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Abstract

This study examines whether parental health shocks are associated with child growth, measured by relative growth through changes in height-for-age difference. Relatively less studies have looked at how exposure to parental health shocks is associated with changes in child growth over time, particularly whether children experience growth faltering or recovery following such adverse events. Using Young Lives India data, we employ a child fixed-effects model for children aged 5, 8, and 12 years to examine how parental health shocks are associated with relative growth. Results suggest that parental health shocks are negatively associated with changes in Height-for-age difference. We explore gender heterogeneity by estimating the association of shocks separately for girls and boys. We further examine whether the effects of parental health shock on child growth differ across households with different food expenditure patterns, using the Household Food Group Expenditure Index (HFGEI).

Keywords: *Parental Health Shocks, Child growth, Height-for-age Difference, Household food expenditure*

JEL Codes: *I15, D10, J13*

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1. **INTRODUCTION**

Households in developing economies face substantial risks arising from climatic events, economic fluctuations, and individual-specific shocks (Dercon, 2002). These shocks are broadly classified as idiosyncratic and covariate shocks. Idiosyncratic shocks are household-specific adversities that affect individual households, such as illness or death of a household member. On the other hand, covariate shocks refer to events that affect several households within a community or a wider population, such as natural disasters (Jalan & Ravallion, 1999). Children are particularly vulnerable to such adversities because they depend on household resources for their nutrition. Even temporary disruptions in household resources during childhood can have long-term consequences for growth, cognitive development, educational attainment, and productivity (Rosales-Rueda, 2018; Hoddinott et al., 2011; Victora et al., 2008). Using longitudinal data from the Young Lives survey in India, this paper examines the association between parental health shocks on changes in child growth measured by relative growth through changes in height-for-age difference (HAD).

Health shocks reduce household income, disrupt the allocation of labour within the family and at the same time increase medical expenditure. These disruptions may affect children by reducing the household resources available for them. At the same time, parental illness increases children's participation in income-generating activities and domestic work, with paternal illness primarily increasing paid work and maternal illness increasing household responsibilities (Dinku et al., 2018; Wongmonta, 2024). These adjustments often occur at the expense of children's education. Evidence from several developing countries has shown that parental health shocks are associated with reductions in school enrolment, educational attainment, and grade progression (Bratti & Mendola, 2014; Case & Ardington, 2006; Chen et al., 2009; Evans & Miguel, 2007; Gimenez et al., 2013; Himaz, 2013; Mendolia et al., 2019).

Using longitudinal data from the Young Lives survey in India, this paper examines the association between parental health shocks and changes in child height relative to WHO reference trajectory. Change in growth is measured as the change in height-for-age difference (HAD) between survey rounds. HAD measures the deviation of a child's observed height from the WHO reference median height for a child of the same age and sex. Positive changes in HAD indicate growth recovery, whereas negative changes indicate growth faltering. We further explore gender heterogeneity by estimating the effects of shocks separately for girls and boys. Findings suggest that parental health shocks are significantly associated with growth faltering. The effects also differ by gender: Parental health shocks are significantly associated

with growth faltering in girls while it is not significantly associated with growth faltering in boys. An important contribution of this study is to examine whether the association between parental health shocks and child growth varies across households with different food expenditure patterns. Using the Household Food Group Expenditure Index (HFGEI), we investigate whether household food expenditure patterns moderate the relationship between parental health shocks and child growth.

2. **LITERATURE REVIEW**

Health shocks can affect household welfare by reducing earned income while increasing medical expenditure, thereby constraining the resources available for other forms of consumption. Evidence from Vietnam shows that adverse health shocks, measured by negative changes in body mass index (BMI), are associated with lower earned income and higher medical spending among uninsured households. The study further finds that both food and non-food consumption respond to adverse health shocks, suggesting that households are unable to fully smooth consumption in response to the economic consequences of illness (Wagstaff, 2007). Health shocks can reduce employment, working hours, and individual earnings, thereby lowering household income (Riphahn, 1999; Cai et al., 2014). These changes in labour supply may necessitate adjustments in the allocation of labour and time among other household members. A qualitative study by Sauerborn et al. (1996) from rural Burkina Faso, identifies intra-household labour substitution as the main strategy for compensating for labour lost to illness. Evidence from developing countries indicates that these adjustments differ according to which parent experiences the health shock. Using Young Lives data from Ethiopia, Dinku et al. (2018) show that parental illness significantly alters children's time allocation. Paternal illness is associated primarily with an increase in children's participation in income-generating activities, whereas maternal illness increases children's involvement in domestic work. These effects also differ by gender, with maternal illness having stronger implications for girls' domestic responsibilities and paternal illness being more strongly associated with boys' involvement in economic activities. Similarly, evidence from Thailand suggests that parental health shocks can increase children's labour-market participation while reducing their educational investment. Wongmonta (2024) finds that parental illness reduces school enrolment and years of schooling, while chronic parental illness increases labour-force participation among older children. The effects are particularly pronounced following maternal illness, which is associated with increases in children's working hours.

The reallocation of children's time following parental health shocks may occur at the expense of schooling. Evidence from Bosnia and Herzegovina shows that poor maternal health reduces children's probability of remaining enrolled in education, with Bratti and Mendola (2014) estimating a decline in enrolment among older children. They also find evidence that maternal illness increases children's employment. Consistent with this, Mendolia et al. (2019), using panel data from Vietnam, find that parental illness reduces school enrolment while increasing children's labour-force participation and working hours. The effects are particularly strong for maternal illness and among girls, indicating that the loss of maternal health may simultaneously reduce educational participation and increase children's engagement in work.

In Indian context, the literature on parental health shocks has primarily focused on children's educational outcomes and time allocation, while evidence on child growth and nutritional outcomes remains limited. Using Young Lives data from India, Dhanaraj (2016) finds that parental health shocks delays school enrolment and reduces grade attainment, while maternal illness increases children's involvement in unpaid household work and paternal illness increases participation in family enterprises and paid employment. A more recent study by Vikram et al. (2024) analyses Young Lives India panel data finds that father's death increases time spent in paid work and caregiving for girls. Maternal illness reduces unpaid work for girls and increases participation in paid work for boys. Similarly, droughts increase care work for both boys and girls, whereas floods increase care work and reduce leisure time for boys but substantially increase girls' involvement in household chores.

Compared with the vast literature on education and time use, relatively little research has examined how parental illness affects children's nutritional outcomes. Recent evidence from Bangladesh finds that parental illness reduces child height (Hossain and Nazneen, 2024). Evidence of association of parental health shocks on child health outcomes remains limited in the Indian context. Regarding literature on adverse effects of shocks on child health, most of them have used outcomes such as height-for-age z-scores (HAZ) or stunting measured at a particular point in time. Relatively less studies have looked at how exposure to adverse hocks is associated with changes in child growth over time, particularly whether children experience growth faltering or recovery following such events. Georgiadis et al. (2017) examine the determinants of child growth recovery and faltering using longitudinal data from the Young Lives study across Ethiopia, India, Peru and Vietnam. Their analysis considers natural disaster, livelihood and family-related shocks alongside household and community characteristics. For India, their period-specific OLS estimates show that natural disaster shocks are negatively associated with changes in relative height between ages 1 and 5, while family shocks are

negatively associated with relative height at age 1. In their longitudinal analysis using pooled OLS and first differences, the association between family shocks and child growth is positive and statistically significant in the first-differences specification. They use a broad family shock measure that includes illness or death of parents or other household members, divorce or separation, and changes in household composition. They examine child growth using period-specific OLS regressions and, in their longitudinal analysis, pooled OLS and first-difference estimators. In contrast, the present study employs a child fixed-effects model using observations from Rounds 2–4 of the Young Lives Younger Cohort in India, covering approximately ages 5, 8 and 12 years. This approach exploits within-child variation over time to examine the association between shocks and changes in height-for-age difference.

Building on the existing literature, this study draws on longitudinal data from the Younger Cohort of Young Lives India, using Rounds 2, 3, and 4, when the children were approximately 5, 8, and 12 years old, respectively. A child fixed-effects model is employed to investigate the relationship between parental health shocks and children's relative growth. Growth is assessed using changes in height-for-age difference (HAD) across survey rounds. An increase in HAD indicates an improvement in a child's height relative to the World Health Organization (WHO) reference median, whereas a decline reflects a deterioration in relative height. The novelty of the current study lies in addressing the role of nutritional adequacy by investigating whether the effects of these shocks on child growth differ across households with different food expenditure patterns, using the Household Food Group Expenditure Index (HFGEI). Limited evidence is available on whether differences in food expenditure patterns mitigate the adverse consequences of such shocks for child growth. This study investigates the extent to which the association between shocks and children's growth differs across levels of the HFGEI. The extent to which differences in household food expenditure composition can protect children from the adverse growth consequences of such shocks has received limited attention in previous research. The study addresses this gap by examining the potential buffering role of household food expenditure diversity.

3. **DATA AND METHODOLOGY**

3.1 Data Source

This study draws on data from the Younger Cohort of Young Lives India, a longitudinal study conducted in Andhra Pradesh and Telangana, India. The survey employs a sentinel-site sampling design, with 20 sentinel sites selected at the mandal (sub-district) level. We use data

from three rounds of the Younger Cohort: Round 2 (2006), Round 3 (2009), and Round 4 (2013), when the children were approximately 5, 8, and 12 years old, respectively. Round 1 is excluded because information on parental health shocks is unavailable for that round. The outcome variable is the change in height-for-age difference (HAD), which requires observations from at least two consecutive survey rounds to calculate changes in children's relative height. Observations with missing values or outlying height-for-age z-scores (HAZ) are excluded from the analysis. Children who were temporarily residing outside the household were also excluded because the HFGEI was constructed from household food expenditures adjusted for household adult-equivalent size. Since household food expenditure was collected only for household members, adult-equivalent expenditure could not be calculated for children who were not residing in the household at the time of the survey. The final sample comprises 1,786 children, yielding 5,358 child-round observations across the three survey rounds.

3.2 Outcome variable

Rather than using changes in standardized height-for-age, we construct a measure based directly on the child's height deviation from the WHO reference median following the approach of Georgiadis et al. (2017). For each survey round, we calculate the difference between a child's observed height and the median height of a child of the same age and sex in the WHO reference population (WHO Multicentre Growth Reference Study Group, 2006, 2007; de Onis et al., 2007). We then calculate the change in this difference between two consecutive survey rounds. A positive value indicates that the child's relative height position improved between two consecutive rounds, indicating growth recovery, whereas a negative value indicates that the child moved further below the reference trajectory, indicating growth faltering. A value close to zero indicates that the child's relative position remained broadly unchanged over the interval. We use this measure rather than the change in height-for-age z-score (HAZ), which is widely used to assess child growth. While HAZ is useful for describing a child's height relative to the reference population at a given age, changes in HAZ are not necessarily a direct measure of growth recovery or faltering. In particular, because the age-specific distribution of the WHO reference population changes with age, HAZ may change mechanically as children age even when their absolute height deficit relative to the reference, measured in centimetres, remains unchanged or increases (Leroy et al., 2013; Lundeen et al., 2014). Thus, changes in HAZ can partly reflect the changing properties of the reference distribution rather than the child's actual change in height relative to the expected growth trajectory. This measure proposed by Georgiadis et al. (2017) addresses this issue by evaluating the child's height

relative to the corresponding WHO reference height in centimetres at each measurement point and then examining the change in this relative position over time.

3.3 Shock variable

Parental health shocks are measured using self-reported information on serious parental illness or death occurring between consecutive survey rounds. All models control for other household shocks, defined as adverse events excluding parental health shocks. Controlling these shocks helps isolate the impact of parental health on child growth by accounting for the influence of other household adversities.

3.4 Control variables

Relevant socioeconomic and demographic factors are used as control variables. All the models include current household wealth index and its lagged value, community level access to electricity and drinking water, lagged household size, urban/rural residence, child age. Dhanaraj (2016) shows that parental health shocks in the Young Lives data are transitory rather than persistent, suggesting that they are an exogenous source of variation. Following this approach, we treat parental health shocks as transitory events and additionally control for household vulnerability factors such as the household dependency ratio, presence of household members with disabilities or elderly members, and whether the household is female-headed. We have used lagged values of household size to account for changes in household composition following adverse events (Dhanraj et al., 2019). All models also include survey-round dummy variables.

3.5 Household Food Group Expenditure Index

Following Humphries et al. (2017), household dietary quality is evaluated using the Household Food Group Expenditure Index (HFGEI). Information on food expenditure is obtained from three sources: food purchased by the household, food received as gifts or transfers, and food obtained through own production. The values reported across these sources are combined to calculate total expenditure for each food category.

Seven food categories are considered in constructing the index, based on the World Health Organization classification: starches, meat and fish, eggs, legumes and nuts, dairy products, fruits and vegetables, and fats and oils. Expenditure on each category is adjusted for household adult-equivalent size to account for differences in household composition. To reduce the influence of extreme observations, these expenditure measures are winsorized at

the 1st and 99th percentiles. The adjusted values are subsequently standardized using z-scores and subjected to factor analysis. The index is derived from the retained single-factor solution. A lower HFGEI score reflects a pattern of food expenditure that is relatively less oriented towards dietary diversity, particularly expenditure on animal-source foods.

The validity of this interpretation is assessed by comparing food expenditure patterns across four groups of households ranked according to their HFGEI scores. For each quartile, the average proportion of total food expenditure allocated to individual food categories is calculated. The comparison indicates that the composition of household food expenditure varies with the index score. In the lowest HFGEI quartile, grains, roots, and tubers account for approximately 40.4% of total food expenditure, whereas their share falls to 31.8% in the highest quartile (Table 1). The opposite pattern is observed for dairy products, whose expenditure share rises from 7.4% in the lowest quartile to 13.3% in the highest. Similarly, the share allocated to meat and fish increases from 11.2% to 14.3%. Fruits and vegetables account for a modestly larger share of expenditure at higher levels of HFGEI, while the proportion allocated to legumes shows comparatively little variation across the quartiles.

Table 1: Household Food Group Expenditure Shares across HFGEI Quartiles

Food group	Q1	Q2	Q3	Q4
Grains, roots and tubers	40.39	34.37	32.77	31.81
Meat and fish	11.19	13.66	13.79	14.34
Eggs	1.71	2.08	2.10	2.12
Milk and dairy products	7.38	9.64	11.17	13.33
Legumes and pulses	9.45	9.27	9.62	8.71
Fruits and vegetables	19.11	20.98	21.22	20.92
Fats or oils	10.78	10.01	9.34	8.77

Source: Author's own calculation from YL data

The observed differences across HFGEI quartiles suggest that the index distinguishes households according to the composition of their food expenditure. Households with lower HFGEI scores devote a comparatively larger proportion of their food budget to staple foods, particularly grains, roots, and tubers. In contrast, higher scores are associated with a greater

allocation of expenditure towards a wider range of food groups, especially nutrient-rich foods such as meat, fish, and dairy products.

3.6 Empirical Methodology

The baseline empirical model is a child fixed-effects specification

$$\Delta HAD_{it} = \beta_1 Shock_{it} + \beta_2 OtherShock_{it} + X_{it}'\gamma + \delta_t + \alpha_i + \varepsilon_{it}, \quad (1)$$

where ΔHAD_{it} is the change in the HAD of child i between survey rounds $t-1$ and t. $Shock_{it}$ denotes parental health shock. $OtherShock_{it}$ is a vector of all other household shocks included to isolate the effect of the shock of interest. X_{it} is a vector of time-varying child and household characteristics. δ_t denotes survey-round fixed effects, and α_i represents child fixed effects. Standard errors are clustered at the baseline community level, as some children moved across communities during the survey period.

To determine the appropriate panel-data specification, we conducted a Hausman test comparing the fixed-effects and random-effects estimators. The test rejected the null hypothesis of no systematic difference between the two estimators indicating that the unobserved individual-specific effects are correlated with the explanatory variables. We therefore use a child fixed-effects model, which accounts for unobserved time-invariant characteristics of children and exploits within-child variation over time to estimate the association between exposure to shocks and changes in child growth.

To examine whether household dietary quality moderates the association between shocks and child growth, we estimate the following interaction model:

$$\Delta HAD_{it} = \beta_1 Shock_{it} + \beta_2 HFGEI_{it} + \beta_3 (Shock_{it} \times HFGEI_{it}) + \beta_4 OtherShock_{it} + X_{it}'\gamma + \delta_t + \alpha_i + \varepsilon_{it}, \quad (2)$$

where X_{it} is a vector of time-varying child and household characteristics. δ_t denotes survey-round fixed effects, and α_i represents child fixed effects.

3.6.1 **Descriptive Statistics**

This section presents the descriptive statistics for variables used in the analysis. The descriptive statistics are presented separately for children exposed and not exposed to parental health shocks.

Table 2. Descriptive Statistics by Exposure to Parental Health Shocks

Variable	No Parental Health Shock	Parental Health Shock
Height-for-age difference (cm)	−8.283	−9.054
Access to drinking water (%)	96.75	97.078
Access to electricity (%)	94.79	94.15
Wealth Quintile (%)		
Poor	26.6	33.2
Middle	33.9	37.8
Rich	39.4	28.9
Dependency ratio	0.948	1.031
Disabled members (%)	7.8	10.7
Elderly present (%)	18.1	18.3
Female-headed household (%)	5.9	13.3
Household size	5.365	5.01

Source: Author's own calculation from YL data

Tables 2 show that children exposed to shocks have lower mean HAD than those who are not exposed. The mean HAD is −8.28 cm among children without parental health shocks, compared with −9.05 cm among those exposed to parental health shocks. Since a lower HAD indicates a greater difference between observed height and the WHO reference median, this suggests that children exposed to shocks are further below the reference height.

Figure 1: Child Height by Parental Health Shock Exposure

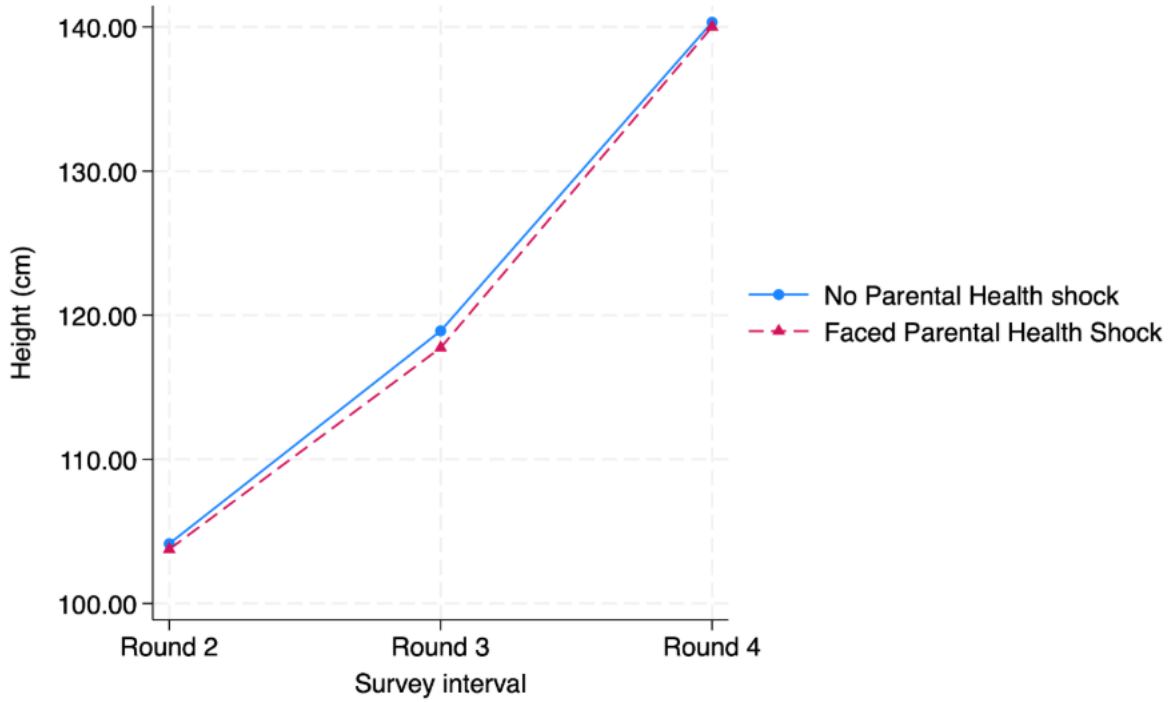


Figure 2: Absolute Difference from WHO Reference Median by Parental Health Shock Exposure

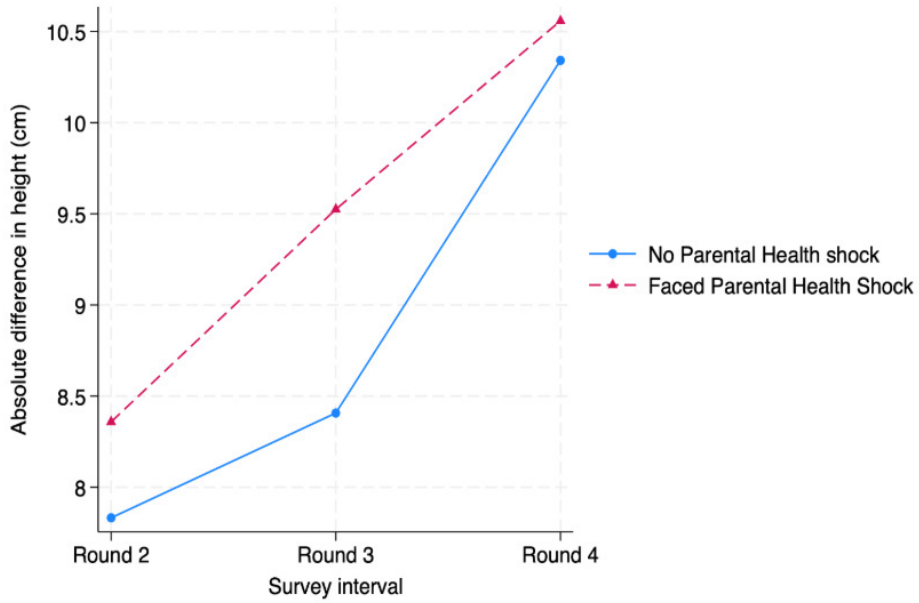


Figure 1 presents the mean height across rounds, separately for children exposed and not exposed to parental health shocks. Children's mean height increases substantially across the survey rounds for both groups. In Round 2, the mean height is approximately 104 cm for both

groups. By Round 3, children without parental health-shock exposure have a slightly higher mean height than those exposed to a shock. By Round 4, however, the mean heights of the two groups become very similar, at approximately 140 cm.

Figure 2 shows that the absolute height difference increases over time for both groups. The figure indicates that children exposed to parental health shocks consistently exhibit a larger absolute deviation from the WHO reference median than children without such exposure. The difference between the two groups is particularly evident in Rounds 2 and 3, while the gap becomes relatively smaller by Round 4.

Figure 3: Distribution of Height-for-Age Difference by Parental Health Shock Status

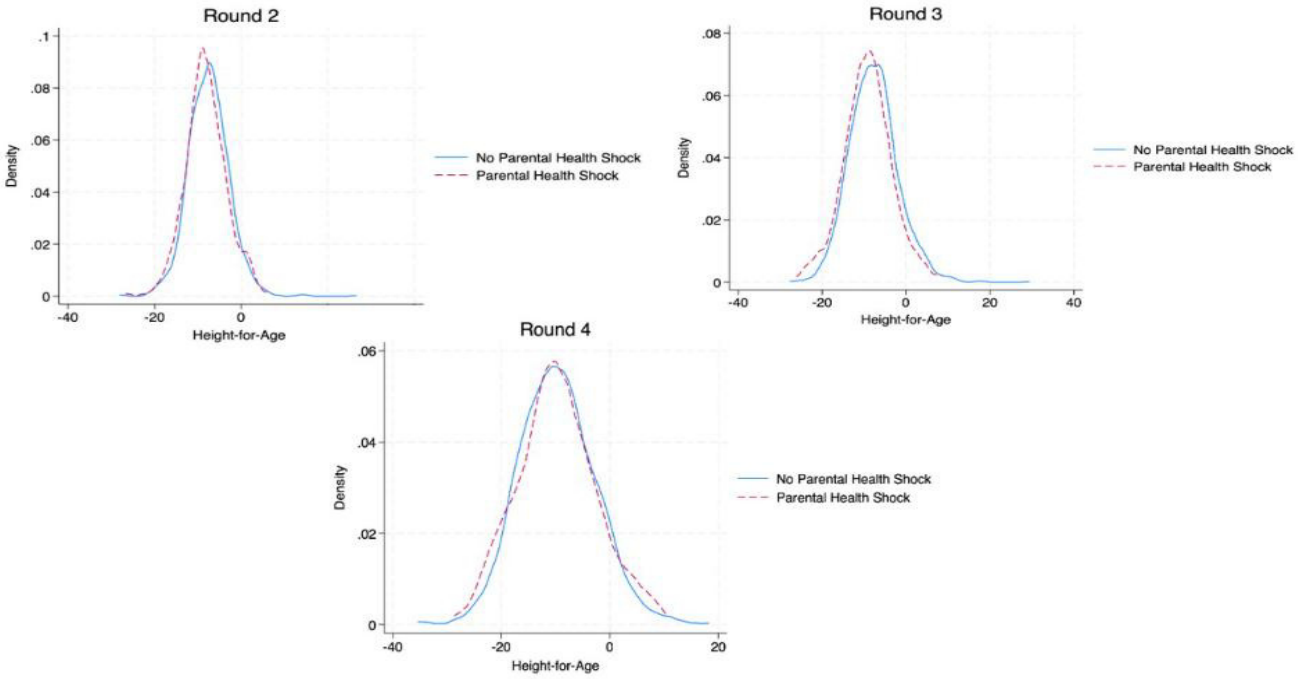


Figure 3 presents the kernel density distributions of height-for-age Difference (HAD) for children exposed and not exposed to parental health shocks across the three survey rounds. The distributions show considerable overlap between the two groups. The distribution for children exposed to parental health shocks is to the left in round 2 and 3, suggesting relatively lower height-for-age among exposed children. The distributions become more closely aligned in the fourth round.

Table 3: Difference in Mean t-test of HAD by Exposure to Health Shocks

Shock	No Shock	Shock	Difference
Parental health shock	−8.283	−9.054	0.771***
Paternal health shock	−8.343	−9.084	0.741***
Maternal health shock	−8.322	−9.335	1.013***

*** p < 0.01, ** p < 0.05, * p < 0.10.

The t-test results presented in Table 3 show that children exposed to parental health shocks have significantly lower mean HAD than those who did not experience such shocks. Similar differences are observed for both paternal and maternal health shocks.

4. RESULTS AND DISCUSSION

4.1 Impact of Parental Health Shock:

This section presents the results and discusses their broader implications. Estimating Equation (1) using a child fixed-effects panel model yields the results shown in Table 4. Exposure to a parental health shock is associated with growth faltering. On average, during intervals in which a child is exposed to a parental health shock, their relative growth (ΔHAD) is 0.467 cm lower than during intervals without such exposure. Because ΔHAD captures changes in a child's height relative to the WHO reference trajectory, the negative coefficient indicates a worsening relative height position following exposure to a parental health shock. The child's absolute height deficit relative to the WHO median increases by 0.467 cm more following exposure. This finding is consistent with evidence from Bangladesh showing that parental illness is associated with poorer child height outcomes (Hossain & Nazneen, 2025).

Table 4. Association between Parental Health Shocks and Changes in Height-for-age difference

	Change in HAD
Parental Health shock	-0.467**
	(0.225)
Other shocks	-0.769***
	(0.207)
Community level access to drinking water	-0.808
	(1.077)
Community level access to electricity	0.831
	(1.137)
Area of Residence (reference: Urban)	
Rural	-1.115*
	(0.629)
Unknown	-0.894
	(1.120)
Wealth Index	0.599
	(0.857)
Lagged wealth index	-2.629***
	(0.998)
Dependency ratio	0.0297
	(0.191)
Household disabled	0.167
	(0.244)
Elderly present	0.314
	(0.295)
Female-headed household	-0.926**
	(0.384)
Survey Round (Ref: Round 2)	
Round 3	4.901***
	(0.252)
Round 4	3.642***
	(0.707)
Lagged household size	-0.0679
	(0.0567)
Constant	-2.428
	(1.630)
Observations	5,331
Number of children	1,786
R-squared	0.230

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 5. Gender Heterogeneity

	Change in HAD	
	Girls	Boys
Parental Health Shock	-0.703**	-0.274
	(0.334)	(0.267)
Controls	Yes	Yes
Survey-round fixed effects	Yes	Yes
Observations	2460	2871
Number of children	825	961

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 5 present estimates separately for girls and boys to examine whether this association differs by gender. For girls, exposure to a parental health shock is associated with a statistically significant 0.703 cm decline in relative growth. This suggests that girls experience slower growth relative to the WHO reference trajectory following a parental health shock. For boys, the estimated coefficient is also negative (-0.274 cm), but it is not statistically significant.

4.2. Heterogeneity in the Association by Household Food Group Expenditure

This section investigates whether the relationship between parental health shocks and children's growth differs according to household food expenditure patterns, as captured by the Household Food Group Expenditure Index (HFGEI). The interaction between parental health shocks and HFGEI is positive and statistically significant (Table A1 in the Appendix). This finding suggests that the adverse association between parental health shocks and relative growth diminishes as household food expenditure becomes more diversified. The negative association between parental health shocks and ΔHAD is strongest among households with low HFGEI scores and becomes statistically insignificant among households with high HFGEI scores (Table 6). These results suggest that households allocating a greater proportion of their food expenditure to diverse food groups may be better positioned to protect children's growth when a parent experiences a health shock. Conversely, children in households with limited capacity to afford a varied diet appear more vulnerable to the consequences of such shocks. Access to supplementary nutrition programmes that provide foods such as eggs and

milk could potentially help address nutritional deficiencies and reduce children's vulnerability to disruptions in household welfare.

Table 6. Average Marginal Effects of Parental Health Shock at Different Levels of HFGEI

HFGEI level	Marginal effect of parental health shock
25th percentile (−0.763)	−0.751*** (0.293)
50th percentile(−0.230)	−0.557** (0.237)
75th percentile (0.549)	−0.273 (0.243)

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

These findings are consistent with existing evidence on the effects of shocks on food consumption. Hossian and Nazneen (2025) report that parental illness increases household food insecurity and reduces food intake, particularly the consumption of protein-rich foods such as eggs and meat. Their findings also indicate that households may respond to parental health shocks by substituting relatively inexpensive staple foods for more nutrient-dense alternatives. Similarly, qualitative evidence from Young Lives Ethiopia suggests that parental health shocks can reduce both the quantity and quality of food consumed by children (Chuta, 2014). To examine whether household food expenditure diversity (HFGEI) may be systematically related to exposure to parental health shocks, we regress the HFGEI on parental health shock and other household characteristics. The results show that parental health shock is not significantly associated with HFGEI (Table A2 in appendix). This rules out the possibility of HFGEI being potentially endogenous.

5. CONCLUSION

This paper examined the association of parental health shocks on children's nutritional status using the Young Lives longitudinal survey. While previous studies have primarily focused on the educational and labour market consequences of parental health shock, this study investigated whether these shocks are also associated with children's growth. Most of the literature that has examined the impact of shocks have used outcomes such as height-for-age z-scores (HAZ) or stunting measured at a particular point in time. For this study, we have used change in height-for-age difference (HAD) between survey rounds, with positive values

indicating growth recovery and negative values indicating growth faltering. The results show that parental health shocks is associated with poorer growth trajectories, parental health indicate growth faltering. Parental health shocks are significantly associated with growth faltering in girls and while it is not significantly associated with growth faltering in boys. The adverse association between these shocks and child growth becomes smaller as household food expenditure diversity increases, suggesting that diversified household food expenditure may help protect children's nutritional status during periods of such adversities.

The findings have important policy implications. First, strengthening health-risk protection is essential to reduce the financial burden of parental illness. Improving access to affordable primary healthcare and essential medicines, alongside strengthening enrolment and awareness of public health insurance schemes such as Ayushman Bharat and state-level programmes such as Aarogyasri, may help households manage medical expenses without substantially compromising children's nutritional needs. Second, nutrition interventions should be responsive to household shocks. Children from households experiencing parental illness should receive greater attention through existing nutrition programmes, with particular emphasis on the early identification of growth faltering and timely nutritional support. Integrating household health-risk screening with child growth monitoring could help identify vulnerable children before nutritional disadvantages become more severe.

Overall, the study highlights the importance of integrating health-risk protection with child nutrition policies. Protecting households against the economic consequences of parental illness, while ensuring continuity in children's nutrition and healthcare, may help reduce the risk of growth faltering. By demonstrating the links between parental health shocks and child growth outcomes, this study contributes to a broader understanding of how household health vulnerabilities can shape child development and underscores the need for policies that address both the immediate consequences of illness and its potential implications for children's long-term wellbeing.

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APPENDIX

Table A1. Interaction between parental health shock and HFGEI

	Change in HAD
Parental health shock	-0.473**
	(0.227)
HFGEI	-0.0919
	(0.106)
Parental health shock x HFGEI	0.365*
	(0.213)
Other shocks	-0.759***
	(0.206)
Community level access to drinking water	-0.831
	(1.076)
Community level access to electricity	0.820
	(1.142)
Area of Residence (reference: Urban)	
Rural	-1.142*
	(0.625)
Unknown	-0.968
	(1.107)
Wealth Index	0.603
	(0.868)
Lagged wealth index	-2.635***
	(1.000)
Dependency ratio	0.0272
	(0.189)
Household disabled	0.170
	(0.248)
Elderly present	0.312
	(0.300)
Female-headed household	-0.962**
	(0.391)
Survey Round (Ref: Round 2)	
Round 3	4.925***
	(0.256)
Round 4	3.726***
	(0.722)
Lagged household size	-0.0654

	(0.0568)
Constant	-2.414
	(1.641)
Observations	5,331
Number of children	1,786
R-squared	0.231

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table A2. Regression of Household Food Expenditure Diversity on Parental Health Shocks and Household Characteristics

	HFGEI
Parental health shock	0.0372
	(0.0270)
Other shock	−0.0382
	(0.0391)
Access to drinking water	0.0235
	(0.135)
Access to electricity	−0.153
	(0.175)
Residence	
Residence (Ref: Urban)	
Rural	0.0998*
	(0.0584)
Unknown	−0.0776
	(0.116)
Current wealth index	1.254***
	(0.104)
Lagged wealth index	0.643***
	(0.0912)
Dependency ratio	0.0728***
	(0.0195)
Household disabled member	−0.123***
	(0.0353)
Elderly present	−0.236***
	(0.0315)
Female-headed household	0.196***
	(0.0494)
Round 3	0.585***
	(0.0400)
Round 4	1.335***
	(0.0832)

Lagged household size	−0.0343***
	(0.00643)
Female child	−0.0137
	(0.0276)
Constant	−1.320***
	(0.234)
Observations	5,331
R-squared	0.484

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

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