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Synopsis: Childhood shocks, safety nets and cognitive skills: Panel data evidence from rural Ethiopia

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Shocks in early childhood can have irreversible effects on long-term child welfare. A number of studies have investigated the effects of such shocks on child nutrition and health. However, evidence is scarce on the effects of shocks in early childhood on cognition, particularly when measured after the early childhood window during preschool and beyond. Given its history of recurring natural and economic shocks, Ethiopia presents a compelling context in which to seek a better understanding of the effects of shocks in early childhood on cognition.

Using child-level panel data from rural areas of Ethiopia, we analyze effects of both economic and non-economic shocks on child cognition skills measured after the early childhood age window. We identify that drought, in particular, reduces child cognitive skills markedly. Food price inflation during the study period and divorce also have significant adverse effects on cognition. Promisingly, we find that the safety net program established by the Ethiopian government in 2005 to protect households from the economic effects of such shocks mitigated the reduction in cognitive skills associated with these shocks.

Ethiopia has a long history of natural disasters that include droughts, floods, crop pests, and localized rain failures that at times have turned into humanitarian crises with long term social and economic repercussions (Pankhurst 1986, Dercon and Porter 2010). While Ethiopia has registered impressive economic growth in the last two decades, more than 80 percent of its population still subsists on rain-fed agriculture. This means that a single drought, if left unchecked, can lead to a crisis of significant proportions. These shocks hit disproportionately harder on children than on adults.

Childhood shocks in Ethiopia

Many studies have focused on the effects of economic, social, and health shocks on health and nutrition outcomes during early childhood. This period of physical development in children is important to cognitive skills development as it is during this stage of life when critical brain development occurs. Undernourished children are observed to have poorer cognitive skills, are found to be less likely to complete school, and are less economically productive in adulthood. Furthermore, undernutrition can lead to irreversible neurological damages.

Specifically, an impairment in physical growth in the first two years of life is never fully recovered (Alderman and Walker 2014) and slow growing children experience poorer psychomotor development and interact less frequently with their environment (Grantham-McGregor et al. 2007; Yamano, Alderman, and Christiaensen 2005). However, the evidence of the effect of childhood shocks experienced by somewhat older pre-school children on the development of their cognitive skills is scarce, particularly in the context of poor countries like Ethiopia. This study aims at filling this evidence gap.

The motivation for this study is spurred by the number of economic shocks occurring in Ethiopia since 2000 and the resultant, significant changes in the humanitarian assistance policy of the government of Ethiopia. The Productive Safety Net Programme (PSNP) was launched in 2005 and was designed to target chronically food insecure households in drought prone areas. Although this programme does not specifically target children, a significant impact of PSNP is identified on child cognitive scores (Table 1).

Table 1: Impact of shocks and PSNP participation between 2006 and 2009 on cognitive test scores for children born in 2001/2002, difference-in-differences regression

Dependent variable: PPVT score (SD)	(1)	(2)	(3)
Drought, 2006-09 x Year_2009	-0.170**	-0.176**	-0.181**
	(0.077)	(0.078)	(0.078)
Divorce, 2006-09 x Year_2009	-0.385**	-0.385**	-0.392**
	(0.166)	(0.167)	(0.164)
Change in cereals prices, 2006-09 x Year_2009	-0.913***	-0.897***	-0.984***
	(0.247)	(0.248)	(0.254)
Change in milk and egg price, 2006-09 x Year_2009	-0.009	0.000	-0.042
	(0.063)	(0.063)	(0.068)
Change in meat prices, 2006-09 x Year_2009	-0.438***	-0.424***	-0.466***
	(0.129)	(0.129)	(0.132)
PSNP participation, 2006-09 x Year_2009			0.178**
			(0.088)
Dummy for child being enrolled in preschool		0.375***	0.368**
		(0.142)	(0.143)
Number of health problems child had from birth to age one year		-0.028***	-0.029***
		(0.011)	(0.011)
Drought, 2002-2006		-0.130***	-0.116**
		(0.049)	(0.049)
Number of obs.	2182	2182	2182
R-squared	0.13	0.14	0.15
Child level controls	Yes	Yes	Yes
Household level controls	Yes	Yes	Yes
Village level controls	Yes	Yes	Yes

Note: * p<0.10, ** p<0.05, *** p<0.01. Robust standard errors are in parentheses. PPVT is the Peabody Picture Vocabulary Test, standardized to a mean of zero and a standard deviation of 1.0.
Source: Authors' calculations from Young Lives Data

Data and approach

The data used in this study comes from the three-round panel data set developed through the Young Lives Project (YLP) from surveys conducted in 2002, 2006 and 2009 in the four major regions of Ethiopia – Amhara; Oromia; Tigray; and Southern Nations, Nationalities, and Peoples (SNNP) regions, plus Addis Ababa, the national capital. YLP Ethiopia tracked two different cohorts of 3,000 children over the three rounds from two age groups. These are 2,000 children born in 2001-02 (the younger cohort) and 1,000 children born in 1994-95 (the older cohort).

Cognitive scores were measured for all study children. The two cohorts were re-surveyed in 2006 and 2009, with a relatively low attrition rate of 2.2 percent over the three survey rounds.

The estimation strategy deployed controlled for child, household, and village level characteristics and for initial conditions. It also took into account the effects of major, potentially time-varying factors, as well as policy interventions, such as the PSNP, and also attempted to identify the causes of such impacts.

Cognitive achievement was modeled as a knowledge acquisition production process, taking into consideration parent or caregiver investments and household income (affecting consumption), among others. Difference-in-differences (DID) methods were also implemented. These methods included baseline characteristics to control for early shocks and other potentially time-varying variables.

Results

Our results show that shocks from drought, divorce, and food price increases negatively affected child cognitive skills in the period considered (Table 1). These results are statistically significant and robust to different specifications. Drought and divorce shocks reduced child cognitive test scores by 0.18 and 0.39 standard deviations, respectively. Increases in food prices, specifically cereal and meat prices, also decreased the test score substantially. An increase in average cereal and meat prices by one Ethiopian Birr per kilogram decreases the cognitive test score by 0.98 and 0.47 standard deviations, respectively. Milk and egg price increases also suggest similar negative impacts, but are not statistically significant.

Other factors, such as pre-school enrolment, have a significant positive effect on child cognitive test scores, while sickness and previous drought between 2002 and 2006 have the opposite effect. The impact of participation of the child's household in the Productive Safety Net Programme (PSNP) is significantly positive on cognitive test scores. However, the results are derived from a sub-sample of the areas covered by the PSNP, and cannot therefore be taken to represent the wider national impact of PSNP on cognitive scores.

Policy implications

The results we obtained from using rigorous identification strategies and controlling for other confounding factors suggest that economic shocks, such as drought and food price rises, and non-economic shocks, such as parental divorce, that negatively affect their socio-emotional growth, negatively impact child cognitive skill development. However, the PSNP appears to play an important role in reversing some of these negative impacts.

These results are in line with similar studies done in comparable situations and suggest that consideration of economic and non-economic shocks, such as those considered here, are critically important in designing policies that aim to address child welfare needs, as well as human capital development. Specifically, this study complements the evidence on the long lasting effects of shocks experienced during early childhood, but brings much needed additional evidence to the rarely available empirical evidence of the detrimental effect of shocks experienced even after early childhood, mainly during the later preschool years. The results strongly suggest that, even when children grow into their later preschool years, continued investment in child health and nutrition is as important for the development of their cognitive skills as during early childhood.

The implications of this findings are far reaching: policies to address child welfare and ensure sustained growth and overall human development need to seriously consider continued investments in children in their late preschool years, in addition to the early childhood period. In other words, unlike for other early childhood nutrition and health deficiencies, early childhood shortfalls in cognitive skills can be improved by investments at later age, including during preschool. Such careful interventions would be required in contexts like rural Ethiopia where shocks are recurrent, child protection schemes are scarce and difficult to implement, pre-schooling is hardly available, and investments in socio-emotional interventions for young children are rare and frustrated by both economic and non-economic factors. This study suggests that social protection programs, if designed and implemented carefully, can enhance child cognitive development, protect child development outcomes, and improve child welfare.

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