Funding the Future: Strategies for Early Childhood Investment, Costing and Financing
# Contents Coordinators’ Notebook No. 30, 2008

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Economic losses due to failure to provide early childhood development services: Empirical evidence from Eastern and Southern Africa

Sudhanshu Handa and Anand Sharma

The economic losses arising from a failure to ensure adequate ECD were recently highlighted in The Lancet (Volume 369, 2007). Calculations based on estimates of years of schooling lost due to malnutrition and slow learning, with a rate of return per year of schooling of 9%, indicate that the total loss in adult lifetime earnings due to early childhood malnutrition alone is around 22% (Grantham-McGregor et al. 2007). These estimates are based on illustrative data from panels in three countries (Brazil, Jamaica, and the Philippines).

The purpose of this article is to apply the Lancet model to two longitudinal data sets from Eastern and Southern Africa (ESA) in order to derive additional estimates of the economic cost of ignoring ECD in that region. The large sample sizes and lengthy panels make these two data sets a unique resource for researchers who wish to study the impact of early childhood circumstances on later life outcomes.

The KwaZulu Natal Income Dynamics Survey

The KwaZulu Natal Income Dynamics Survey (KIDS) is a longitudinal survey that currently has three rounds of data (May et al. 1999) and is housed at the School of Development Studies at the University of KwaZulu Natal in the Republic of South Africa (RSA). The data sets (for the years 1993, 1998, and 2004) are available to the public for direct download through the project website (sds.ukzn.ac.za/).

In this analysis, we use the 1998-2004 panel to assess the link between early childhood deficits in 1998 and later grade attainment and school achievement in 2004. We follow Grantham-McGregor and others (2007) and measure ECD deficits using stunting and living in poverty. Grade attainment is measured by years of school completed; achievement is measured by a composite score based on the number of correct responses to a set of questions on mathematics and literacy administered to children ages 7-9 in the 2004 panel. This index ranges from 0 to 12 and has a mean of 7.5 and a standard deviation (SD) of 2.5. Poverty is measured by (log of) household per capita consumption expenditures and malnutrition is measured by height-for-age z-score (with a cut-off of -2 to indicate stunting).

The relationship between household income at ages 1-4 (from the 1998 survey round) and learning six years later (2004), controlling for nutritional status and age, is shown in figure 1. The difference between the bottom and top quintiles is around 4 points, which translates into a 1.6 SD difference and is highly statistically significant. Thus loss in cognitive achievement due to early childhood poverty (controlling for malnutrition) is extremely high in RSA.

![Learning in 2004 and household income in 1998](image_url)
The effect of stunting at ages 1-7 on grade attainment (years of schooling) at ages 7-12 and on learning at ages 7-9 is estimated via multivariate regression analysis, controlling for household income and age. Predicted years of schooling and learning achievement are shown in figures 2 and 3 respectively. The effect sizes are quite substantial. By age 12 stunted children lag behind by 1.3 grades relative to normal children (figure 2); by age 9 in 2004 (age 3 in 1998, shown on the horizontal axis in figure 3) stunted children score about 0.8 points lower on the achievement index relative to normal children. These differences represent about one third of an SD in each case; for achievement, based on the trend lines in the graph, this difference can be expected to increase to about 0.6 SD by age 17, when most children end school in RSA.

We derive the economic cost of early childhood malnutrition based on the estimates presented above and a rate of return to schooling of 9% per year (cumulative lifetime earnings). The loss in years of schooling is about 1.3 by age 13 and is assumed to increase to 1.5 by age 17 based on the trend in figure 2. The loss in learning by age 17 is around 0.6 SD as explained above. Grantham-McGregor and others (2007) report that a 0.75 SD deficit in learning translates into about a 2-year reduction in schooling, so a 0.6 SD loss translates into 1.6 years of lost schooling. Thus the total loss in schooling due to stunting alone (controlling for income) in RSA is 3.1 years. Based on a rate of return of 9% per year, the cumulative lifetime loss in adult income for children who are stunted by age 7 is approximately 30%.

Grantham-McGregor and others suggest that the “poverty effect” can account for an additional 5.9% in lost earnings.
The Kagera Health and Development Survey

The Kagera Health and Development Survey (KHDS) consists of four panels collected in Kagera, Tanzania in 1993-4 and a fifth follow-up in 2004, thus providing an eleven-year longitudinal data set of over eight hundred households. These data were collected by the World Bank (2006) and are available to download at www.worldbank.org/LSMS/country/kagera2/kag2home.html. The KHDS did not collect learning achievement data, so analysis focuses on the relationship between malnutrition by age 5 (<-2 SD in height for age) and years of completed schooling eleven years later. Figure 4 plots estimated years of schooling by age in 2004, based on nutritional status eleven years earlier and controlling for income. A consistent gap in school attainment tracks all the way up to age 18, though at around 0.5 to 0.75 grades, the deficit is much smaller than that observed in RSA.

Again assuming a rate of return per year of schooling of 9%, the Kagera results suggest much smaller losses due to malnutrition alone, in the range of 4.5 to 6.75% per year. Of course these do not include losses due to reduced cognitive achievement and poverty, the addition of which will likely place the loss in lifetime earnings due to ECD failures at over 10%.

Private versus social returns to ECD

The estimates above are solely the private costs associated with ECD failures. Not included are the substantial social benefits linked to improved education, which include reductions in healthcare costs, crime, violence, abuse, juvenile delinquency, and other public externalities. The cost of crime in the U.S. has been estimated at over $600 billion per year (Anderson 1999), while results from the High/Scope Perry Preschool Project show that an ECD intervention alone can reduce crime rates by 14-26% (Barnett 2003). Consequently, the total social loss associated with neglecting early childhood development can very easily represent 40-50% of adult lifetime earnings. It is hard to imagine an alternative investment in any sector of the economy that would deliver a larger financial payoff than a well-designed ECD intervention for poor children.

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References


