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ADULT MORTALITY IN THE ERA OF HIV/AIDS: SUB-SAHARAN AFRICA *

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INTRODUCTION

The strong age-specific impact of HIV on mortality is reshaping the population structure of African countries with substantial epidemics. The survival of adults in the worst effected countries is substantially reduced which will eventually depopulate certain tiers of the age pyramid, reducing the number of adults available to reproduce, and this together with the impact of HIV on fertility itself, will substantially alter the age distribution of severely impacted African populations for many decades to come.

This paper investigates the impact of the pandemic on adult mortality at the national level and examines the relationship between total adult mortality, HIV-related adult mortality and the prevalence of HIV among adults. The impact of HIV on the age-pattern of adult mortality is described, and data on existing age-patterns of adult death and the number of years of life expectancy lost due to HIV are discussed.

B. DATA

The data used in this work come from United Nations and World Health Organization sources. Data describing the overall number of adult deaths, HIV deaths and percent of adults infected with HIV (prevalence) come from the UNAIDS "Barcelona" Report 2002 (UNAIDS, 2002b) and refer to the calendar year 2001. Data describing the age-pattern of adult mortality come from the UN's World Population Prospects 2002 Revision (United Nations Department of International Economic and Social Affairs, 2003b) and refer to the calendar period 2000-2005. The Population Prospects contains projected figures based on empirical data collected largely in the 1990s, and for this reason the projections through the period 2000-2005 should roughly match the empirical figures for that same period. Finally, data describing the years of life expectancy lost as a result of HIV come from the UN's HIV/AIDS Population Impact and Policies 2001 (or AIDS Wall Chart) (United Nations Department of International Economic and Social Affairs, 2003a). Although most of the figures presented in the AIDS Wall Chart refer to the calendar year 1999, the life expectancy figures describe the period 2000-2005 and are therefore completely temporally compatible with the data describing HIV prevalence and number of adult HIV deaths from the Barcelona Report and the age-pattealTm(ey tempo and Wo11.0 Theed in th97.5832 Tm0m United N

Generally, male adult mortality worsens as HIV prevalence increases. Ignoring some atypical observations, most values of are below 40 percent for low HIV prevalence countries (i.e. below 5%) most of which are in West and Central Africa, except Somalia and Eritrea. It is noteworthy that the majority of low HIV prevalence countries with abnormally high adult mortality levels are those with a recent history of civil war, i.e. Somalia (60%), the Democratic Republic of Congo (57%), Eritrea (49%), Chad (45%), and Guinea Bissau (42%). From levels below 40 percent in countries with HIV prevalence rates below 5 percent, reaches values above 55 percent in 8 out of the 12 countries with HIV prevalence rates between 5 and 10 percent, and increases above 60 percent in 9 out of the 12 countries where the HIV prevalence rate is

Western Africa 4.8 percent and 3.21 per thousand; Northern Africa 2.6 percent and 1.10 per thousand. By prevalence group in descending order the average prevalences and crude

published a collection of mortality data collected by demographic surveillance system (DSS) sites in Africa and Asia (*INDEPTH*, 2002b). Seven distinct age patterns of mortality were identified in that data set, two of which likely reflected a significant impact of HIV (*INDEPTH*, 2002a) in the form of significantly elevated mortality between ages 20 to 55 for males and 20 to 45 for females. The data contributing to those patterns was almost exclusively derived (92 percent) from sites in Tanzania and South Africa over the decade of the 1990s, all of which regularly conduct verbal autopsies (Caraël and Bernhard, 1998; Chandramohan et al., 1998; Kalter et al., 1990) on all deaths. As a result, these sites can describe the distribution of deaths by *likely* cause, including HIV, over the decade of the 1990s.

A recent examination of these cause-specific death data using cause-deleted life tables revealed an increase in the probability of dying between ages 15 and 50 associated with HIV-related causes of up to 127 percent for males and 153 percent for females (Clark et al., 2003). Plotting the age-specific HIV-related (including TB) mortality rates from those sites at the beginning 1990s and again at the end of the decade reveals three distinct age-patterns of HIV-related mortality, one describing an urban setting in Dar es Salaam, one for rural settings in Tanzania, and one for the comparatively young and rapidly growing epidemic in South Africa, see figures 3.b.1-3.b.4.

The figures reveal a comparatively mature (stable) epidemic in both rural and urban settings in

displays the relationship between the probability of dying for young children aged 0-4 and adults aged 15-49 and HIV prevalence among adults aged 15-49 (both sexes). It is immediately clear that there is a striking, positive, slightly curvilinear relationship between the probability of dying for adults and adult HIV prevalence, while for young children (mainly infected through vertical transmission) there is no real relationship – if anything, a slightly negative relationship. Keeping in mind that this is a meta analysis of the UN's data describing mortality and HIV prevalence in Africa, this suggests that there is a strong relationship between HIV prevalence and adult mortality, while for children a strong relationship has not yet been empirically identified. There are several explanations for the 59p1the 59p1the 59p2Tw a72 686.1962 Tm(H

of adult HIV prevalence (United Nations Department of International Economic and Social Affairs, 2003a). Comparing these reveals that HIV/AIDS is reducing period life expectancy by from three to 34 years for males and females combined among the 35 African countries with adult HIV prevalence estimates of 1.0 percent or greater between ages 15-49, figure 4.1. Plotting the reduction in combined male and female loss in life expectancy associated with HIV by HIV prevalence reveals a linear association with about 0.93 years of life expectancy lost per one percent increase in HIV prevalence among adults aged 15-49. The intercept of the fitted line is 0.58 indicating that there is some non-linearity in this association near zero percent prevalence.

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TABLES

TABLE 1.1. HIV PREVALENCE AND LIFE TABLE PROBABILITY OF DYING BETWEEN AGES 15 AND 45 (${}_{45}q_{15}$) BY SEX IN 2000

Country	HIV Prevalence	${}_{45}q_{15}$ Males	${}_{45}q_{15}$ Females
Mauritius	0.1%	0.22789	0.10908
Madagascar	0.3%	0.38462	0.32181
Senegal	0.5%	0.35538	0.30280
Somalia	1.0%	0.59610	0.45244
Gambia	1.6%	0.37289	0.32019
Mali	1.7%	0.51791	0.43305
Eritrea	2.8%	0.49264	0.44118
Guinea-Bissau	2.8%	0.42152	0.37072
Ghana	3.0%	0.37950	0.32603
Eq. Guinea	3.4%	0.33883	0.27972
Benin	3.6%	0.38364	0.32787
Chad	3.6%	0.44864	0.36058
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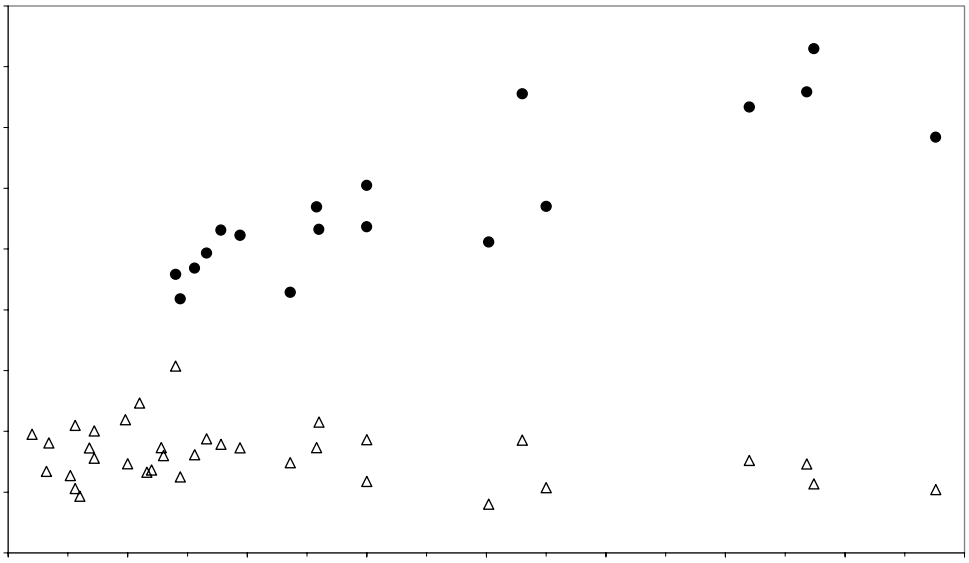
TABLE 2.1. HIV DEATHS, TOTAL POPULATION AND CRUDE HIV MORTALITY RATE FOR ADULTS 15-49 IN AFRI

TABLE 2.2. HIV DEATHS, TOTAL POPULATION AND CRUDE HIV MORTALITY RATE FOR ADULTS 15-49 IN AFRICAN NATIONS WITH ADULT HIV PREVALENCE OF ONE PERCENT AND GREATER IN 2001 SUMMARIZED BY REGION AND PREVALENCE GROUP

	HIV Deaths	Total Population	Crude HIV Mortality Rate per 1,000	Average Prevalence (%)

Figure 3.b.3. Smoothed HIV-related Sex-Age-Specific Mortality Rate for the Morogoro District DSS site (AMMP), Tanzania – source: (Clark et al., 2003)

Figure 3.c.1. Probability of Dying by HIV Prevalence (ages 15 to 49) for 35 Countries in Africa with HIV Prevalence Estimates of 1.0 percentor Greater, Males and Females Combined. (source: UN AIDS Wall Chart, accessed July, 2003, UN Population Prospects 2002 Revision, and the UNAIDS 'Barcelona Report' Report on the Global HIV/AIDS Epidemic, 2002)



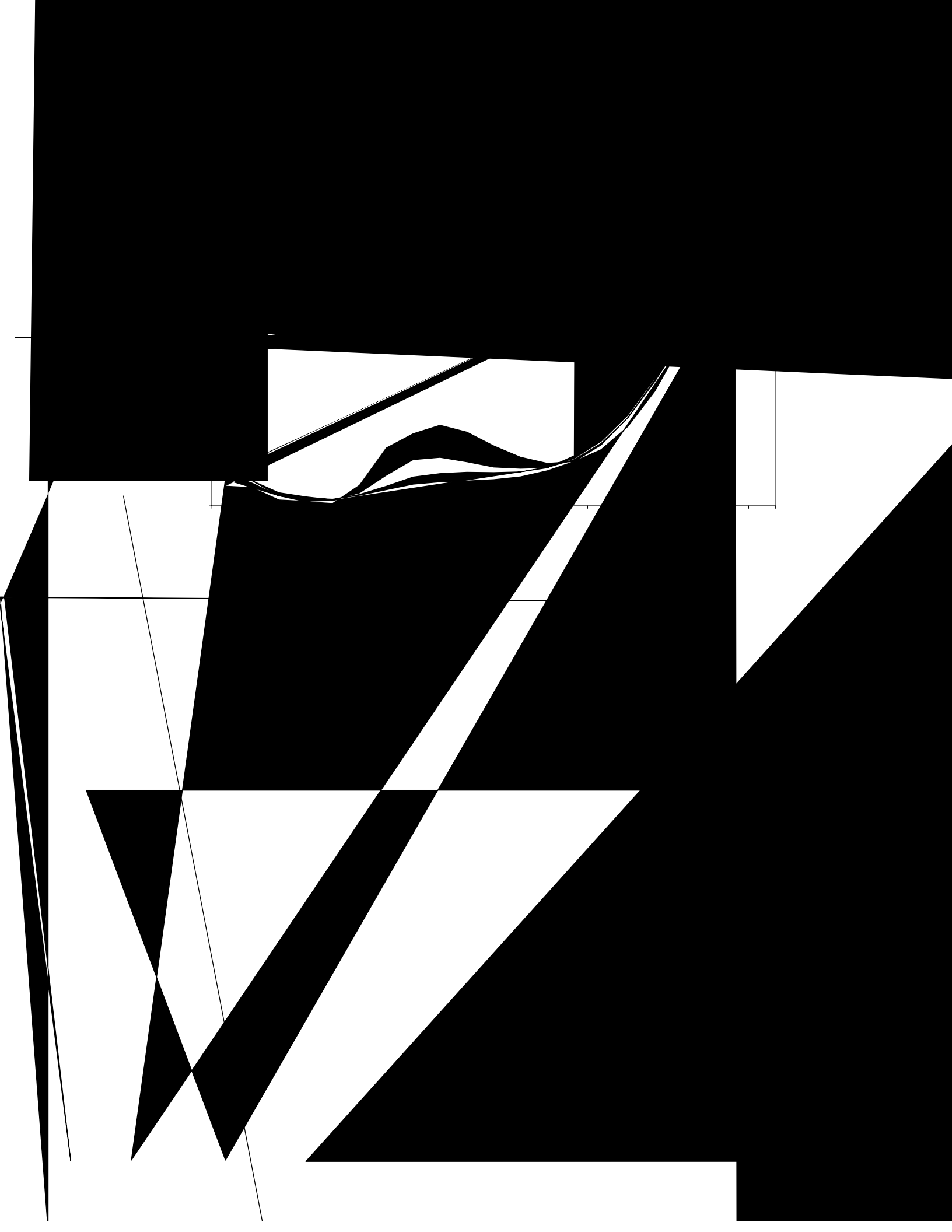


Figure 4.1 Years of Expectation of Life at Birth Lost Associated with HIV by National HIV Prevalence (ages 1[illegible] countries in Africa with HIV Prevalence Estimates of 1.0 percentor Greater, Males and [illegible] Source: UN AIDS Wall Chart, accessed July, 2003, and the UNAIDS 'Barcelona [illegible] Report' Report on the Global HIV/AIDS Epidemic, 2002)