, we are only looking at orphans and non-orphans for whom all within-household characteristics are the same. By including a household-fixed effect in our estimation equation, we are controlling away the variations across the different households in this restricted sample. These controls ensure that we are able to make a causal inference regarding the impact of orphanhood on a child's nutritional and educational indicators.

Estimating Equations

Our initial comparative analysis of orphans and various orphan categories with non-orphans for our entire sample is achieved through the empirical specification in the following two equations:

$$Y_{ij} = \beta_0 + \beta_1 * Orphan_i + \beta_2 * X_{ij}^{'} + \varepsilon_{ij} \tag{1}$$

$$\begin{aligned} Y_{ij} = \beta_0 + \beta_1 * MaternalOrphan_i + \beta_2 * PaternalOrphan_i + \\ \beta_3 * PaternalOrphan_i * MaternalOrphan_i + \beta_4 * X_{ij}^{'} + \varepsilon_{ij} \end{aligned} \tag{2}$$

Here our outcome variable Y_{ij} is nutritional indicators of Height-for-Age, Weight-for-Age and Weight-for-Height Z scores (for 0-5 year children) and years of education for children aged 0-17. In Equation (1), our main explanatory variable *Orphan* is a dummy which will give us the impact of being an orphan relative to non-orphan on our outcome indicators. In Equation (2), our explanatory variables are *Paternal orphan*, *Maternal orphan* and its interaction term in order to give us the affects on outcome indicators for each category of orphans (Maternal, Paternal and Double orphans) relative to non-orphans. In both equations we control for $X_{ij}^{'}$ individual and household-level factors like wealth index, caste, number of household members, age and sex of the child, and relationship to household head.

As discussed above in Methodology, our causal framework works through a restriction of sample to "blended" households, where atleast 1 orphan and 1 non-orphan cohabit, and by controlling for household-fixed effects. This specification is described below:

$$Y_{ij} = \beta_0 + \beta_1 * Orphan_i + \beta_2 * X_j^{'} + \beta_3 * Z_i^{'} + \varepsilon_{ij} \tag{3}$$

$$Y_{ij} = \beta_0 + \beta_1 * MaternalOrphan_i + \beta_2 * PaternalOrphan_i + \beta_3 * PaternalOrphan_i * MaternalOrphan_i + \beta_4 * X_j^{'} + \beta_5 * Z_i^{'} + \varepsilon_{ij} \quad (4)$$

Here our outcome variable Y_{ij} is again nutritional indicators of Height-for-Age, Weight-for-Age and Weight-for-Height Z scores (for 0-5 year children) and years of education for children aged 0-17. In Equation (3), our main explanatory variable *Orphan* is a dummy which will give us the impact on outcome indicators of being an orphan relative to non-orphan in households that have both types of children. In Equation (4), our explanatory variables are *Paternal orphan*, *Maternal orphan* and its interaction term in order to give us the affects on outcome indicators for each category of orphans (Maternal, Paternal and Double orphans) relative to non-orphans with a similar intra-household interpretation. In both equations we control for $X_j^{'}$ household-level fixed effects, thereby controlling for all household characteristics, and adding some individual-level controls $Z_i^{'}$ like age of the child, sex of the child, and their relationship to the household head.

4 Empirical Results

In Table 5 and 6, we have ran two specifications for each of the four outcomes of interest, one with the control for Wealth Index and one without. Other household characteristics like number of members and belonging to Backward Caste (SC, ST and OBC) are kept in all specifications. Child level characteristics are mapped by variables like the sex of the child (taking the value 1 for male) and relationship to head of household indicated by the dummy *distantrel* (takes the value 1 if child resides with a relative other than a parent or a grandparent). In column 8 in each table, we have kept age of child and its square in the regression to capture the differential effect of age on years of education. As previously discussed under Table 2, age is positively correlated with both orphanhood and schooling and not including it in the regression will bias upwards the coefficients.

In Table 5, columns (1), (3) and (5) indicate that being an Orphan reduces the standardized Height-for-Age, Weight-for-Age and Weight-for-Height scores by 0.05, 0.04 and 0.03 respectively. These effects are significant at the 5%, 1% and 10% levels respectively. However, when we account for Wealth Index in columns (2), (4), and (6), the impact of orphanhood becomes negligible in magnitude and insignificant. For education, the Orphan status reduces year of schooling by 0.30 and 0.25 years in columns (7) and (8) respectively, both highly significant at the 1% level.

In Table 6, we extend our framework to the three categories of orphans to understand to see if their outcomes are different from each other or non-orphans. The results here are more

Table 5: Regression results from Equation (1)

	(1) zhfa	(2) zhfa	(3) zwfa	(4) zwfa	(5) zwfh	(6) zwfh	(7) yearsofeduc	(8) yearsofeduc
orphan	-0.05**	0.00	-0.04***	0.00	-0.03*	-0.01	-0.30***	-0.25***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)
sex	0.03***	0.04***	0.02***	0.03***	0.01**	0.02***	0.07***	0.08***
	(0.01)	(0.01)	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)	(0.00)
distantrel	0.07***	0.01	0.10***	0.04***	0.07***	0.04**	0.02*	-0.03**
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)
No of Members	-0.01***	-0.02***	-0.01***	-0.01***	-0.00	-0.00***	-0.04***	-0.05***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
bcaste	-0.33***	-0.15***	-0.31***	-0.15***	-0.17***	-0.10***	-0.16***	-0.01***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)
wealth index		0.20***		0.18***		0.08***		0.17***
		(0.00)		(0.00)		(0.00)		(0.00)
age							-0.01***	-0.01***
							(0.00)	(0.00)
agesquare							0.04***	0.04***
							(0.00)	(0.00)
Observations	338925	338925	345602	345602	331766	331766	848014	848014

Standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01

Table 6: Regression results from Equation (2)

	(1) zhfa	(2) zhfa	(3) zwfa	(4) zwfa	(5) zwfh	(6) zwfh	(7) yearsofeduc	(8) yearsofeduc
Maternal	-0.06	-0.01	-0.05*	-0.01	-0.04	-0.01	-0.42***	-0.35***
	(0.04)	(0.04)	(0.03)	(0.03)	(0.03)	(0.03)	(0.01)	(0.01)
Paternal	-0.06**	-0.01	-0.05***	-0.00	-0.04	-0.01	-0.25***	-0.20***
	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)
Maternal*Paternal	0.26***	0.18*	0.24***	0.17**	0.14	0.10	0.33***	0.25***
	(0.10)	(0.10)	(0.07)	(0.07)	(0.08)	(0.08)	(0.04)	(0.04)
distantrel	0.07***	0.01	0.10***	0.04**	0.06***	0.04**	0.03**	-0.03**
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)
sex	0.03***	0.04***	0.02***	0.03***	0.01**	0.02***	0.07***	0.08***
	(0.01)	(0.01)	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)	(0.00)
No of members	-0.01***	-0.02***	-0.01***	-0.01***	-0.00	-0.00***	-0.04***	-0.05***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
bcaste	-0.33***	-0.15***	-0.31***	-0.15***	-0.17***	-0.10***	-0.16***	-0.01***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)
wealth index		0.20***		0.18***		0.08***		0.17***
		(0.00)		(0.00)		(0.00)		(0.00)
age							-0.01***	-0.01***
							(0.00)	(0.00)
agesquare							0.04***	0.04***
							(0.00)	(0.00)
Observations	338925	338925	345602	345602	331766	331766	848014	848014

Standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01

complex, with the effect on Weight-for Height losing significance in its entirety. Maternal orphans are faring worse than non-orphans in all nutritional indicators (columns (1)-(6)). However, the correlation is significant at the 10% level only in column (3) for weight-for age where wealth index is not included in the model. On the other hand, in columns (1), (2) and (3), we observe that being a Paternal orphan reduces the standardized scores for HFA, WFA and WFH by 0.06, 0.05 and 0.04 respectively, the relationship being significant only for the first two at 5% and 1% respectively. These effects become insignificant when wealth index is controlled for.

For Double orphans, the positive correlation is consistent across columns (1)-(6). In columns (1) and (3), we see that being a Double orphan increases the standardized scores for HFA and WFA by 0.26 and 0.24 respectively, each of which is significant at the 1% level. What is perhaps more interesting is that although these coefficients drop to 0.18 and 0.17 in columns (2) and (4), they continue to remain significant at 5%.

For education in column (7), being a Maternal orphan reduces years of schooling by 0.42 years and being a Paternal orphan reduces the same by 0.25 years, both significant at 1%. The coefficients drop but remain highly significant when wealth is included in column (8). Again, the interaction term is positively correlated with education. However, given the specification of our estimating equation, the differential impact on double orphans is the sum of the Double, Maternal and Paternal coefficients, with the result implying that Double orphans are better off than only Maternal and only Paternal orphans but not non-orphans. The controls have similar coefficients as in Table 5.

In Table 7 and 8, we have regressed each of the four outcomes of interest on their orphanhood and type of orphan status respectively while controlling for household-fixed effects. We thereby do not need to control for other household characteristics like number of members, belonging to Backward Caste (SC, ST and OBC) and Wealth Index since these variations across households get washed away after controlling for the household-fixed effect. All other child-level (individual) controls like sex of the child, relationship to household head (*distantrel*) and age of child and its square (for education) remain the same as specified for Tables 5 and 6.

In Table 7, columns(1), (2) and (3) indicate that being an orphan reduces the standardized Height-for-Age, Weight-for-Age and Weight-for-Height scores by 0.02, 0.01 and 0.004 respectively; however these effects are significant only for Zhfa at 10%. Although insignificant, the negative coefficient of 0.01 in column (4) indicates that being an orphan reduces a child's years of education by 0.01 years on average.

Table 7: Regression results from Equation (3)

	(1) zhfa	(2) zwfa	(3) zwfh	(4) yearsofeduc
orphan	-0.0157	-0.0130*	-0.0042	-0.0079
	(0.01)	(0.01)	(0.01)	(0.02)
sex of household member	0.0152	0.0079	-0.0027	0.0672***
	(0.01)	(0.01)	(0.01)	(0.02)
distantrel	0.0121	0.0154	0.0135	-0.3089***
	(0.02)	(0.01)	(0.01)	(0.04)
age of household members				-0.0124
				(0.01)
ageofchildsq				0.0327***
				(0.00)
Observations	16867	17325	16496	29837

Standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01

Table 8: Regression Results from Equation (4)

	(1) zhfa	(2) zwfa	(3) zwfh	(4) yearsofeduc
Maternal	-0.0091	-0.0067	-0.0030	-0.0340
	(0.02)	(0.01)	(0.01)	(0.03)
Paternal	-0.0281**	-0.0211**	-0.0039	0.0398
	(0.01)	(0.01)	(0.01)	(0.03)
Maternal × Paternal	0.0593*	0.0314	-0.0042	-0.1267*
	(0.04)	(0.02)	(0.03)	(0.07)
distantrel	0.0085	0.0142	0.0145	-0.2964***
	(0.02)	(0.01)	(0.01)	(0.04)
sex of household member	0.0151	0.0080	-0.0026	0.0675***
	(0.01)	(0.01)	(0.01)	(0.02)
age of household members				-0.0118
				(0.01)
ageofchildsq				0.0326***
				(0.00)
Observations	16867	17325	16496	29837

Standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01

Similar to Table 6, in Table 8 we compare outcomes across the three categories of orphans with respect to non-orphans but with our restricted sample and including household-fixed effects. There is no statistically significant difference in any nutritional outcome for maternal orphans. For Paternal orphans, the Height-for-age and Weight-for-Age scores are on average 0.03 and 0.02 units worse off than that of Non-Orphans, both statistically significant at the 5% level. There is no statistically significant difference for any other nutritional indicator for Paternal orphans. Interestingly, Double orphans show a 10% statistically significant better faring on Height-for-Age scores than not only Maternal and Paternal orphans but also Double orphans. With regards to the measure of years of education in column (4), we see that Maternal and Paternal orphans are worse than non-Orphans, the effects being insignificant. On the other hand, double orphans have a 0.13 lesser years of education on an average than non-orphans, the effect being significant at 10%.

5 Discussion

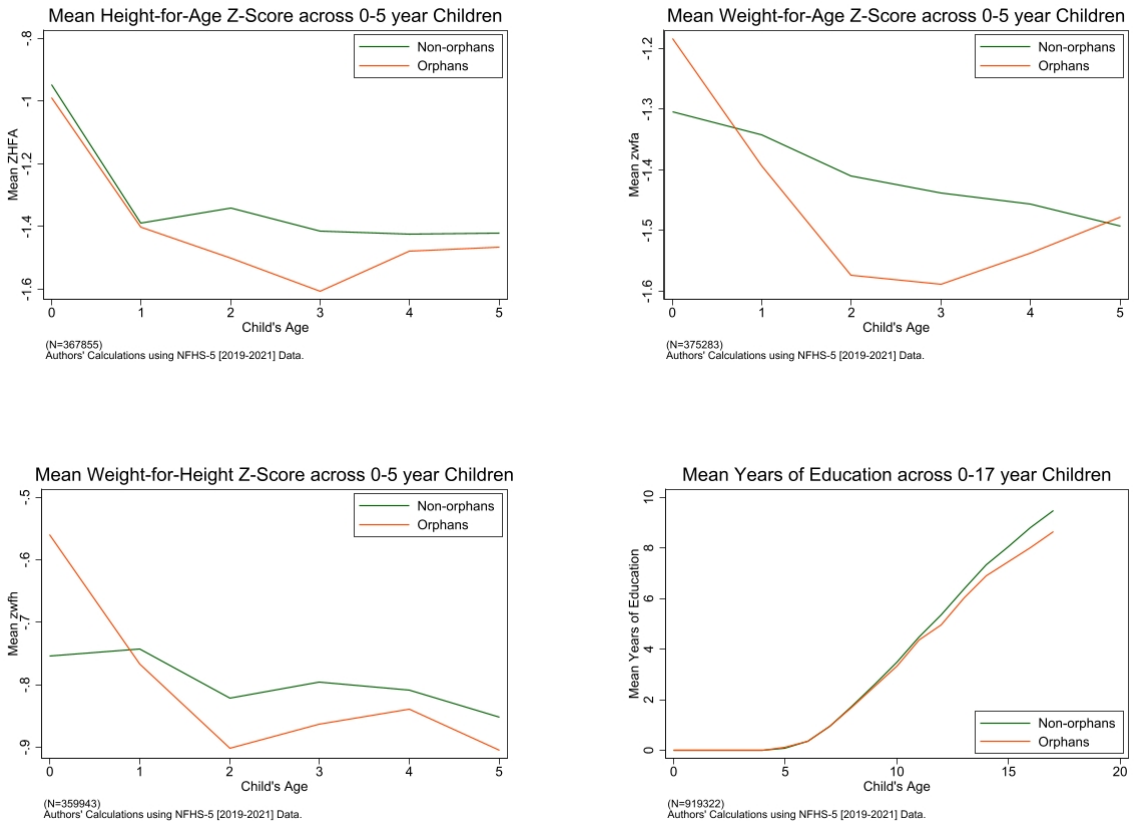

Figure 3: Mapping our Outcome variables of interest (*Height-for-Age, Weight-for-Age, Weight-for-Height and Years of Education*) by Age of Children for entire sample

Figure 3 depicts the determinants of nutritional status and educational attainment among orphaned and non-orphaned children across age. As 35.5% of Indian children in NFHS-5 suffer from malnourishment (stunting, underweight, wasting), we have obtained negative standardised Z-score values for both non-orphans and orphans (Radhakrishna and Ravi,

671). The top left table depicts instances of stunting among children aged 0-5 by looking at their mean Height-for-Age Z scores (ZHFA). As the figure depicts, from the ages of 0-1, both orphans and non-orphans depict similar negative ZHFA scores. From the ages of 0-1, non-orphans and orphans follow the same trend, with stark divergence between 1-3 years of age as orphans have consistently lower scores. However from the ages 3 till 5,the gap reduces indicating that they might be catching up to non-orphans. The top-right table depicts instances of children aged 0-5 being underweight by looking at their mean weight-for-age Z scores (ZWFA). The orphans start falling behind non-orphans at age 1 and the gap between them widens till the age of 5. The bottom left table depicts instances of wasting among children aged 0-5 by looking at their mean weight-for-height Z scores (ZWFH). Again, the orphan disadvantage starts at age 1 with the gap between them remaining the same till age 5. In the bottom-right table, we observe mean years of education among orphaned and non-orphaned children aged 0-17 across age. Till the age of 10, both groups of children receive the same educational attainment. However, from the ages of 10 till 17, the curve for non-orphans deviates upward, indicating that orphanhood might hinder educational attainment at a later stage when cost of education increases.

Interpretation of Results

In Tables 5 and 6, when Wealth Index is accounted for, we observe that the negative effect of orphanhood status on nutritional indicators becomes insignificant. This indicates that the main channel through which loss of either parent or both affects children's outcomes is the negative income or wealth shock. These could be due to the loss of running income from the late parent or placing of the child in households poorer than their original homes (Case Et Al., 484).

The negative coefficients for number of household members is also theoretically supported by Chuong and Operario who discuss how increasing number of household members increases a child's likelihood of education delay. Similarly, the negative relationship between being lower caste and nutritional and educational outcomes of children in general are also well documented (Dommaraju et al., 477).

In Table 6, Mother coefficient is insignificant and the statistically significant negative coefficients for paternal orphan lose their significance with Wealth controls showing that there is a negative income shock which results from the loss of the income earning father. Gertler et al. have documented the impact on parental death and school enrollment rates in Indonesia, and their findings largely corroborate ours. The high magnitudes of the interaction term vis-a-vis the individual coefficients for Maternal and Paternal orphans imply that Double orphans are not only better off than maternal and paternal orphans, they are also better off than non-orphans. While these results might be unexpected, we believe that this can be

explained by familial and community ties. As discussed in the Living arrangements section, since many of these double orphans are cared for by their grandparents, they often receive better support overall as discussed by Karimli et al.

Tables 7 and 8 delve into our intra-household causal estimation in our restricted sample and control for household fixed effects. The results show that orphans are worse off than non-orphans in terms of both nutritional and educational indicators. This is also observed across the different orphan categories in Table 8. This finding provides evidence against the argument that the educational disadvantage of orphans is solely due to lower levels of household resources, since here we are only considering "blended" households and controlling for all household-fixed effects. As described by Hamilton's rule, adult caretakers are more likely to shy away from investing in children who are more distantly related. This can be a result of both greater affinity to their own children and also because they are more likely to reap the benefits from their children later in life, in terms of transfers and support in old-age (Case et al., 484). The significant results for Paternal Orphans and not for Maternal Orphans further nuances the picture, indicating that that the loss of an income earning parent lowers the position of the orphaned child in the family even further, resulting in fewer resources being invested in him.

6 Limitations and Scope for Further Research

Since our data does not contain information about either the timing of the parental death or the circumstances of the same, it is tough to set up a longitudinal framework to establish causality. Looking at cross-sectional data limits our analysis to observable current outcomes for children, undermining the long term effects that orphanhood could potentially have for children across time. Mapping the impact of orphanhood on outcomes later in adulthood is worth studying to fully capture its consequences on life outcomes. For example, Beegle et al. in a longitudinal analysis of orphanhood on education and health in Tanzania tracked 718 non-orphaned children from 1991 to 2004, and found that 19% of them experienced parental loss before age 15. They found that maternal orphanhood was linked to a permanent setback of 2cm in final height and a year of educational attainment. Expressing welfare in terms of consumption expenditure, this translated to an 8.5% deficit compared to peers whose mothers had survived.

Further, the effects of orphanhood go beyond basic indicators of health like weight and height. Dietary diversity, a good indicator of micronutrient adequacy was studied by Ali et al. in their 2018 study in the Brong Ahafo region of Ghana where under 5 orphaned children in orphanages and non-orphan children in households were compared and statistically significant differences in mean and minimum dietary diversity scores were observed, such that orphans had both a higher mean and minimum dietary diversity score. Although

the results are counterintuitive, they can be mainly attributed to well-balanced daily menus that the orphanages in the study followed and thus lack external validity. Since surveys like NFHS now gather data on Food baskets and are increasingly stressing on more comprehensive health indicators, there is a need to extend our comparative analysis to higher order indicators of physical and mental well-being. Similarly, for education, the indicators like enrollment rates, probability of dropping out or being behind the adequate grade levels are more nuanced ways of capturing outcomes.

Additionally, it is well studied how absence of parental figures in teenage years particularly exposes children to risks like substance abuse, early sex or sexual exploitation and delinquency. Thurman et al. in their paper on sexual risk among South African adolescents found that orphaned youth were significantly more likely to be exposed to sexual activity as compared to non-orphans (49% v/s 39%). Moreover, they were also more likely to have engaged in sexual intercourse at an earlier age as compared to non-orphans. In India, data on sexual risk and exploitation of children on a scale like NFHS is lacking and unreliable given the stigma associated with reporting it. These hypothesis can be studied in the Indian context by undertaking surveys, a direction we hope our paper points further researchers to.

7 Conclusion and Policy Implications

Our study extensively investigated the impact of orphanhood on educational and nutritional outcomes in India. Initially, our analysis across the entire sample of households (Tables 5-6) indicated that the negative effect of orphanhood on nutritional indicators becomes insignificant when accounting for the Wealth Index. This shift underscores that the primary conduit through which the loss of a parent impacts children's outcomes is predominantly the negative income or wealth shock resulting from the orphanhood event.

Moreover, our findings within "blended" households (Tables 7-8) revealed noteworthy disparities. Orphans, on average, exhibited inferior educational outcomes compared to non-orphans, while no statistically significant differences were observed in nutritional indicators. This discrepancy contradicts the presumption that the educational disadvantage of orphans solely stems from lower household resources, as we meticulously controlled for all household-fixed effects.

The distinctive nature of investments—where nutritional provisions are more uniformly distributed among all children, while educational investments are more substantial—could contribute to these disparities. Additionally, our surprising observation that Double orphans fare better than Maternal and Paternal orphans and non-orphans might be attributed to familial and community support networks, especially when Double orphans are cared for by

pension-receiving or relatively better off grandparents.

Overall, our study underscores the critical role of economic shocks following parental loss and emphasize the need for targeted interventions addressing the adverse effects of orphanhood on children's well-being. Recognizing the vulnerabilities of orphaned children is crucial for policy decisions: if extended families and social networks provide adequate support, then policies might not necessarily need to specifically target orphans. Instead, assistance could be directed based on indicators of socioeconomic poverty. However, if all else being equal, orphans are more disadvantaged, it might be wise for governments to create policies specifically tailored to support them.

The United States' Assistance for Orphans and Other Vulnerable Children in Developing Countries Act of 2005 is aimed at supporting orphans and other vulnerable individuals, particularly those affected by HIV/AIDS in Sub-Saharan Africa (Chigbu, 2019). Mexico's National System for Integral Family Development (DIF) also provides programs for adoption, foster care, and education support to orphans and those without adequate families. In India, the government, through its Ministry of Women and Child Development, implements schemes like the Integrated Child Protection Scheme (ICPS), aims to provide comprehensive care and protection for vulnerable children, including orphans. However most policies target instituitionalized children and thus single parent orphans (comprising 91% of the total orphans) are left without adequate support. Further, there is a lack of mechanisms aimed at aiding their transition to adulthood with negligible skillbuilding or employment support.

We hope that our paper broadens the scope of discourse around policies targeting orphans and takes into account the multifaceted effects of orphanhood. Tailoring policies to the nuanced needs of different types of orphans— Maternal, Paternal, and Double— is crucial for addressing their distinct challenges. For Maternal orphans, policies might prioritise emotional support and alternative caregiving arrangements, while Paternal orphan-focused initiatives could emphasise financial support and skill-building opportunities compensating for the absence of the breadwinner. Double orphans, if facing compounded challenges, would require comprehensive policies covering financial aid, education, healthcare, and long-term support.

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