



# HIV/AIDS, human capital, and economic growth prospects for Mozambique

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## Abstract

This paper examines the implications of AIDS deaths for economic growth prospects for Mozambique. Human capital accumulation through education receives particular attention. Education and human capital transition matrices are estimated using a minimum cross entropy approach. Consistent with evidence from Tanzania and elsewhere, HIV/AIDS is assumed to slow the rate of human capital accumulation. Using a dynamic computable general equilibrium approach, reduced rates of human and physical capital accumulation are shown to interact strongly with technical change that is biased towards physical and human capital. The results point to the education sector as a major and policy sensitive channel of impact.

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## 1. Introduction and background

As in other countries in the southern Africa region, a human development catastrophe is unfolding in Mozambique. Estimated HIV prevalence rates amongst the adult population in the year 2005 are around 16% with the rate projected to continue to increase with time (Ministry of Health, National Institute of Statistics, Ministry of Planning and Finance, & the Center for Population Studies, 2001). Due to the average time lag of about 9 years between infection and

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death from AIDS, the projections of AIDS deaths through 2010 are, barring rapid advances in medical technologies, essentially programmed into the system. Nearly all of the people projected to die in this decade, including the latter parts, are already HIV positive.

Efforts to comprehend the economic implications of the HIV/AIDS pandemic have been appearing in the literature for about a decade. Examples of early work include efforts by Cuddington (1993) and Kambou, Devarajan, and Over (1993). More recent assessments include Dixon, McDonald, and Roberts (2001), Robalino, Voetberg, and Picazo (2002), and Arndt and Lewis (2000). Despite well-known shortcomings, the studies typically focus on the growth rate of per capita GDP. Using this metric, the studies range widely in estimating mild to strong impacts.

Early studies of AIDS and economic growth typically focused on physical capital accumulation and rates of technical progress as the primary channels through which the pandemic impacts economic growth. However, there are real concerns about impacts on the educational system and, by extension, on rates of accumulation of human capital. Since more educated people tend to be substantially more productive, declines in rates of human capital accumulation could have significant implications for growth. This area has been the focus of more recent literature. Bell, Devarajan, and Gersbach (2003), Young (2004), and Corrigan, Glomm, and Mendez (2005) point to human capital accumulation as the major potential conduit determining the duration and severity of economic implications from the HIV/AIDS pandemic. Conclusions diverge widely. For example, Bell et al. (2003) and Young (2004) both consider the case of South Africa. Their conclusions range from a positive impact on per capita GDP, phrased as “the gift of the dying” by Young (2004), to total economic collapse (Bell et al., 2003).

In this study, human capital accumulation through education receives particular attention. The paper differs from the existing literature in that the implications of HIV/AIDS for human capital accumulation are considered from both the demand and supply sides. In addition, consistent with substantial evidence worldwide, technical change is assumed to be biased towards human capital implying interactions between growth in the human capital stock, technical change, and the rate of economic growth. Finally, empirical estimations of transition probabilities within the education sector underlie the analysis. The results point to the education sector as a major and policy sensitive channel of impact.

The paper is structured as follows: Section 2 summarizes a detailed analysis of the implications for human capital accumulation conducted by Arndt (2003). Section 3 presents the economy-wide modeling approach including critical assumptions and model scenarios. Section 4 discusses the major results. Section 5 provides the concluding remarks.

## 2. Human capital, development, and AIDS

AIDS can be expected to lower the school age population, reduce the share of the school age population that seeks to attend school, and impair the capacity of the education system to deliver on its mandate. All of these factors point to a reduced rate of human capital accumulation. The experience of Tanzania, where the pandemic is approximately one decade more advanced, appears to confirm these fears. Wobst and Arndt (2004) find a reduction in the probability that a student will attain the final year of primary school over the 1990s and point to AIDS deaths over that decade as the most plausible cause.

Arndt (2003) uses an information theoretic approach similar to Karantininis (2002) to estimate an education and skills transition matrix for Mozambique. In the approach, the population is divided into categories corresponding to young children not working and not attending school;

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