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Preschool nutrition increases economic productivity, incomes and human capital

An ongoing IFPRI project is assessing the long-term impact of investing in preschool nutrition and the long-term costs of failing to do so. The project includes work in many countries, including the two studies—one in Guatemala and one in Zimbabwe—profiled here.

The Guatemala study examines the effect of early childhood nutrition intervention on economic productivity, incomes, and human capital in adulthood. It looks at outcomes among individuals who participated as preschool children in a nutrition supplementation trial between 1969 and 1977. Two nutritional supplements (*atole,* a high-energy protein drink, and *fresco,* a low-energy drink devoid of protein) were provided to randomly selected preschool children in four villages in Guatemala. The Zimbabwe study examines the long-term costs of civil conflict and drought, which are causally linked to increased rates of malnutrition. IFPRI's findings to date have been published in five key papers:

- Alderman, H. et al. 2006. Long-term consequences of early childhood malnutrition. *Oxford Economic Papers.* oep.oxfordjournals.org/cgi/content/abstract/58/3/450.
- Behrman, J. et al. 2004. Hunger and nutrition. In *Global crisis, global solutions.* www.copenhagenconsensus.com/Files/Filer/CC/Papers/Hunger_and_Malnutrition_070504.pdf.
- Hoddinott, J. 2006. Shocks and their consequences across and within households in rural Zimbabwe. *Journal of Development Studies.* www.informaworld.com/smpp/content~content=a741607999~db=all.
- Hoddinott, J. et al. 2008. The impact of nutrition during early childhood on income, hours worked, and wages of Guatemalan adults. *The Lancet.* www.thelancet.com/journals/lancet/article/PIIS0140-6736(08)60205-6/abstract.
- Maluccio, J. et al. 2009. The Impact of nutrition during early childhood on education among Guatemalan Adults. *Economic Journal*. pier.econ.upenn.edu/Archive/06-026.pdf.

Behrman et al. (2004) show that even under conservative assumptions, investments in preschool nutrition, particularly in micronutrients, have high benefit–cost ratios. The findings, published in *The Lancet*, show that consumption of the *atole* supplement from birth to 24 or 36 months—but not at older ages—had a statistically significant, positive effect on men's hourly wage rates. The magnitude of these effects was sizeable. For example, exposure to *atole* from birth to 24 months increased men's wages by 46 percent. Although not formally calculated in the article, this translates to a benefit–cost ratio in excess of 50 to 1, which is an extremely high return.

The results published in the *Economic Journal* article (Maluccio et al. 2009) showed that exposure to *atole* during preschool years also significantly increased men's and women's test scores on reading comprehension, vocabulary, and nonverbal cognitive ability more than 25 years after the intervention ended. This and the 2008 *Lancet* study were the first to demonstrate directly high adulthood returns on preschool-nutrition investments.

The Zimbabwe study (Alderman et al, 2006) examined children born during Zimbabwe's civil war (1965–1979), as well as children who were between 12- and 36-months-old during the droughts of the early 1980s. It showed that both sets of children were more likely to be malnourished as preschoolers and that this higher level of malnutrition was causally linked to poorer health and height attainments in late adolescence. The results reported in Hoddinott (2006) demonstrate that assessing the impact of drought at the household level can mask the adverse short and long term effects shocks such as these have on the nutritional status of pre-school children.

Outcomes

- The research results have been highlighted by the Copenhagen Consensus, which examined returns to 17 potential development investments and concluded that the returns to nutrition interventions are among the highest, surpassing investments in trade liberalization, malaria, water, and sanitation.

- The Copenhagen Consensus Center research formed the basis of a detailed article in *The Economist* in May 2004 on the costs of preschooler malnutrition. In combination with the Zimbabwe research, it also formed the basis of a July 2004 editorial in *The Economist* calling for renewed attention to the subject.
- The Zimbabwe and Guatemala studies are extensively reviewed in the most recent *Handbook of Development Economics,* with the Guatemala work described as "one of the most innovative studies in the field of health and development."
- The UN cites the Zimbabwe and Guatemala studies as strong evidence of the costs associated with preschool malnutrition in its "Standing Committee on Nutrition (SNC): 5th Report on the World Nutrition Situation."
- *The Lancet* article was cited in an April 2008 speech by Robert Zolleick, President of the World Bank.
- The findings from both studies underpin the World Bank's strategy document, "Repositioning nutrition as central to development," and appear in the "Global framework for action" document from UNICEF's Ending Child Hunger and Undernutrition Initiative.

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