Do Public Programs Serve As Buffer Against Negative Shocks?
Evidence from a panel study in Andhra Pradesh, India

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Extended Abstract

I. Introduction

Childhood exposure to natural disasters in developing countries is known to significantly affect the health ,educational and labor market outcomes of population in the long-run. With a large share of households depending on agriculture -a highly volatile source of subsistence- the effects may be worse for the rural poor who lack formal credit markets. In this case, a sufficiently large shock may force parents to take their children out of school to work in the labor market. This becomes more of a concern as the investments in early childhood can have significant effects on the human capital attainments and achievements as adults.

Any economic crisis in developing countries is generally associated with declining incomes and worsening employment possibilities. In the context of agrarian distress under weather shocks like droughts, this often results in adverse outcomes of loss of land rights against debt and declining nutrition levels for the poorer majority of populations. The loss in human capital in the early formative years often leads to the inter-generational transmission of poorer health status and poorer labor market outcomes. Stunting, or low height-for-age, is a measure of chronic malnutrition, and the rate of stunting is high among all children in Andhra Pradesh. According to National Family Health Survey(NFHS-3, 2006) prevalence of Malnutrition among children (0-59 months) in Andhra Pradesh is very high (32.5% underweight 42.7 % stunted and 12.2% wasted).

Drought is found as one of the most important risks that households face (experienced by about one-third of the population), where the welfare loss is exacerbated by the overall agrarian crises in India. With over 80 per cent of the population dependent on agriculture & without access to formal credits the drought shock is often worse .If people are forced to lower their calorie intake, this can leave children more susceptible to illness,exacerbating already existing low nutrition levels. In this context, it would be very important to examine how specific sub-groups of population are vulnerable to the exogenous weather shocks. Additionally, in the context of the Indian agrarian crisis, it would be interesting to see,whether the existing public works program is any good in reducing the negative impact of drought shocks in early childhood.

II. Background about NREGS

The National Rural Employment Guarantee Scheme provides a legal guarantee for 100 days of employment in every financial year to adult members of any rural household willing to do public work-related unskilled manual work at the statutory minimum wage of Rs.80 per day. At least one-third beneficiaries is reserved for women who have registered and requested work under the scheme. To facilitate women with very small children to take part in the program it has the availability of child care facilities at work-sites, and coverage of 0-6 age group by crèche facilities. The major public works programs in India have been introduced with numerous objectives including short term income

generation, asset creation, protection from negative shocks (macro- economic, natural disasters etc.) empowering rural women, reducing rural-urban migration and poverty alleviation. Given the biggest public works policy is currently being extended to all the districts throughout the country, it would **of** prime importance for policy purpose, to estimate the impact of the current policy (which has provisions for child care and female reservations) on child outcomes.

III.   Research Question

In the above context the current paper addresses the following research question. It examins the impact of exogenous variation in income from drought shocks on child health outcomes (anthropometric scores) & estimates just how much of a weather induced income shock poor households are able to buffer the negative effect by participation in National Rural Employment Guarantee Scheme (NREGS) ,India's current biggest public program. Additionally we examine whether the above benefits(if any) vary by the age,gender,caste or initial nutritional status of the recipient? For policy implications the result is disaggregated to see whether specific sub-groups of children are more vulnerable than others.

IV.   Data

The current study uses a unique household panel data set :Young Lives Survey from Andhra Pradesh, India. It follows two age cohorts over a period of 4 years: a younger cohort of 2,000 children (aged between 6 and 18 months) and an older cohort of 1,000 children (aged between 7.5 and 8.5 years in 2002).It consisted of a multi-stage random sampling to select the two cohorts of children covers seven districts (indicated by red stars in the appendix map) including 103 villages from the state. In the second round (2006/7), 1950 children of the younger cohort and 994 children of the older cohort could be traced and resurveyed; attrition rates are low (0.9%). Four districts(Cuddapah, Karimnagar, Anantapur, Mahaboobnagar) from the Young Lives sample coincide with the first phase of NREGS implementation. The NREGS was implemented in phase-wise manner based on a criteria of backwardness calculated from a mix of demographic, social and economic indices (including the % of scheduled tribes and scheduled castes' population, agricultural productivity and the prevalent notified minimum wages for agricultural laborers in the State).The following table shows the summary statistics of the key variables used in the analysis for two age cohorts.

Summary Statistics

Variable	YOUNGER COHORT		OLDER COHORT
	EGS Available	EGS Not Available	EGS Available
Height-for-age (HAZ)	-1.75	-1.5	-1.58
Weight-for-Age (WFA)	-1.95	-1.75	-2.05
BMI	13.82	13.98	15.5
ΔHAZ	-0.48	-0.08	0.03
Drought	0.41	0.1	0.41
Access to med facility	0.91	0.9	0.89
Hhsize	5.71	5.26	5.38
Mum-education	4.25	4.59	4.34
Dad-education	6.56	5.79	5.42
Mom-weight	45.04	48.27	47.81
Wealth-index	0.43	0.49	0.29
Obs	1122	889	569

V. Empirical Strategy

Utilizing the exogenous variation in drought experience across households, we use the **Difference in Differences (DID)** to examine any systematic variation in anthropometric scores of children exposed to droughts. The basic estimating equation is

$$\Delta Z = \beta 1 * Drought + \beta 2 * Xi + \beta 3 * Xr + \beta 4 * EGS + \beta 5 * Drought * EGS + \varepsilon$$

ΔZ: difference in anthropometric Z-scores between two rounds(height for age, weight for age)
X is a vector of time-invariant attributes including child's caste and gender,parental education, initial wealth , household wealth, household size, region, household location (urban/rural), community
Xr is a vector of region characteristics
Drought is a dummy for drought shock between two rounds
EGS: Dummy for registration in Employment Guarantee Scheme

The problem arising from the time unvarying unobservables at the child,household and cluster levels biases and omitted variable biases can be tackled by using the differencing strategy. However overcoming the potential bias arising due to self selection into different schemes is more challenging. The nature of the bias would depend on the underlying mechanism for households in self-selecting into schemes. If it is found that exposure to negative shock (droughts) induces a poor household to take part in the program, this would underplay the remedial effect of the schemes, and the estimated coefficients for programs would be under-biased.

To tackle this specific selection problem the study plans to use an instrumental variable approach in assessing the impact of participation in NREGS in buffering negative effects of drought we initially rely on instrumental variable technique to account for the self-selection into program. After controlling for the difference in roll out time of the scheme across districts the average number of work-site present in village and the provision of a child-care facility in it is random. However these two administrative information is highly correlated with participation in the scheme.

We thus instrument participation into scheme (EGS) on the following village level variables available combining the survey data with the administrative data:
1) Average number of work-site present in one's village(avgsite)
2) Average number of child care facility available in the work-site (avgchldcare)

We estimate the following equation predicting the participation variable -'EGS' on the instruments after controlling for the same set of independent variables used in the earlier equation:
$$EGS = \alpha 1 * avgsite + \alpha 2 * avgchldcare + \beta 2 * Xi + \beta 3 * Xr + e$$

VI. Initial Results

 It is found that drought affected children had significantly lower height-for-age z-scores, indicating long-term deprivation. Exposure to drought shocks has a statistically significant negative effect on height-for-age scores for the younger cohort, significant at 10% level. For the younger cohort the

drought experience reduced a child's height-for-age z-score by about 0.26 standard deviations. Boys had significantly lower height-for-age z-scores and were more likely to be stunted than girls and the result is more pronounced for 'scheduled castes' and minorities. However, comparing between two survey rounds it is found that boys had greater catch up in height-for-age between the two rounds and have higher z-scores in the second round.

Regarding take up of the scheme it is found that poorer and lower caste households are more likely to register for this program. No such effect of drought shock is found for the older cohort. In spite of provision of child-care centres on work-site only 8.74% of registered respondents were found to have reported the availability of child-care centres on site. The next step of the analysis involves using the third round of the survey(collected in 2010) , where the three phases of roll-out information of the scheme across districts can be exploited to verify the initial results. With the new round of data it would be possible to explore whether there is persistence of the initial health loss along the policy-relevant demographic sub-groups.

Appendix
Map showing the phase-wise roll-out of the NREGS across districts in Andhra Pradesh, India