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THE DEMOGRAPHIC AND ECONOMIC IMPACT OF HIV-AIDS IN MALAWI, 1987-2022

by

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THE DEMOGRAPHIC AND ECONOMIC IMPACT OF HIV-AIDS IN MALAWI, 1987-2022

Introduction and Scope of the Study

Malawi has one of the highest seroprevalence rates in Africa. The HIV infection is spreading at a rate of about 20-25 people per hour and new AIDS cases are emerging at a rate of six-eight people per hour according to the National AIDS Control Programme of the AIDS Secretariat of the Ministry of Health. It is estimated that between 800,000 and one million Malawians are now infected with the human immuno-deficiency virus (HIV), which is the causative agent of AIDS (acute immuno-deficiency syndrome) (Ciotti, 1993). Most if not all people infected with HIV will eventually succumb to AIDS after suffering prolonged illnesses. The transition from AIDS to death is very swift, usually within four years, with no cure likely to be available in the foreseeable future. The morbidity and mortality caused by AIDS will have an enormous impact on Malawi's social and economic development in the future especially because of the burden the disease will impose on health services delivery and family welfare.

Yet all the short- and long-term ramifications of this epidemic in productive loss or dislocation by sector, by occupation, by age and sex and by urban and rural dimensions in the country are not adequately known. The methods employed so far have not been sufficiently detailed to measure their impacts. Recent studies on the economic impact of HIV-AIDS in Africa have primarily focused on the macroeconomic aspects of the epidemic using some simplified macro models (see Cuddington, 1993 for Tanzania and Cuddington and Hancock, 1993 for Malawi). These studies have one basic feature driving the macroeconomic effects of the epidemic: the use of a macroeconomic model with a declining labor force caused by AIDS, usually a supply-side orientation in a macro framework. But this is not sufficient because it does not identify where the economic effects of HIV-AIDS are felt, that is, which sectors of the population are likely to suffer from what degrees of loss of welfare. Therefore, USAID/Malawi has launched some systematic analytical and statistical investigations to come to grips with the multiple dimensions of the HIV-AIDS epidemic.

The present study offers some analytical and statistical approaches to HIV-AIDS that can be used for determining the scope of future policy interventions in Malawi with regard to the epidemic.

Briefly, the methodology has the following key stages in a sequential order:

1) construction of demographic forecasts (without HIV-AIDS) for Malawi by district and nation using appropriate assumptions of total fertility rate (TFR), urban-rural growth, life expectancy, and choice of a life table (this may be characterized as DEMOGRAPHICS without HIV-AIDS);

2) analysis of the HIV-AIDS data base in Malawi and choice of an epidemiological model (EPIMODEL) for forecasting the national level seroprevalence rates over the years 1987-2022;

3) calibration of the EPIMODEL to the estimates of national and district level seroprevalence rates in adults in Malawi for application to the DEMPROJ model (demographic projections model by the Futures Group, Washington, DC) to obtain DEMOGRAPHICS with HIV-AIDS, by district and for the nation;

4) derivation of HIV-AIDS impacts on demographics in Malawi with such statistics as rates of HIV infection, number of new AIDS cases, deaths due to AIDS, changes in the dependency ratio, infant mortality rate, orphans due to AIDS, and classification of deaths due to AIDS by occupation and sector (characterized as DEMOGRAPHICS with HIV-AIDS);

5) clarification of assumptions regarding replaceability of loss due to deaths by AIDS by occupation from the unemployed or underemployed labour force (ECONOMIC MODEL);

6) calibration of non-replaceable loss of productive labour force to macro and sectoral impacts on variables such as GDP, employment, unemployment and labor earnings

over time (ECONOMIC MODEL);

7) impact of health care costs due to HIV-AIDS (defined as direct costs) on private savings and the evaluation of economic consequences (ECONOMIC MODEL);

8) spatial impacts (distinguished by the 24 districts of Malawi) of manpower loss due to AIDS by sector over time (ECONOMIC MODEL);

9) policy implications of the epidemic and suggestions for some preventive measures to redress the economic and social losses due to HIV-AIDS.

This study is organized in three primary sections: Section 1 incorporates Stages 1 through 4, which are referred to collectively as the Demographic Impact of HIV-AIDS in Malawi; Section 2 incorporates Stages 5 through 8, which are characterized as the Economic Impact of HIV-AIDS in Malawi; and Section 3 explores the policy implications of redressing some of the economic and social costs of HIV-AIDS. The present report analyzing the various aspects of the study begins with a summary of the major findings which serves also as an overview of the issues involved. All statistical tables are appended at the end of the text in three segments: (1) ANNEX describing the main statistical results referred to in the text; (2) Statistical Appendix with demographic simulations of DEMPROJ Model; (3) ANNEX (2) showing the relevant data for prevalence rate estimation in 24 districts of Malawi.

SUMMARY AND CONCLUSIONS

Most of the world's AIDS victims are in Africa, where the current economic and social structures are not adequate to cope with the consequences of the epidemic. With one of the highest seroprevalence rates (HIV infections) on the continent, Malawi is facing very difficult choices for combating the epidemic in both the medium and the long term. The present study, sponsored by USAID/Malawi, is intended to explore in depth the repercussions of the epidemic on both the demographic and the economic fronts over a 35-year period, 1987-2022, to provide a framework for HIV-AIDS policy interventions. It is multidimensional and multisectoral, and it captures a long-range point of view, covering a large array of analytical and factual information suited to policy analysis of AIDS impact in Malawi.

The study is divided into three sections:

(a) Epidemiological and Demographic impact of HIV-AIDS, 1987 - 2022,

(b) Economic impact of HIV-AIDS, 1987 - 2022, and

(c) Policy implications.

In the first two sections, an attempt has been made to balance an analytical methodology and an empirical application suitable to Malawi's conditions. In the third section, policy implications provide a menu of some cost-effective options that the country can choose to combat the epidemic and its widespread effects.

1. MAJOR FINDINGS

A Epidemiology

(1) From both the analytical and empirical points of view the most important, but often neglected, aspect of HIV-AIDS research is the epidemiological foundation of the "incidence rate" over time, i.e., the probability of HIV infection for an adult (hitherto uninfected) at different points of time. There

is no standard principle of incidence rate prediction. It varies with the level of the current HIV-infected population, the prevalence of sexually transmitted diseases (STDs) and condom use, and with many other socio-cultural aspects of marital and extra-marital sexual practices. In the empirical assessment of Malawi a peak incidence rate of 3.5 percent in 1996 (for adults) has been hypothesized, followed by a slow but steady decline. As the incidence rate triggers the prevalence rate, there is a high national prevalence rate of 20 percent (adult) in 1995 and 21 percent in 1996 followed by a lower prevalence rate in later years. This hypothesis is based on the most plausible scenario currently acknowledged by the social researchers in the field including the AIDS Secretariat, and it is buttressed by the growing consciousness of Malawians who are concerned about the rapid pace of HIV infections to take preventive actions. However, research on the empirical content of incidence rate by age-sex cohorts and socio-economic characteristics (urban and rural) in Malawi has been very limited so far. It is an important area for further social and epidemiological research.

(2) A national HIV prevalence rate in Malawi and its projections for the future cannot be determined without a bottom-up aggregation of different prevalence rates available in various districts or regions in the country. This aggregation process should also separately cover urban and rural areas for which HIV prevalence rate data exist in some segments of the historical period. The empirical exercise in the study arrives at the national prevalence rate from the disaggregated district-level prevalence rate from the segmented data by an aggregation process. It is a desideratum for research as well as for policy.

(3) Demographic projections with and without HIV-AIDS have been made with the help of DEMPROJ model (the Futures Group, Washington) for each of the 24 districts of the country over the period 1987-2022 in five-year intervals. District-level projections are summed up to national projections of all demographic variables including those of expected new HIV infections, new AIDS cases and new deaths due to AIDS.

The assumptions in the national projections (and implicitly in the district projections) include:

(a) a declining fertility rate from 6.7 in 1987 to about 3 in the year 2022

(b) an increasing life expectancy from 45 years in 1987 to 60 years in 2022

(c) a life table (Coale-Demeny (North)) of mortality (or survival) rates,

(d) an initial (1987) population base by age/sex, urban/rural and district dimensions

(e) a time path of HIV-prevalence rates

(f) standard assumptions of HIV to AIDS conversion

(g) standard rate of perinatal transmission of HIV (mother to child) and

(h) progression rates of AIDS to death (adults and children).

Adjusting the national assumptions to districts yields district-level demographic impacts (without AIDS and with AIDS) over the period 1987-2022. At the national level the HIV-AIDS impacts show the following features:

(1) In 1994 the HIV-infected population (adults and children) is estimated to be about 1 million. This population reaches a peak level of 1.4 million in 1998 and then declines (Table 20).

(2) New HIV infections (annual) conform to a bell-shaped curve with a peak of about 237,000 in 1996 whereas the average annual HIV infections during the period 1990-2000 amount to 175,000. The decline in new HIV infections (below 100,000 after 2000) is a reflection of the assumption of declining prevalence rate over time (from the level of 21 percent in 1996 the rate is assumed to decline by 1 to 2 percent per year (Table 20).

(3) Following the pattern of HIV infections, new AIDS cases peak (with an average lag of about 8 years) in 2002 at 221,000 and thereafter decline gradually until the second decade of the next century when they become much less numerous. Cumulative AIDS cases reach about 2.5 million by the year 2015 (Table 20).

(4) Annual deaths due to AIDS peak in 2001 (212,000) with the maximum concentration of deaths during the period 2000-2004 (with an average of 200,000). By the year 2022, a total of 2.5 million people are likely to have died because of AIDS (Table 20).

(5) The proportion of AIDS deaths in the total deaths (inclusive of AIDS) is estimated to rise from the current level of 18 percent (in 1995) to an average of 75 percent during 2000-2005 (Table 20A). The composition of mortality by disease is dramatically altered.

(6) Based on the maternal death definition of orphanage, it is estimated that about 167,000 children (0-14 age group) become newly orphaned every year during 2000-2005, a period of maximum concentration for the entire time span of the study. On a cumulative basis, whereas the orphan population is only 121,000 in 1995, by 2000 this population surges to 689,000 and by 2005 to 1.5 million. The number of new orphans falls to lower levels year during 2006-2022 resulting in a cumulative orphan population of about 2 million by 2022 (Table 21(D) and Box A below).

BOX A ORPHANS BY MATERNAL DEATHS DUE TO AIDS (in thousands, selected years)					
	YEAR				
	1995	1997	2000	2005	2010
New Orphans	43	80	168	141	51
Cumulative Orphans	121	272	689	1520	1925
Source: Table 21(D)					

(7) Changes in the fertility rate response to the AIDS epidemic have been difficult to articulate because of both negative and positive contributory factors. There is no clear evidence as to which of these factors might dominate in the long run, given the divergent socio-economic characteristics of seropositive women in the country.

B. Demographic Impacts

The impacts of HIV-AIDS on key demographic variables in Malawi are summarized as follows:

(1) As shown in Box B, the annual population growth rate with AIDS declines by about 0.7 percentage point on the average when compared to the growth rate without AIDS during 1992-2012.

BOX B Average Annual Population Growth Rate (in percent)				
	YEAR			
	1992-1997	1997-2002	2002-2007	2007-2012
Without AIDS	2.8	2.6	2.4	2.2
With AIDS	2.0	1.5	1.7	2.0
Difference	0.8	1.1	0.7	0.2
Source: Table 22.				

By the year 2007, AIDS is likely to reduce the population by about 1.4 million, and by 2022 the reduction is about 1.7 million (Box C). The reduction of population is less than the total number of deaths (2.5 million) by 2022 because births continue to rise in the presence of AIDS under the assumption of an unchanged fertility rate.

BOX C Population and Labor Force, with and without AIDS (in thousands)						
Population	YEAR					
	1997	2002	2007	2012	2017	2022
Without AIDS	10858	12362	13924	15565	17248	18923
With AIDS	10483	11423	12491	13877	15483	17168
Difference	375	939	1433	1688	1765	1755
Labor Force						
Without AIDS	5457	6264	7495	8790	10097	11477
With AIDS	5188	5615	6550	7733	8991	10272
Difference	269	649	945	1057	1116	1205
Source: Table 22.						

(2) Labor force (age 15 - 64) loss with AIDS amounts to 270,000 in 1997, 650,000 in 2002, 945,000 in 2007, and about 1 million in subsequent years. Nevertheless, the results indicate a growing labor force over time in spite of AIDS, i.e., there is no absolute decline in labor force with AIDS (Box C).

(3) Life expectancy with AIDS falls very rapidly and infant mortality rate (IMR) rises very sharply during 1997-2012 (Box D). The average decline in life expectancy during the period is above 5 years and the rise in IMR is about 44 points (per thousand). These effects are less severe in the later period 2012-2022 as deaths are much less numerous. AIDS therefore causes a severe blow to the health status of the population in general and children (infants) in particular.

BOX D

Life Expectancy and Infant Mortality Rate (IMR)

	YEAR				
Life Expectancy	1992-1997	1997-2002	2002-2007	2007-2012	2012-2017
Without AIDS	46.0	47.8	49.6	51.4	53.2
With AIDS	43.6	42.0	44.4	48.4	52.0
Difference	2.4	5.8	5.2	3.0	1.2
IMR (Per 1000)					
Without AIDS	127.6	118.1	109.4	101.1	92.9
With AIDS	156.3	167.1	163.8	129.6	105.7
Difference	-28.7	-49.0	-54.4	-28.5	-12.8

Source: Table 22.

(4) Labor force share of population with AIDS declines by about 1 percentage point (on the average) compared to the scenario without AIDS particularly during 2002-2022 (based on average of Box C). The maximum drop of 1.5 percentage points occurs during 2002-2017. The corresponding dependency ratio (the ratio of children plus elderly to the labor force) therefore rises,

which is likely to put an increasing burden of economic and social costs of AIDS on the society through a loss of productive labor force and a fall in average age (from about 32 to about 31) of the labor force during the period 2000-2015.

(5) Whereas it is assumed that the average Malawian is expected to be employed for about 25 years between the ages 15 and 65, the average adult HIV-infected Malawian will work for only 10 years for the same age group. This loss of 15 productive years due to AIDS is translated into 20 years of loss for urban workers and about 14 years for rural workers.

C. The Economic Impact

The economic impact assessment of HIV-AIDS is operationalized by two routes: (a) the method of direct costs of HIV-AIDS, and (b) the method of indirect costs of AIDS which involves both a human capital approach (earnings loss) and a macro approach to GDP loss.

C.1 Direct Cost of HIV-AIDS

(1) The direct costs of testing for HIV-AIDS and treatment costs (at hospitals) of adults amount to Malawi Kwacha (MK) 15.6 million (evaluated in 1990 prices) in 1992, then rise progressively till 2000 with a peak of about MK93 million, whereafter costs decline (Box E).

The corresponding shares (in percent) of these costs in the Ministry of Health curative budgets show similar movements, starting from 26 percent in 1992 to about 87 percent in 2000 (Box E).

Box E Direct Costs of HIV-AIDS of Adults (Hospitals) & Ministry of Health Curative Budget Burden (in millions of Malawi Kwacha in 1990 prices)						
	YEAR					
	1992	1995	2000	2005	2010	2015
Direct Costs	15.6	42.9	92.6	78.0	45.0	13.4
Share in MOH Budget (in percent)	25.8	51.6	87.4	57.6	26.0	6.10
Source: Table 26(AA).						

The period 1995-2005 shows a strong pressure on the Ministry of Health budget which is likely to crowd out health services for other illnesses, thus worsening the standard of hospital health care. Forsythe (1992) reports similar rising shares over time (up to 2000), but the magnitudes are much lower because of his assumption of much lower levels of projected HIV-AIDS prevalence than this study. The country has no choice but to expand home-based care on a sustainable basis.

(2) In the absence of reasonable estimates of funeral costs for adults and children, this study has used one half of the costs of HIV-AIDS as a benchmark, which is conservative. This renders the funeral costs estimates (for adults) to be approximately MK51 million and MK47 million in 2000 and 2005, respectively, whereafter these costs tend to fall in later periods as fewer deaths occur (Table 26a). Even with much lower funeral costs of children (with fewer deaths than adults), these enormous private costs are likely to be borne largely by household dissavings, thereby reducing national savings and future investment.

(3) The direct treatment costs of HIV-AIDS for children (0-2 age group) are much lower than those of adults mainly because of (a) lower incidence of HIV-AIDS in demographic projections and (b) lower per capita funeral costs assumed (Table 26(B)).

C.2 Indirect Costs of HIV-AIDS

There are two approaches to indirect cost measures: (a) macro modeling approach to GDP estimation and (b) human capital approach to earnings loss estimation. The macro approach is much wider than the human capital approach. The latter captures only the loss of present value of all AIDS-stricken individuals' future earnings due to illness or death discounted to the time of death or illness. The macro impact is formalized in a growth model which is designed to assess the contributions of reductions in household savings, worker productivity and loss of non-replicable qualified manpower to the growth of GDP and other macro variables. Based on a supply-side model (Cuddington 1993, 1994) modified to take care of Malawi's historical past, 1987-1994, the assumptions and results of macro approach can be summarized as follows:

C.2.1 Macro Results of AIDS Impacts

The key assumptions which drive the macro results with AIDS over the period 1987-2022 are:

(a) productivity loss due to rising morbidity as a result of illness due to HIV-AIDS;

(b) shift of the labor force towards younger and less experienced workers (after AIDS) reducing the "efficiency age" of work force employed and, therefore, loss of worker productivity;

(c) loss of labor force (experienced) after AIDS which cannot be replaced by existing labor force, and therefore the factor of replaceability or the possibility of substitution with extra investment must be taken into account;

(d) direct costs of treatment of HIV-AIDS (adults and children) are deducted from domestic savings that could have prevailed in the absence of HIV-AIDS; this reduces domestic savings in the presence of HIV-AIDS.

The macro results of AIDS impacts from model simulations with the above assumptions are shown below:

(1) GDP level differences between Model 1 (without AIDS) and Model 2 (with AIDS) in various periods show that during 2000-2020 about 14 percent of GDP loss occurs on the average in each year with the maximum of 17 percent loss in the year 2010 (Box F). This is the one of the most significant losses ever recorded in empirical macro assessments for any African country.

BOX F

GDP Levels (in millions of 1990 Kwacha)

	1992	1995	2000	2005	2010	2015	2020
Model 1 (without AIDS)	4510	4820	5964	7350	9140	11336	14431
Model 2 (with AIDS)	4457	4604	5308	6220	7599	9455	12121
Difference (Model 1 less Model 2)	53	216	656	1130	1541	1881	2310
% Difference	1.1	4.5	10	15.4	16.9	16.6	16.0

Source: Table 28 and Table 29

(2) With AIDS, GDP growth rate falls by about 1.3 percent per year during 1992-2005 and the maximum impact is recorded during 1995-2000 with a decline of 1.5 percent (Box G). For the entire period 1990-2022 the average growth rate decline is 0.55 percent.

BOX G GDP Annual Growth Rate, with and without AIDS (Averages, in percent)						
	YEAR					
	1992-1995	1995-2000	2000-2005	2005-2010	2010-2015	2015-2020
Without AIDS	2.2	4.4	4.3	4.5	4.4	4.9
With AIDS	1.1	2.9	3.2	4.1	4.5	5.1
Difference	1.2	1.5	1.0	0.4	-0.1	-0.1
Source: Table 28 and Table 29						

(3) On a per capita (GDP/population) basis, the decline in the growth rate continues by 0.5 percent per year for the period 1992-2005 whereas the maximum impact is recorded by 0.65 percent during 1995-2000 (Box H). Over the period 1992-2020, the average per capita growth falls by 0.3 percent.

BOX H Per Capita GDP Annual Growth Rate, with and without AIDS (Averages, in percent)						
	YEAR					
	1992-1995	1995-2000	2000-2005	2005-2010	2010-2015	2015-2020
Without AIDS	-0.14	1.58	1.73	2.10	2.21	2.94
With AIDS	-0.65	0.93	1.42	2.04	2.21	2.90
Difference	0.51	0.65	0.31	0.06	0.00	0.04
Source: Table 30						

(4) Capital/labor ratio grows faster with AIDS than without as the economy tries to adjust to a slower growth in the labor force. This is primarily due to the fact that the replacement factor (assumed to be 95 percent of lost labor force due to AIDS which can be replaced by labor force after AIDS) has reduced the possibility of employment. Consequently, the unemployment rate with AIDS shows an increase in every year even with declining labor force relative to the labor force without AIDS.

C.2.2 Sectoral Impacts of HIV-AIDS

The macro results of AIDS impacts have been collapsed into different sectors, e.g, agriculture, manufacturing, construction, trade, transport, and other services, distinguished by formal/informal and urban/rural classification. This mechanism has yielded the following distribution of loss in employment and wage earnings by sector for urban and rural areas in the country.

(a) In urban areas with respect to loss of total earnings (wages), the maximum loss is registered in manufacturing (MK208 million in 1990 prices) followed by community and social services (MK100 million, including government), trade (MK69 million), transport (MK58 million) and finance (MK53 million) over the entire period 1990-2022 (Box I). The employment loss does not follow the same pattern because of differences in average earnings: the largest loss in employment due to AIDS is shown in manufacturing (75,700) followed by agriculture (72,800), trade (48,900), transport (41,600) and construction (38,100) during the period (Box I).

BOX I

EMPLOYMENT AND LABOR EARNINGS LOSS DUE TO AIDS, URBAN AND RURAL, BY SECTOR
(Employment in thousands, and earnings in millions of 1990 MK), 1990-2022

	URBAN		RURAL	
SECTOR	EMPLOYMENT	EARNINGS	EMPLOYMENT	EARNINGS
AGRICULTURE	72.8	29.2	1371.1	732.3
MINING	0.3	0.1	0.1	0.1
MANUFACTURING	75.7	208.1	32.4	121.2
ELEC + WATER	3.8	14	0.6	2.7
CONSTRUCTION	36.1	28.5	26.8	23.6
TRADE	48.9	68.7	26.3	48.4
TRANSPORT	41.6	58.1	17	30.7
FINANCE	13.2	53	0.6	2.1
COMMUNITY SERVICES	86.5	101	46.6	71.2
TOTAL	378.9	560.7	1521.5	1032.3

SOURCE: TABLES 35, 36, 37, 38.

If earnings loss is the main consideration to be taken into account in an AIDS program for prevention, then employment loss fails to be a criterion, as saving the more productive labor force with better earnings becomes more important.

(b) In the rural areas, the loss of workers and earnings due to AIDS is overwhelming in the agricultural sector because of the sheer size of the labor force lost due to AIDS in spite of differences in earnings across sectors. Over the entire period 1990-2022 about 1.37 million workers are lost in agriculture, followed by 47,000 in community and social services, 32,000 in manufacturing, 27,000 in construction and 26,000 in trade. On the earnings side, the ranking changes with agriculture leading (MK732 million), followed by manufacturing (MK121 million), community (MK71 million), trade (MK48 million), transport (MK31 million) and construction (MK24 million) (Box I).

(c) The ratio of urban earnings loss (undiscounted) to rural earnings loss over time, 1990-2022, shows an increasing trend, rising from a level of 0.40 in 1990 to about 0.63 in 2022. This says that the burden of earnings loss due to AIDS falls disproportionately on the urban sectors over time as more productive workers in the urban areas with higher average earnings are lost without concurrent recoupment from the remaining labor force.

C.2.3 Human Capital Aspects of AIDS Impacts

The human capital approach to earnings loss (of workers) due to AIDS has captured two steps in the calculation procedure. These are:

(a) the determination of average years of life lost to AIDS by urban and rural areas and

(b) the timing of cumulative earnings lost by year for urban and rural areas (where earnings are time-variant).

The simulations implemented assume a loss of 20 years for an average urban worker and 14 years for an average rural worker which is consistent with the average national years of life lost due to AIDS of 15. The results indicate the following features after the earnings loss is subjected to two social discount rates, 5 percent and 10 percent respectively.

(1) The undiscounted total loss of urban earnings amounts to about MK11 billion whereas that of rural earnings (undiscounted) amounts to about MK16.5 billion over the entire time period 1990-2022. The national loss is therefore MK27.5 billion. The time path of national earnings loss as a percentage of GDP (without AIDS, but not cumulated) shows a bell-shaped curve peaking out in the years 2008-2009 which registers as high an impact as 17 percent (Table 39). This share falls thereafter as the number of deaths (of workers) subsides.

(2) The discounted urban and rural earnings losses (both at 5 percent and 10 percent discount rates) show the same urban dominance in the period 2015-2022. The national loss of earnings over the entire period, 1990 - 2022, is estimated to be MK10.4 billion and MK 4.5 billion at 5 percent and 10 percent discount rates respectively (see Table 39). For the economic interpretation of present value calculation of economic losses, even the low number of MK4.5 billion (in 1990 prices) with a very high discount rate of 10 percent represents a considerable drain on the resources of the nation.

C.2.4 Spatial Impacts of HIV-AIDS by District and Region

The spatial impacts of employment loss due to AIDS are organized by mapping a district-level dimension to the sectoral distribution of employment and earnings in the country. This transformation has been obtained with the 1987 census benchmarks of distribution of shares in employment by district and sector for urban and rural areas in the country. The results show that:

(a) In urban areas by the year 2010, Blantyre is likely to lose about 46,220 person-years (not people, but the cumulative number of workers' productive years) in manufacturing alone whereas Lilongwe can lose about 11,420 in the same sector. For the same year, 2010, urban losses by region amount to 32,000 for the north, 122,000 for the center and 190,000 for the south. Sectoral composition of losses vary: for the south (dominated by Blantyre district) it is dominated by manufacturing, for the central region it is by community services (including government employees) and for the north it is by agriculture (see Table 51).

(b) In regard to rural losses of man-years for the year 2010, as an illustration, 1.2 million are lost in agriculture of which about a half is borne by the southern region and slightly less by the central region. In the south for the agricultural sector, the largest burden is borne by Mulanje followed by Machinga and Mangochi, whereas in the center the impact in agriculture is disproportionately

on Lilongwe. Apart from agriculture, which accounts for about 90 percent of the rural loss, the remaining burden is shared by community services, manufacturing, trade and transport in descending order (see Table 50).

2. Policy Implications

Because AIDS affects primarily the most productive age group and it is fatal with no cure in sight, it has a larger negative impact on development and growth than other more common diseases such as malaria. In Malawi the economic costs of AIDS are considerable, according to the findings of this study. The government in collaboration with donor agencies should be urged to intensify programs to mitigate the impact and to target prevention programs to the economic sectors most sensitive to HIV infection.

To mitigate the impending socio-economic consequences of HIV-AIDS in the coming decades, this study recommends the following activities for studies and strategies.

(1) Greater investment in cost-effective preventive actions to combat new HIV infections immediately;

(2) In-depth assessment of behavioral characteristics of high risk groups, e.g, urban transient workers, prostitutes, upper class and skilled professionals;

(3) Social impact survey of AIDS-inflicted households to understand coping mechanisms and how their sufferings can be mitigated;

(4) Financing the rising AIDS-related expenditures (both recurrent and development) in Malawi's hospitals to release the pressure on other illnesses which are being crowded out of health care;

(5) Development of home-based care and health centers to care for AIDS patients at decentralized level (includes information, education and communications (IEC) counseling of victims and their relatives);

(6) Sex education at an early age (primary and secondary) and adult sex education in respect of HIV-AIDS;

(7) AIDS education in the work place (both private and public) to ensure that the management is vested in AIDS prevention with specific programs;

(8) Social service assessment teams to address taking care of growing orphan population;

(9) Labor market studies in particular sectors ,e.g., agriculture, civil service, manufacturing (food products, textiles, tobacco and tea processing, sugar refinery), construction, trucking activity and education;

(10) Development of a more consistent statistical information system (includes sentinel surveillance) on a continuing basis through National AIDS Control Programme (NACP) under the AIDS Secretariat of the Ministry of Health;

(11) A National Plan of Action for AIDS with decentralized strategies, monitoring systems and IEC campaigns.

The policies above are not mutually exclusive, i.e., there are cross-cutting issues among them. The capacity of existing institutions to implement policies and the rationale for a new institutional back-up must be considered in determining which of the 11 policies are the most urgent. The above list distinguishes the preventive measures (items (1), (2), (6) and (7)) from the attenuating measures (items (3), (4), (5), (8), (9) and (10)), with the National Action Plan (item (11)) combining the thrust of all items in one. Attenuating measures are a social necessity since ignoring them will involve social costs which policy actors cannot afford to avoid.

2.1 Recommendations

(i) Cost-effective Investment Program to Prevent Rapid HIV Infections

The study has carried out two alternative scenarios of investments necessary to promote 20 percent and 40 percent reduction in HIV seroprevalence for adults starting in 1996. These are likely to reduce the number of seropositive adults from the year 2003 (with an average gap of 8 years incubation period from HIV infections in 1996 to deaths by AIDS in 2003). The results show the following:

(a) A 20 percent reduction in HIV prevalence from 1996 onward reduces deaths due to AIDS by about 12,370 adults annually and a 40 percent reduction just doubles the reduction of deaths (with no economies of scale);

(b) The discounted national earnings (at a 5 percent discount rate) saved is about MK908 million (in 1990 prices) with a 20 percent reduction and about MK1824 million with a 40 percent reduction;

(c) The economic benefit per adult life saved amounts roughly to US$ 1,240 in both scenarios;

(d) Since most studies in AIDS prevention believe that the benefit-cost ratio should lie between 2 and 4, an investment of about US$ 7.7 million per year (benefit - cost ratio = 2) is necessary to avert about 12,400 adult deaths per year from the beginning of the first decade till the end of the second decade of the next century.

On a per capita basis, this means that an investment of US$ 620 per adult is necessary to save one productive adult life.

(ii) **Behavioral Policy Research**

Sexual behavior of high-risk groups particularly in urban areas accounts for the high seroprevalence in Malawi. The groups are:

(a) urban transient workers, often unaccompanied by their wives and children
(b) prostitutes
(c) upper-class and skilled professionals.

There is very limited empirical research on the roles of multiple sex partners and unsafe sex practices such as low use of condoms by high-risk groups in the spread of HIV-AIDS.

(iii) **Cost of AIDS-Related Expenditures in Malawi's Hospitals**

With the pressure of AIDS-related expenditures on Malawi's hospital budgets growing every year, reallocating extra government expenditure to the health sector is not likely to materialize because of macroeconomic fiscal constraints. Alternatives appear to be: (a) larger donor aid to cover some recurrent expenditures related to HIV-AIDS and (b) home-based care for AIDS victims. The latter has not received the careful attention it should. Home-based care remains the most viable long-term solution to the problem of caring for AIDS victims.

(iv) **Statistical Information System on HIV-AIDS**

The current statistical information system based on epidemiology of HIV-AIDS is carried out by National AIDS Control Programme (NACP) at AIDS Secretariat of the Ministry of Health. It had promising developments in the early 1990s, but it is under severe stress to articulate timely data development, monitoring and analysis for policy research. There has been the evidence of repeated underreporting due to limited staff and insufficient surveillance in recent years. There is a technical vacuum in the Secretariat which needs to be filled by immediate and appropriate technical assistance from donor agencies with the support of the Malawi Government in order to build national capacity.

SECTION I

DEMOGRAPHIC IMPACT OF HIV-AIDS IN MALAWI

1.0 DEMOGRAPHIC PROJECTIONS: SOME KEY ISSUES

There have been two main demographic surveys in Malawi which have served as the basis for population projections. These are 1) the 1987 Census of Population and 2) the Demographic and Health Survey (DHS) of 1992, both undertaken by the National Statistical Office (NSO). The 1987 Census of Population has only recently published information on life expectancy, total fertility rate and interdistrict migration. Although DHS provide some information on fertility behavior, the influence of HIV-AIDS on fertility and the related demographics have not been studied so far on an adequate basis.

For demographic projections of Malawi the key variables determining forecasts are deemed to be total fertility rate (TFR), life expectancy (LE), interdistrict migration, international migration (primarily governed by flow of refugees) and the influence of HIV-AIDS. The present study has assumed a very limited role of interdistrict and international migration for long-term projections and has created two sets of demographic projections: (1) without HIV-AIDS and (2) with HIV-AIDS. In the history of demographics without HIV-AIDS, data are available with respect to age-specific fertility rates (ASFR) and patterns of mortality rates (infant, children under five and maternal) to reflect life expectancy data, but they are not good enough for forecasting. Even the forecasts of TFR and LE (before considerations of HIV-AIDS impacts) at the national level are weak. For national-level demographic projections, some basis has to be found to verify and incorporate these two variables in order to obtain reliable demographics without AIDS. In the absence of a sound empirical or econometric basis two scenarios of TFR for Malawi are organized as:

a) Scenario A (Reference Solution)

YEAR:	1987	1992	1994	2000	2010	2022
TFR:	7.6	6.9	6.6	5.4	4.4	3.5

b) Scenario B (Optimistic Solution)

YEAR:	1987	1992	1994	2000	2010	2022
TFR:	7.6	6.9	6.6	5.4	4.0	2.9

(See Tables 1 and 2, Annex)

Scenario A is expected to be commensurate with an aggregate life expectancy (male and female combined) starting with 45 in 1987 and ending with 54 in 2022, whereas in Scenario B by the year 2022 life expectancy is expected to improve to 60. Note that in both scenarios TFR stays at 5.4 in the year 2000, and thereafter the two scenarios differ, which affects the pattern of life expectancy. These scenarios are more optimistic than what has been traditionally assumed for demographic projections for Malawi. For example, the forecast in a Ministry of Economic Planning and Development (EP&D) demographic exercise in 1992 projected an average TFR of 5.8 during 1997-2002 (Optimistic Solution, see EP & D/OPC (Office of the President and the Cabinet) Report, 1992). Scenarios in this study are slightly more optimistic for the same period with an average of 5.4, given the current pace of greater urbanization impacting on a reduced family size.

The main estimated equation driving the TFR forecasts is given by the following equation:

$$TFR = 1.935 + .05*(40-U) + .15*(70-LR) \quad \text{.....(1)}$$

where,

TFR = total fertility rate,

U = percentage of urban to total population (urbanization variable),

(40 = maximum extent of urbanization that the country can achieve over the next 50 years),

LR = literacy rate at the national level (in a percentage form),

(70 = maximum extent of literacy rate at the national level that the country can achieve over the next 50 years), and

1.935 = constant term, which captures the influence of all other variables not included here such as use of contraceptives, extent of information, education and communication (IEC) technology, family planning methods and per capita income.

The above equation has been obtained by simulating different values of TFR for three periods, 1987, 1992 and 1994, given the actual values of U and LR during those years, subject to alternative maximum values of U and LR (here 40 and 70 respectively). The coefficients .05 and .15 to U and LR respectively have been derived to minimize the residuals (calculated minus actual) of TFR for 1987, 1992 and 1994 subject to judgments that literacy should be given a larger weight than urbanization. The simulated values have created the residuals which have yielded the constant term (equal to 1.94) over the 35- year forecast. Following the estimated TFR over time, adjustments have been made to life expectancy of males and females over time with judgments reflecting the expected decrease of mortality rates which should follow a corresponding decline of TFR. Adjustments to life expectancy have been effected by use of linear interpolation rules which do not ask for actual empirical foundations. The current data on TFR are largely disaggregated by urban and rural areas by different dimensions such as age of marriage, education, number of dependents, and marital status, and are not amenable to forecast aggregate TFR and LE at the national level. The approach taken here is governed by the simplicity of a behavior equation for the national TFR which is guided only by two variables, namely urbanization and literacy rate.

1.1 DEMOGRAPHIC PROJECTIONS OF MALAWI WITHOUT HIV-AIDS, 1987-2022

The demographic model used is DEMPROJ version 3.64. The model requires some essential data inputs for implementing projections exercises, which are listed as follows:

a) initial (base year) levels of population data by age, sex classified by urban and

rural areas, and by district

b) forecast levels of TFR by nation and district

c) forecast levels of life expectancy (LE), males and females, by nation and district

d) choice of a life table that corresponds to mortality rates, particularly for infants and under-five children, and the general population

e) expected growth rates of urban and rural populations by nation and district

f) number of male births for 100 female births

g) age distribution of fertility, and

h) international net migration rates.

Contrary to previous projections exercises of the National Statistical Office, Ministry of Economic Planning and Development (Office of the President and the Cabinet, 1992) and World Bank, which are aimed at arriving only at the demographic projections at the national level with minor regional variations, this study focuses separately on district-level forecasts and national forecasts. This approach provides more consistency since district-specific characteristics of fertility, mortality and HIV-AIDS offer a wider range of demographic outcomes than what national projections can offer. From a policy point of view this is more germane to HIV-AIDS impact studies where the national level results are aggregated from the district levels even though this may amount to a large number of simulation results with district focus.

In implementing the exercise of demographic projections using DEMPROJ, all data inputs have district-level characteristics imposed on the system except variables for items (d), (f), (g) and (h), which are assumed to have only the national parameters. Item (h) has been

ignored since refugees/immigrants in the future will have a more limited impact in Malawi. Item (d) is chosen to be the Coale-Demeny (North) life table which comes close to the current infant mortality rate (IMR) and child mortality rate (CMR) in the 1990s. Numerous adjustments have been made to TFR and LE at the district level, given (a) TFR and LE in Tables 1 and 2 at the national level for the forecast period and (b) the initial levels of TFR and LE for districts in the year 1987. Similar exercises have been made for district forecasts for urban and rural growth rates of population. The period of forecast has been set for 1987 through 2022 where the above variables enter as inputs in the projections.

1.2 PROJECTIONS RESULTS: DEMOGRAPHICS WITHOUT HIV-AIDS

The demographic projections have been made under two scenarios: (a) a reference solution with normal decline in TFR and (b) an optimistic solution with a more progressive decline in TFR after the year 2000. The DEMPROJ model provides the results of demographics without HIV-AIDS for the two scenarios (Reference Solution and Optimistic Solution), hereafter named as Malawi 3 and Malawi 4 respectively (See Tables A and B in the statistical appendix). These results are summarized in Table 3, which spans the period 1987 through 2022.

The table reveals the following features:

1. Population growth tapers off much faster in Malawi 4 relative to Malawi 3 after the year 2002 as the fertility rate (TFR) differences become more predominant. By 2022 the level of population in Malawi 4 (with lower TFR) is about 480,000 less than that in Malawi 3 (with higher TFR).

2. The urban percentage of population is much higher by 2022 (33 percent) in Malawi 4 compared to Malawi 3 (30 percent), as should be expected with differences in TFR caused by the urbanization variable noted in Tables 1 and 2.

3. The labor force (age 15-64 share in the total population) also increases after

2002 in Malawi 4 relative to Malawi 3. By 2022, the labor force commands about 63 percent of total population in Malawi 4 relative to 61 percent in Malawi 3. Correspondingly, the dependency ratio is much lower (.542) in Malawi 4 than in Malawi 3 (.596)) by 2022.

4. Model simulations have been made to signify major differences in the two solutions after 2002 primarily due to assumptions of changing TFR and LE after that year. The latter is more appropriate than what is traditionally applied in demographic forecasting which simulates with assumptions of major changes in the parameters for the whole period.

1.3 DEMOGRAPHIC FORECASTS WITHOUT HIV-AIDS AT THE DISTRICT LEVEL 1987-2022

The population census of 1987 has provided benchmarks for initial values (1987) of primary inputs in the district forecasts which reflect TFR, LE and the age and sex structure of the population. The scenarios of TFR and LE are made with adjustments reflecting the differences of these variables in the initial year at the national and district levels. Judgments as to the growth rates of urban and rural population by district have similar features over the forecast period. DEMPROJ model is thereafter applied to all 24 districts of Malawi under two demographic scenarios, a normal TFR-LE combination (reference solution, Malawi 3) and an improved TFR-LE variant (optimistic solution, Malawi 4). Only the primary findings at the district level are reported here along with the differences that emerge after aggregation of district forecasts for the national level when such results are compared to those of national level forecasts of Malawi 3 and Malawi 4.

District-level forecasts are essential for arriving at national level forecasts except under two circumstances: (a) when assumptions of primary inputs for demographic forecasts can be treated equivalently at the district and the national levels, and (b) when demographic inputs for district-level forecasts are not available, which then demands that national level forecasts be decomposed into district forecasts by some decomposition formula, say a shift-share approach. There are always problems of aggregation errors when only national level

forecasts are made as a primary focus of analysis if regional/district variations are considerable as in Malawi. This study verifies the scope of such aggregation errors at the start to prevent distortions in the final estimates of demographic impacts at the national level particularly within the context of HIV-AIDS.

1.3.1 CONCLUSIONS DRAWN FROM DISTRICT-LEVEL DEMOGRAPHIC FORECASTS WITHOUT HIV-AIDS

The aggregation over districts providing the national level demographics for select variables is then compared with the national level forecast of Malawi 3 (Table 3). This comparison is shown in Table 4 to identify aggregation bias. The following conclusions are derived.

1) Aggregate population figures do not differ substantially between Malawi 3 and Malawi-Agg 3 (aggregation over districts) over the period 1987-2022 except slightly in the years 2017 and 2022, Malawi-Agg 3 being always greater than Malawi 3.

2) Labour force percentage participation shows the maximum discrepancy in 1992 with Malawi-Agg 3 giving 49.6 percent as compared with 48.7 percent of Malawi 3; the remaining years are of lower magnitude.

3) Major differences appear for the dependency ratio variable where Malawi-Agg 3 exceeds Malawi 3 for almost all years; the average discrepancy is of the order of 6-8 percent; Malawi 3 solution of initial dependency ratio of .929 in 1987 appears to be substantially lower compared with both Census 1987 and DHS (1992), which indicate roughly a value of unity that comes close to Malawi-Agg 3 solution.

Malawi-Agg 3 solution is therefore preferable when DEMPROJ results with and without HIV-AIDS are being compared in order to deal with absolute number changes.

1.4 ASPECTS OF EPIDEMIOLOGY IN THE DEMOGRAPHIC IMPACT OF HIV-AIDS IN MALAWI

The analysis of demographic consequences of HIV-AIDS in Malawi is carried out in three principal subject areas:

(1) the current state of knowledge regarding the epidemiology of HIV-AIDS in Malawi,

(2) the method of estimation of seroprevalence due to HIV for adult males and females (urban and rural) and the eventual conversion to AIDS (with the help of an epidemiological model), and

(3) application of the epidemiological parameters to modelling the impact of HIV-AIDS on the demographic consequences for Malawi.

The available information in all three areas is by and large either too dispersed or insufficient for full-fledged model applications. The present report analyzes both the empirical and methodological issues and offers some scenarios that are more carefully designed to accommodate available knowledge for plausible impact studies than hitherto attempted.

1.4.1 ASPECTS OF EPIDEMIOLOGY OF HIV-AIDS IN MALAWI

According to the National AIDS Control Programme under the Ministry of Health, the first confirmed case of AIDS was diagnosed in Malawi in 1985. Extensive spread of the HIV-1 infection probably began in the early 1980s. An adult can be infected with HIV for up to 18 years before he or she develops AIDS although the median time of infection before AIDS manifests itself appears to be 8-10 years for the adult population. During this time the HIV-infected person lives without symptoms of ill health (generally described as "asymptomatic") even though his or her immune system is becoming progressively weaker. During this period the infected person can transmit HIV to others. Although the exact mechanisms are not clear, it is believed that exogenous secondary infections (also called

"opportunistic" infections) can stimulate the replication of HIV within infected cells and spread the infection to healthy cells. This leads to progressive impairment or death of the infected cells with the immune system being increasingly disabled. The victim may then pass through several stages that include:

(a) persistent generalized lymphadenopathy (PDL), a condition characterized by chronic inflammation of the lymph nodes;

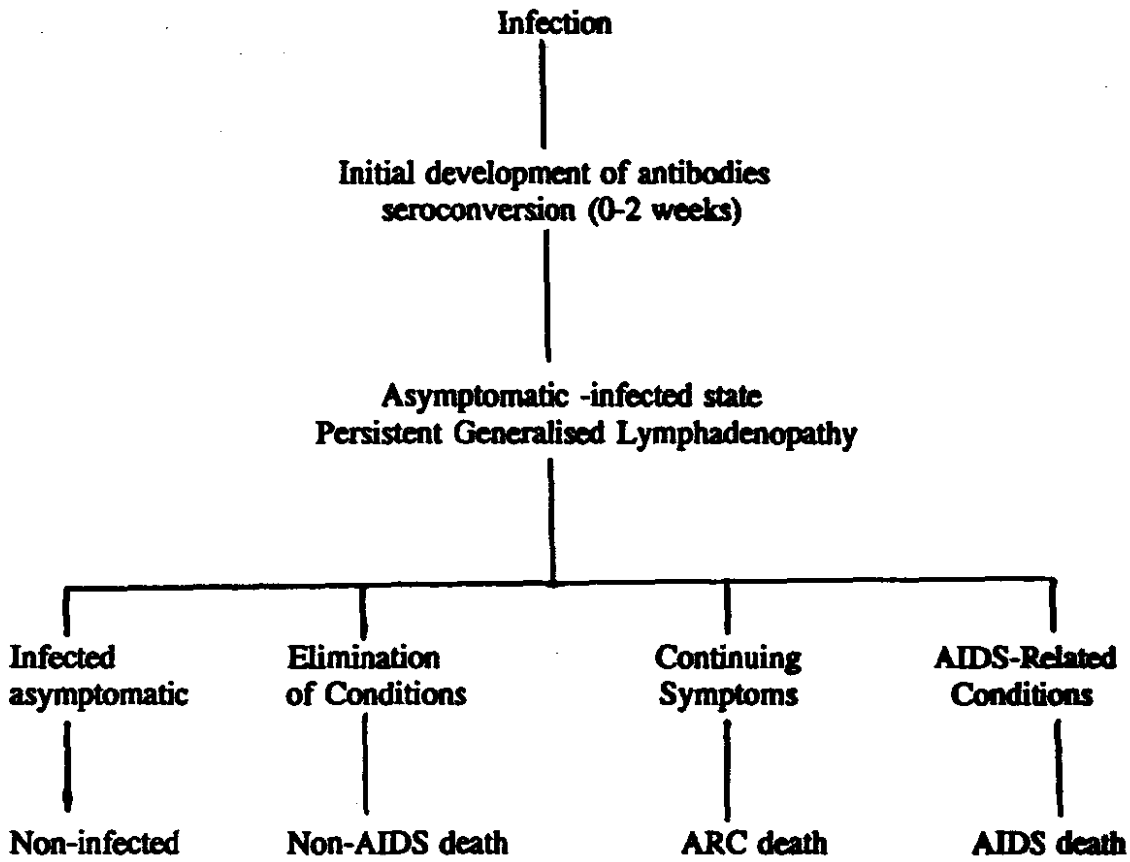
(b) AIDS-related complex (ARC), symptoms and conditions that include recurrent opportunistic infections, chronic diarrhoea, loss of body weight, oral candidiasis and an enlarged spleen;

(c) Clinical AIDS with the development of life-threatening illnesses such as pneumocystis carinti pneumonia (PCP), Kaposi's sarcoma, chronic diarrhoea, fever, acute loss of body weight, cryptococcal meningitis, tuberculosis and candidiasis of mouth and esophagus;

(d) AIDS-related dementia, a late sequel that occurs when HIV penetrates the blood-brain barrier and invades brain cells.

These various stages after infection with HIV are illustrated in Figure 1 with hypothetical sequences postulated by some epidemiologists.

Figure 1: Natural History of HIV Infection



Source: Adapted from Polloni and Glicklich, Review of Approaches to Modelling the Demographic Impact of the AIDS Epidemic, Chapter III, The AIDS Epidemic and its Demographic Consequences, UN/WHO Publication, ST/ESA/SER.A/119, 1991.

In Malawi HIV tests are done by identifying antibody reaction to HIV by ELISA and Western Blot tests, and AIDS cases are diagnosed using the "modified Bangui Criteria". The latter are Africa-specific clinical AIDS indicators that are usually with infections such as oral thrush, chronic diarrhoea, prolonged fever, weight loss and other diseases which frequently strike AIDS patients. The criteria were developed by WHO in Bangui, Central African Republic, in 1985. The Bangui criteria require the presence of at least two major and one minor symptom in order to allow an AIDS diagnosis. In Malawi these criteria have been modified by adding laboratory-confirmed HIV seropositivity.

1.4.1.1 Modes of Transmission of HIV Infection

There are primarily five modes of HIV infection:

(a) heterosexual and homosexual intercourse

(b) transfusion of blood and blood products

(c) infections by needles

(d) intravenous drug use and

(e) perinatal transmission from mother to child.

In Malawi it is believed that the primary modes of transmission are through heterosexual intercourse and perinatal transmission since incidence by transfusion of blood, needles and intravenous drug use are believed to have been minimal (although statistical records for needle-based and intravenous drug use infections are poor). Studies in some African countries show that the factor for HIV seropositivity in infants aged two months to two years is the mother's seropositivity, which suggests that perinatal transmission is the dominant mode of transmission of HIV among infants and young children. Malawi is probably no exception although the statistical record of HIV seropositivity of children in the country does not exist either from blood donor statistics or from antenatal surveillance surveys of women. Even inference from reported paediatric cases of AIDS in Malawi (about four percent of the total number of all reported AIDS cases) is likely to be a gross underestimate because of the difficulty in recognizing the disease in infants. Thus it is necessary to rely on model-based projections of child infections rather than on actual statistics by using plausible parameters for perinatal transmission of HIV.

1.4.1.2 Incubation Period, Infectivity and Progression to AIDS

One of the most important and formidable features of HIV infection is the length of the incubation period, i.e., the time elapsed from infection with HIV to onset of clinical AIDS. This has dramatic consequences on the demographic impact of HIV-AIDS. The shorter the incubation period, the faster is the progression to AIDS and so to deaths. If persons infected with HIV remain asymptomatic and AIDS-free for long periods, they can continue to infect others not previously infected, thus further spreading the HIV virus. During this period, infectivity may vary substantially. There is a sharp rise immediately after infection and again after the onset of clinical AIDS, denoting high infectivity of HIV-infected people in relation to the susceptible or non-infected population (see Polloni and Glicklich, 1991). Malawi data of HIV-AIDS from the National AIDS Secretariat offer no clue to the incubation period, variable rates of infectivity and progression to AIDS because data are not collected on a longitudinal basis. Standardized African parameters and judgments (see UN/WHO, 1991) have to be used to reflect them with model simulations.

1.4.1.3 Risks of Acquiring HIV Infection

There are primarily five risk factors isolated in Southeast Africa which propagate and accelerate HIV infection or seropositivity. These are:

(1) sexual activity with high-risk groups such as prostitutes

(2) prevalence of cofactors such as sexually transmitted diseases (STDs) which hasten infection with HIV

(3) frequency of sexual relations and the number of sexual partners outside the monogamous or polygamous marriage

(4) non-use of condoms as a preventive measure and/or lack of sexual abstinence and

(5) perinatal transmission of HIV (mother to child).

All the above channels increase the probability of transmission of HIV by sexual contact from the infected to the non-infected, characterized as the incidence rate. Infectivity, an important parameter in Africa, depends on sexual practices or conditions that affect partners, e.g., type of sexual relations with change of partners or the presence of sexually transmitted diseases (STDs). Not enough is known about the sexual activity of the population in Malawi regarding the above categories except that the use of contraceptives (mainly condoms) is very limited: not more than five to seven percent of sexual contacts involve condom use. Even DHS (Demographic Health Survey, 1992) presents little information on the mechanisms regulating the speed of seropositivity arising from sexual activity.

1.4.2 GENERAL FEATURES OF HIV-AIDS DATA IN MALAWI

The primary database of HIV-AIDS in Malawi has been built up by the AIDS Secretariat of Malawi under the Ministry of Health. It has three data bank modules: (a) blood donor statistics on seroprevalence; (b) data from antenatal clinics for both rural and urban pregnant women; (c) reported AIDS cases. The first two provide a general picture of seroprevalence across the country by district and by type of screening site, whereas the last shows the evolution of AIDS cases by district and region. Apart from the sampling problems of data collection, i.e., whether they reflect adequately the universe, be it district, screening site or nation, the data have no in-built capacity for estimation of incidence rate, incubation period and other related issues of HIV-AIDS coverage. Nevertheless it is appropriate to review the database briefly before attempting projections of HIV-AIDS victims for the future.

1.4.2.1 Blood Donor Data on HIV Seroprevalence

Statistics of blood donor HIV seroprevalence as collected by the AIDS Secretariat over the period 1988-1994 by district are shown in Table 5. There are sharp variations in seropositivity as well as the sample size of blood donors by district. The sudden fall in samples collected by district in 1994 indicates administrative and logistical problems in

reporting activity and data assembly. There is no clear trend showing whether seropositivity is on the increase or decrease over time by district. Valid information can be marshalled only when the sample size is sufficiently large to provide a valid point estimate of seroprevalence for the district concerned. Such an attempt has been made in later sections of the study where, in the absence of any other statistics such as antenatal seroprevalence, each district has been allocated a point estimate for a particular year, generally in 1991 or 1992. This then has enabled the creation of a time profile of seroprevalence by district after adjustments to the national seroprevalence rates derived from an epidemiological model.

Three observations can be made. First, blood donor data reflect primarily urban seroprevalence, however limited its scope of interpretation may be. Second, blood donor data do not reflect incidence rate which indicates the probability of non-infected population getting infected, since data are likely to include repeat cases of blood donors who are already infected from years before. The present data do not allow any identification of repeat cases in the samples because of the lack of precautions in the statistics to ensure that infected samples in one year were uninfected in the previous year. However blood donor data provide some notions of age/sex and occupational composition of prevalence rates in the country over the period 1988-1994. This information yields the following tables: Table 6 for age/sex distribution and Table 7 for occupational distribution.

The data reveal a preponderance of HIV-infected males relative to females in blood donors (70.7 percent relative to 20.8 percent) as well as a concentration of age groups of 15-29 and 30-44. Although the ratio of prevalence rates (males/females) should be close to 1:1, such ratio should be much lower in age group 15-29 and much higher in age group 30-44. The data of blood donors do not fully substantiate this: the ratio of seroprevalence rates of males and females in age group 15-29 is almost equal to unity whereas that in age group 30-44 is a little higher than unity. There are likely to be some sampling errors in data negating the general notion of age-specific seropositivity differential between males and females. Accordingly, age/sex distribution of AIDS cases can be used as a more appropriate device in Malawi to infer prevalence rates (when HIV-prevalence data by age and sex are insufficient) - an indirect method which is the epidemiological modelling approach frequently used in Africa (see, for example, Garenne, Madison and Tarantola study on demographic

impact of HIV-AIDS in Abidjan, Data for Decision Making Project, Harvard School of Public Health, 1994). The occupational distribution of HIV seroprevalence is provided in Table 7.

The system of occupational classification applied by the AIDS Secretariat does not fit in with the standard international classification of occupations followed by the UN or ILO. Also the prevalence rate by one occupation, military/police, is high but divergent in respect of the aggregate data (over the whole period) compared with data for 1991: 46.3 percent vis-a-vis 62.2 percent. The occupational classification of the AIDS Secretariat needs some readjustment to bring it in line with a standard international classification which distinguishes primarily by professional, administrative (management), clerical, production and service workers. Such an attempt has been made in later sections dealing with statistical indicators of seroprevalence by occupation. Nevertheless the preponderance of HIV prevalence in the higher socio-economic milieu characterized by the educated/skilled class as shown in Table 8 is indicative of the general picture noted in Southeast Africa (see World Bank Study on Tanzania, 1992).

1.4.2.2 HIV Seroprevalence for Pregnant Women, from Antenatal Clinics, Urban and Rural

HIV seroprevalence surveillance of pregnant women has been carried out in Malawi in several antenatal clinics, both urban and rural, from 1985 through 1993. In the urban areas the major centers of surveillance have been Blantyre's Queen Elizabeth Central Hospital (QECH), Lilongwe's Kamuzu Central Hospital (KCH) and Mzuzu District Hospital, spanning different periods: Blantyre from 1985 through 1993, Lilongwe from 1987 through 1990, and Mzuzu for 1987 and 1989. Results are shown in Table 8. From rural areas between 1987 and 1993, the seroprevalence of pregnant women in Malawi's three regions is shown in Table 9. Sentinel rural HIV seroprevalence rates of antenatal women for 1992 and 1993 are shown in Map 1 in a geographical breakdown by site of selected clinics. A dramatic increase of seroprevalence of rural women from 7.6 percent in 1992 to 12.3 percent in 1993 is evident.

Three important studies reflecting the above data which expand the current knowledge of HIV epidemiology for women in Malawi have been published recently : (1) research on HIV by the Johns Hopkins University and Ministry of Health (see Taha et al, 1994); (2) role of high socio-economic status as a risk factor for HIV transmission (see Dallabetta et al,1993), and (3) syphilis and HIV seroprevalence in rural antenatal women (Ciotti, 1994). The first two studies report on findings of seroprevalence for antenatal women in Blantyre, and the last one reports on findings from ten clinics throughout the country covering a sentinel group of rural antenatal women with a view to monitoring the spread of the HIV epidemic. The major conclusions of these studies that have some significance in assessing the future prospects of female seroprevalence in Malawi are summarized as follows:

(1) The rate of seroconversion (incidence rate) after delivery of babies at QECH, Blantyre, shows a progressive increase (out of a sample of 694 HIV-1 seronegative mothers) over time, i.e., after the first six months after delivery, seroconversion rate (incidence) is only 0.9 percent but accelerates to about 4.34 percent by the end of two years. This suggests that urban women in Malawi are at increased risk during the postnatal period, whereas the lower rate in the first six months could be due to the traditional practice of sexual abstinence (see Taha et al).

(2) In the cross-sectional study of QECH urban women, sexually transmitted diseases (STDs) such as genital warts are found to be significantly correlated with HIV seropositive mothers (8 percent) as compared to HIV seronegative mothers (2 percent) giving an odds ratio equal to 4 (see Taha et al).

(3) High socio-economic status (SES, defined as husband's education of more than eight years) of urban women is significantly associated with HIV infection of women, and this association increases with a current history of STD and a history of multiple partners (including husband's partners). Higher SES and STD each approximately doubles the risk for HIV infection: there is a fourfold increase in HIV prevalence in women of higher SES with an STD (42 percent) compared with women of lower SES with no STD (11 percent). However, while higher SES is not a risk factor for the presence of current STD, it is a strong risk factor for HIV infection. These findings

suggest more high-risk sexual activity in higher SES women coupled with better access to medical care for treatment of bacterial STDs or high-risk sexual activity in husbands with higher SES coupled with better access to medical care for STDs. (see Dalabetta et al).

(4) Rural women show greater HIV prevalence with non-rural occupations of husbands, i.e., women who have husbands with occupations other than farmers and fishermen show higher prevalence (see Ciotti, 1994). Table 10 shows HIV seroprevalence of rural women by husband's occupation.

(5) The risk of infection by syphilis is not a cofactor for HIV infection. Syphilis seroprevalence has actually decreased from 1992 to 1993 whereas HIV seroprevalence has increased considerably (see Ciotti, 1994).

(6) There is considerable variation in HIV seroprevalence by district for rural antenatal women as shown in Table 11.

(7) Whereas seroprevalence rates are similar in the Northern (9.7 percent) and Central regions (7.6 percent), they are markedly higher in the Southern region (18.7 percent) (Ciotti, 1994).

(8) The highest level of infection among women is recorded for the age group 20-24 (16.48 percent), followed by age group 25-29 (13.07 percent) and then by age group 15-19 (10.29 percent) (see Ciotti, 1994).

The above findings suggest some scope of delimiting the variations of seroprevalence of urban and rural women in Malawi by district, and it is an important piece of information which is used to derive benchmarks (point estimates) for seroprevalence by district in later expositions. In the absence of reliable data of male seroprevalence, female seroprevalence (from antenatal testing) is considered to be a better proxy for adult seroprevalence (male and female combined) for the districts where data warrant them by urban and rural areas.

1.4.2.3 Development of AIDS cases in Malawi, 1985-1994

Following recognition of the first AIDS cases in 1985, reported cases escalated rapidly. By 1994, a cumulative total of 36,603 cases had been reported in the country (see Table 12).

The highest number of reported cases in a single year is 7,439 in 1991. However the number of reported cases is very likely to understate the true number. The NACP (National AIDS Control Programme) estimates a cumulative number of likely AIDS cases (from the start of the epidemic in 1985 through 1992) to be approximately 132,000. There is a considerable degree of uncertainty regarding the number of infant AIDS cases because paediatric AIDS is more under-reported than adult AIDS. Model estimates vary from one-third to one-fourth of total AIDS cases to represent child AIDS cases (see Chin and Sonnenberg, 1991, in Tanzania case study by World Bank, 1992, and Ciotti, June 1993). Reported cases of child AIDS cases in Malawi have been 4.4 percent whereas adults (age group 15-54) represent 92 percent of all reported cases. In Tanzania the figures in 1990 are very similar: 4 percent for children and 94 percent for adults (age group 15-55) (see World Bank study on Tanzania, 1992).

Age/sex distribution of AIDS cases in Malawi shows a large variation: there are more cases of AIDS in women than men in the age groups 15-19 and 20-29 in the ratios of 4 to 1 and 5 to 3 respectively as given by the AIDS Secretariat in 1992. This can be explained by girls maturing sexually earlier than boys and engaging in sexual activity earlier, while men in their early thirties have sex with younger women, many of them in their teens. The percentage distribution of AIDS cases by age/sex shows that the highest percentage for females is 45 percent in the age group 20-29 and that of males is 40 percent in the age group 30-39. The corresponding male and female percentages are 28 percent for age group 20-29 and 32 percent for age group 30-39. These proportions may be considered relatively valid in projection exercises even though the actual reporting of AIDS cases is always understated.

1.4.2.4 Rationale for an Epidemiological Model of Malawi for Forecasting

No national forecast of HIV-AIDS in any country is possible without a model having a clear epidemiology of the epidemic. The model should have the ability to backcast, i.e., go backward to retrace the historical data of HIV and AIDS with plausible epidemiological parameters, and then should go forward, i.e., forecast with another set of epidemiological parameters defining the speed of the epidemic and its saturation possibilities. Whereas backcasting is relatively easy in a mathematical sense, forecasting is not because it demands not only the usual knowledge of the epidemic that has triggered the current history but also some judgments about the dynamics of behaviorial interactions that may evolve in the future.

To overcome uncertainties in forecasting, explicit assumptions have to be made for developments of scenarios using the model, and this includes policy interventions to redirect behavior and effect change. A basic epidemiological model is the starting point to provide the framework for the national level forecasting, as most studies have emphasized (see UN/WHO, 1991). Thereafter other models incorporating such a basic structure can be developed to highlight more disaggregated impacts. In the present study the basic epidemiological parameters at the national level based on an epidemiological model are developed first, then satellite models such as DEMPROJ to simulate demographic impacts at a more disaggregated level are constructed. This two-stage approach is both operationally feasible and meaningful because final policy interventions need to be dovetailed at the disaggregated level.

1.4.2.5 The Core Epidemiological Model

The core model containing the minimum number of variables has the following system of equations and variables.

Identity:	N	= HIVCURR + AIDSCURR + SUSPOP	.....(1)
"	HIVCURR	= HIVCUM - AIDSCUM	.....(2)
"	HIVCUM	= HIVCUM(-1) + HIVNEW	.....(3)
"	AIDSCUM	= AIDSCUM (-1) + AIDSNEW	.....(4)

*	AIDSCURR	= AIDSCUM - DEATHCUM	.....(5)
*	DEATHCUM	= DEATHCUM (-1)+ DEATHNEW	.....(6)
*	SUSPOP	= SUSPOP* - HIVCUM	.....(7)

Behavior

HIVNEW	=	INCRATE * SUSPOP	.....(8)
(INCRATE	=	Incidence Rate)	
AIDSNEW	=	AIDSRATE * HIVCUM (-j)	.....(9)
DEATHNEW	=	DEATHRATE* AIDSCUM (-m)	.....(10)
INCRATE	=	(HIVCURR, SUSPOP, SEXCONT, FREQCONT, RATEPARTNER, CONTEXTSTD, CONTRACEP)	.....(11)

Identity

PREVRATE	=	HIVCURR / N	.....(12)

List of Variables and Parameters in the Epidemiological Model

Variables

N	=	Adult population by age and sex
HIVNEW	=	New infections of HIV by age and sex
HIVCUM	=	Cumulative new infections of HIV
AIDSNEW	=	New cases of AIDS by age and sex
AIDSCUM	=	Cumulative cases of AIDS by age and sex
HIVCURR	=	Current outstanding number of HIV cases by age and sex (excludes AIDS and subsequent death)
AIDSCURR	=	Current outstanding number of AIDS patients by age and sex
DEATHNEW	=	New cases of death due to AIDS by age and sex
DEATHCUM	=	Cumulative cases of death due to AIDS by age and sex
SUSPOP	=	Susceptible population by age and sex (population free of HIV but likely to fall victims to HIV in the current year)
SUSPOP*	=	Susceptible population by age and sex which is free of HIV in the base case solution (without HIV-AIDS).

Parameters

INCRATE	=	Incidence rate of HIV infection from SUSPOP by age and sex
PREVRATE	=	Prevalence rate of HIV by age and sex
AIDSRATE	=	Rate of new AIDS victims by age and sex
DEATHRATE	=	Rate of death from AIDS victims by age and sex
SEXCONT	=	Number of sexual partners per adult by age and sex
FREQCONT	=	Frequency of sexual contacts per adult by age and sex
RATEPARTNER	=	Rate of partnership change by age and sex
CONTEXTSTD	=	context of opportunistic diseases (for any adult in relation to partners subject to such diseases)
CONTRACEP	=	Use of condoms to prevent STDS and HIV/AIDS.

The above simultaneous system of equations is solved in each year subject to some variables known in advance. The latter in particular refers to lagged variables (lagged by j year with a sign (-j) for AIDSNEW and a sign (-m) year for DEATHNEW) and SUSPOP* (which is given by the base case solution of demographics without HIV/AIDS). In the behavior equations there are three rates, namely INCRATE, AIDSRATE and DEATHRATE. These are factors representing a) incidence rate of HIV indicating the rate of infection of susceptible adults likely to catch HIV for the first time, b) conversion rate of HIV to AIDS and c) conversion rate of AIDS to death respectively stretched over time. Curiously, PREVRATE (prevalence rate of HIV) is determined from the solution of the system, given the three rates. Hence PREVRATE cannot be set exogenously in projection exercises; it has to be solved from within. In a mathematical sense, PREVRATE can be expressed in a reduced form :

$$\text{PREVRATE} = f\,(\overset{(+)}{\text{INCRATE}},\ \overset{(-)}{\text{AIDSRATE}},\ \overset{(+)}{\text{DEATHRATE}},\ \overset{(+\text{ or }-)}{\text{SUSPOP*}}) \quad \ldots\ldots\ldots\ldots(14)$$

where f can have a complicated non-linear form given the structure of the model, i.e., the ratio of INCRATE to PREVRATE will vary over time but within limits, and in

general a higher INCRATE will lead to a higher PREVRATE indicated by a + sign. Similar partial differentials are indicated by signs above the variables. Thus a faster conversion of HIV-infected population to AIDS will reduce the current population of HIV-infected and will reduce PREVRATE, but a higher DEATHRATE (from AIDS) will reduce the population N and may increase PREVRATE. However an increase in SUSPOP increases N and will reduce PREVRATE, but the same increase should have a positive effect on INCRATE because more people are susceptible to infection and therefore will positively impact PREVRATE.

The combined effect of SUSPOP on PREVRATE is difficult to predict. INCRATE appears to be the most difficult of all variables in the model for projections exercises since it depends on many variables that are difficult to articulate precisely because they are not always observable. Studies and experiments done by Brouard, Bulatao (1991, UN/WHO) with African epidemiology give some insights as regards the range of possibilities of INCRATE, but they are uncertain. This brings into focus some major challenges to the behavior assumptions of adults with or without the usage of condoms, in particular, of sexually active adults, whether single, monogamous or polygamous. In the absence of precise information for Malawi, the present study has run some experiments with Bulatao's incidence rates in a medium and high incidence framework. Estimates of PREVRATE have been obtained in that framework given the standard AIDSRATE and DEATHRATE transmission parameters chosen from Southeast African case studies.

The above model, which is largely experimental owes its origin to EPIMODEL of James Chin (see Chin and Lwanga, 1991). This model has all the features described above except for INCRATE, which is circumscribed by such additional assumptions as:

a) the shape of the HIV incidence curve (usually a Gamma function)
b) the HIV prevalence at a particular time (the reference year) and
c) where the reference year is positioned on the HIV incidence curve (the age of the epidemic).

The incidence curve (frequency curve of new HIV infections over time expressed as a proportion of all HIV infections during the expected length of the epidemic) has a bell-

shaped curve. It starts with a very low incidence rate in the beginning of the epidemic, then rises at some later point to a peak level and falls thereafter. This gives the cumulative prevalence curve of HIV infection in the long run to be logistical rather than exponential. The incidence curve is given by the following equation:

$$G(a,t) = t^{(a-1)} * \exp(-t)/ T(a) \quad \text{.....(13)}$$

where,

t = time, exp(-t) = exponential t years backward, and T represents Gamma distribution with parameter "a".

The methodological innovation here is that given any selected value of "a", the above procedure derives a path of INCRATE that can generate a certain number of a given HIV-infected population at a given point of time. So if it is assumed that one million adults are infected in Malawi in 1994, the relevant enquiry is to search for that value of "a" which will generate one million HIV-infected adults for 1994 and the corresponding path of INCRATE previous to 1994, given some assumptions of transition rates of AIDSRATE and DEATHRATE. INCRATE is very sensitive to the choice of value of "a" in the Gamma function and is generally applicable to short-run forecasts. Hence it is necessary to make appropriate assumptions regarding its evolution for long-run forecasts which are particularly suitable for HIV-AIDS impact studies.

1.4.2.6 Past Model Forecast and Present Formulation

The framework of the EPIMODEL applications of the National Aids Secretariat, Malawi, is very close to the model described above. The Secretariat starts with an estimated prevalence rate (PREVRATE) for Malawi of 11.7 percent. This is done on the basis of the following simple assumptions for the year 1993 (see Table 13). The aggregated national PREVRATE is estimated to be 11.7 percent with the urban rate at 30 percent and the rural at 9 percent. The total HIV population (HIVPOP) is then equal to 1,173,525 or about 1.17 million. This HIVPOP is equivalent to our model variable, HIVCURR (which is free from AIDS) except that it includes children, which has biased upwards the Secretariat figure of

aggregate infections of HIV.

The EPIMODEL had to calibrate INCRATE for the total population with adjustment to AIDSNEW and DEATHNEW (deriving thereby AIDSCURR) for all years before 1993 in order to be consistent with the target PREVRATE of 11.7 percent in 1993. AIDSNEW and DEATHNEW variables follow the assumptions of particular progression rates of HIV to AIDS, and AIDS to DEATH, given ab initio.

Four particular criticisms can be made regarding calculated values of variables for all years starting from 1980 to 1993 in the AIDS Secretariat model simulations. First, it is questionable to apply INCRATE and PREVRATE to total population that includes children, as both rates should apply to adults only. INCRATE of adults and INCRATE of children are different. In many respects INCRATE of children could be much higher than that of adults because children born to mothers with HIV will fall victim to HIV with as high as a 30 percent probability. Hence separate calibration of HIV infection of children is required.

Second, it would have been worthwhile to calibrate all variables by urban and rural dimensions when such PREVRATEs are given for 1993, yielding different HIV impacts for urban and rural areas. This is because the characteristics of urban and rural proliferation of HIV/AIDS are sharply different and should be treated separately rather than by the application of a single national PREVRATE option. This is a common problem of aggregation error which is found in many epidemiological models applied to HIV/AIDS impact studies.

Third, it is not clear how PREVRATE can be selected to be 30 percent for urban areas of Malawi and 9 percent for rural areas in 1993 without clear statistical validation. Presumably the Secretariat has assumed 30 percent for urban areas based on findings of the antenatal clinic at Queen Elizabeth Central Hospital in respect to pregnant women of Blantyre, and for rural areas some weighted average of PREVRATE of pregnant women from antenatal rural clinics in the North, South and the Central regions. It is not clear why Blantyre should stand out as the indicator of urban prevalence rate at the national level.

Finally, regarding projections by the EPIMODEL (worst case) applications of the AIDS Secretariat, there is one additional problem relating to the movement of INCRATE over time. The Secretariat sets INCRATE to peak out from 1996 onwards. In 1996 it is set to 2 percent, and in 1997 and 1998 to 1.9 percent and 1.8 percent, respectively, with EPIMODEL projections ending in 1998. The time path of INCRATE by EPIMODEL is chosen by the Gamma parameter "a" which is 5 in the historical period. This Gamma value is found to be low. In most epidemiological models INCRATE in Southeast Africa rarely slows down before 2005 and PREVRATE declines by 2010. The corresponding Gamma parameter in the literature is much higher. These assumptions have enormous consequences on HIVCURR, AIDSCURR and DEATHCUM in the forecast period.

Of the other studies which have been made for HIV-AIDS projections for Malawi, a recent study by Sokal (1991) is worth mentioning. This study provides projections of HIV infections and new AIDS cases in Malawi up to the year 2000, and the projections have been used by Forsythe (1992) for an estimation of the economic impact of AIDS in Malawi. Sokal made two scenarios with the help of DEMPROJ model for the period 1990-2000, with a best case scenario having an incidence rate equal to 1 percent and a worst case scenario having an incidence rate of 2 percent. In the best case scenario HIV seroprevalence stabilizes at 11 percent, and in the worst case scenario it rises to 18 percent by the year 2000. The cumulative number of AIDS deaths in the two cases reaches respectively only 500,000 and 630,000 by the year 2000 (see Forsythe, 1992). The projections undertaken by the present study as well as the recent estimates of the AIDS Secretariat show that even the worst scenario of Sokal is relatively mild.

1.4.2.7 Present Formulation and the Strategy

A simple spreadsheet version of the model on the computer is shown in Table 15 and Table 16 for two variants of HIV to AIDS conversion with interacting INCRATE and PREVRATE, given AIDS and death progression rates for adult population carried out year after year (see Table 14). INCRATE is set for the adult population using roughly Bulatao's estimates from 1985 onwards. This generates PREVRATE in each year using the model until the desired PREVRATE for urban and rural areas is arrived at separately for 1993 and 1994.

The strategy run for Malawi for sensitivity tests is as follows:

Step 1: Set INCRATE, which keeps on increasing by year, by sex (adults) for the historical period 1983-1994;

Step 2: Estimate PREVRATE by year by sex (adults);

Step 3: Stop simulations when solutions yield desired PREVRATE for 1993 or 1994;

Step 4: Project with alternative INCRATE so that by year 2010 PREVRATE of adults should decline and INCRATE peak out by 2005, which is a general characteristic of most African epidemiological scenarios based on models.

The above procedure is run for the whole country so that at the national level, there is a set of values of PREVRATE consistent with INCRATE over time. At the next stage, the national level PREVRATE is adjusted to suit the requirements of the district level PREVRATE. The latter is introduced into the DEMPROJ model which provides all the demographic projections necessary for results with HIV-AIDS.

At the national level various simulations of variables of the core epidemiological model have been collected, given the demographic projections of Malawi's adult population (male plus female) without HIV-AIDS (extracted from Malawi 3). The input variables in these simulations have been (a) alternative paths of INCRATE and (b) alternative assumptions of conversion rates of HIV to AIDS, but DEATHRATE (progression rate of AIDS to death) has been set to a two-year period with 50 percent of AIDS victims dying in the first year and the remaining 50 percent dying in the second year. These simulations created a large variety of epidemiological variables like PREVRATE, HIVNEW, HIVCUM, AIDSCUM, AIDSNEW, DEATHCUM, and SUSPOP. From them a path of INCRATE has been chosen which renders two different scenarios of HIVCURR, PREVRATE and other variables, depending on two AIDS conversion rates (HIV to AIDS) that seem to indicate that Malawi's

HIVCURR (current HIV-infected adult population) in 1994 could vary between 520,000 (rapid AIDS conversion) and 822,000 (slow AIDS conversion). INCRATE chosen here is not random but is chosen from select set of INCRATE applicable to Africa (see Bulatao, UN/WHO, 1991) which implies an aggregate prevalence rate within the range of 10-16 percent in 1994 for Malawi. The set of assumptions embedded in these simulations is shown in Table 14.

The results of simulations are shown in Table 15 (slow conversion) and Table 16 (fast conversion), both assuming the same values for adult population (N) (from demographics of Malawi without HIV-AIDS) and INCRATE over the period 1984-2010. The period chosen should be sufficiently long to give some insights into the divergent paths of HIVCURR, AIDSCURR, DEATHNEW and finally the derived PREVRATE as N* (final adult population) changes with deaths. SUSPOP remains unchanged because the non-infected population is not subject to any changes except by HIVNEW, which is derived by equation (8). The results from this exercise highlight some interesting features of the influence of epidemiological parameters in demographic forecasting with HIV-AIDS. These are summarized below.

1. Faster conversion to AIDS creates more deaths (see DEATHNEW and DEATHCUM) which reduce both N* (final adult population) and HIVCURR; the latter reduces PREVRATE, given INCRATE.

2. PREVRATE in Table 16 (faster conversion) starts peaking out by 2000 (13.5 percent) whereas in the slower conversion (Table 15) it remains as high as 22.8 percent, peaking out in 2004. The considerable difference between the two scenarios suggests that PREVRATE forecasting is bound to remain uncertain unless the epidemiological basis of conversion rates (HIV to AIDS) applicable to Africa in general and Malawi in particular is settled. There is some evidence that the conversion rate could be faster than the slow conversion rate (an 18-year period).

3. HIVCURR and AIDSCURR are tradeoffs in the simulations where DEATHCUM cuts a wedge between the two variables. In both simulations HIVCUM and SUSPOP

remain unchanged by the assumption of a fixed path of INCRATE.

4. The two simulations suggest two extreme values of HIVCURR in Malawi ranging between 520,000 (fast conversion) and 820,000 (slow conversion) in 1994 with respective PREVRATE values of 10.6 percent (fast conversion) and 15.9 percent (slow conversion).

The above experiment has determined the limits of some critical epidemiological parameters that should accompany the actual modelling of demographic projections.

1.5 DEMOGRAPHIC PROJECTIONS OF MALAWI WITH HIV-AIDS, 1987-2022: APPLICATION OF DEMPROJ MODEL

The application of DEMPROJ model to obtain HIV-AIDS impacts requires the following input assumptions in addition to all other assumptions that have been built into the demographic projections without HIV-AIDS. In this scheme the following additional requirements are:

(a) the year when extensive spread of HIV began

(b) the time path of HIV prevalence rate (adult, male and female combined)

(c) adult conversion from HIV to AIDS

(d) perinatal (mother to child) transmission of HIV

(e) infant conversion from HIV to AIDS

(f) progression rates of AIDS to death

(g) percent of AIDS infants dying in first year

(h) distribution of new adult infections by age and sex

(i) any change in assumptions regarding the path of total fertility rate (TFR) that may be attributed to the effects of AIDS.

DEMPROJ model requires PREVRATE (adults) to be specified in advance. This implies an INCRATE which has to be commensurate with it. The other requirement is perinatal transmission (d), which has been ignored in the epidemiological model for the sake of simplicity together with assumptions of (e) and (g). The results of DEMPROJ are therefore likely to be different since apart from PREVRATE (adults) the consequences of HIV-AIDS on children are now incorporated in DEMPROJ. This feature is to be distinguished from the adult epidemiological model which has ignored the birth and mortality process of children due to AIDS but which has an impact on the evolution of future adults likely to be victims of HIV-AIDS. DEMPROJ therefore has this additional dynamic feature but it has the weakness that PREVRATE has to be exogenously provided. To overcome this mismatch a two-stage approach is invoked: in the first stage the epidemiological model provides PREVRATE consistent with a path of chosen INCRATE applied to adult population over time, and in the second stage DEMPROJ uses this PREVRATE of the epidemiological model coupled with other exogenous assumptions required for DEMPROJ. This is not a full-proof method, but it is the only strategy that is applicable in Malawi in the absence of a full-blown model of demographics with age/sex distribution by cohorts based on sound epidemiology.

1.5.1 DEMPROJ MODEL APPLICATIONS: SETTING OF INPUT VALUES

1.5.1.1 Prevalence Rate Estimates

The first basic input is the representative time profile of PREVRATE that needs to be created for both national and district levels. This has involved three stages: (a) an initial time path of PREVRATE from a chosen set of alternative PREVRATE paths (national level) consistent with the core epidemiological model (applied to adults); (b) setting of critical values of PREVRATE by district in some years such as Blantyre (urban) (set to values found for women in antenatal clinics during 1987-1993 (see Table 9); (c) making adjustments to district-specific PREVRATE using the path of national level PREVRATE (urban and rural) postulated in stage (a). The district level PREVRATE which goes through the above stages is shown in a special annex for the 24 districts. Undoubtedly a great deal of judgment is used in these forecasts where in each district PREVRATE by urban and rural areas is treated

differently and an aggregate PREVRATE (weighted sum of urban and rural adult population) by district is derived. The weights of urban and rural adult population are derived from the demographic forecast solution of each district without HIV-AIDS.

District-level PREVRATE estimates show a wide variety, with the highest recorded in Mulanje, followed by Blantyre, Mchinji, Zomba and Chiradzulu particularly during the period 1993-1996 (see Table 17). The lowest PREVRATE is recorded in Dowa over the entire time period. Both urban and rural PREVRATE along with their respective weights determine the path of each district's aggregate PREVRATE. The highest rural PREVRATE is shown for Mulanje in 1993: 28.74 percent (given by the estimate of a rural antenatal survey) which has been used to calibrate the entire time path of rural PREVRATE. That in turn has also pushed the urban PREVRATE path upward (by an assumption of a minimal percentage increment for urban areas across the board). Similar adjustments have been made for Blantyre, which shows the highest urban PREVRATE in 1993 (30.2 percent) with the corresponding rural PREVRATE of 18 percent.

The national level PREVRATE (see Table 18) is derived finally by weighting all district-level PREVRATE estimates with the district-level urban and rural population (adults) forecasts. This PREVRATE is not the same as what was started in stage (a) since an aggregation over districts has taken place. The results of this process have shown the estimates in Table 18 for national PREVRATE over 1987-1992.

Whereas the AIDS Secretariat estimates that in 1993 the average prevalence rate in Malawi is approximately 11.7 percent, a more likely figure according to this study's estimate is 14.7 percent. This is not only because of different urban and rural weights (12.4 percent and 87.6 percent) but also because the urban aggregate PREVRATE is estimated here to be 27 percent and the rural 13 percent, instead of 30 percent for urban and 9 percent for rural areas in the AIDS Secretariat estimate. Weighting district level PREVRATE to arrive at national level PREVRATE was never previously undertaken because district level

PREVRATE has been difficult to estimate. Hence the national level PREVRATE estimate in the past has been at best a guess-estimate without proper district level accounting. Aggregation error is therefore something which should be verified when disaggregated results can be marshalled, and such error is not always negligible, as is apparent in the PREVRATE estimate.

A second important feature of Table 18 is that the pattern of PREVRATE follows a bell-shaped curve, peaking in the year 1996 and falling thereafter. In this study it is maintained that the pace of PREVRATE decline is so rapid that after the year 2010, PREVRATE in Malawi almost vanishes. This may not actually occur, in which case the scenario can be interpreted as optimistic (or perhaps very optimistic). However two judgments have been used to draw the scenario presented in Table 18. First, it is believed that there is a learning process, i.e., people become cautious in their sexual habits when many people die, often friends and relatives. It is assumed that such a state of consciousness is beginning to emerge in Malawi in this decade with so many deaths due to AIDS. This does not mean that seroprevalence drops low immediately, but the momentum of caution continues. Second, once this momentum is built, the logic of epidemiology takes over and sooner or later the epidemic has to diminish. The question, however, remains when. This study has postulated the year 2010 as the deadline; others may have a different timing. As stated earlier, the path of incidence rate forecasting and thereafter PREVRATE is not yet easy to articulate, and therefore some judgments will always prevail. Nevertheless from the analytical point of view of impact studies of HIV-AIDS, the rate of decline does not pose a serious problem. A slower decline of PREVRATE after the peak will only magnify impacts of HIV-AIDS. Thus the present study with a relatively faster decline in PREVRATE should be regarded as a conservative framework for impact studies.

1.5.1.2 Other Input Values for DEMPROJ

The values of other parameters chosen for DEMPROJ model are as follows:

(a) The year extensive spread of HIV has begun is set to 1987.

(b) Adult conversion from HIV to AIDS is assumed to be the same as in scenario 1 of Table 12 where about 15 percent of HIV cases do not fall victim to AIDS after an extended period of 18 years (this is a typical DEMPROJ default option).

(c) Perinatal transmission of HIV (from mother to child) is assumed to be 30 percent, i.e., the percentage of babies born to HIV-positive mothers who are HIV- positive.

(d) Infant conversion from HIV to AIDS (cumulative by years of infection) is assumed to be:

Years since infection	Cumulative %
1	23.7
2	39.8
3	51.2
4	65.4
5	74.9
6	82.9
7	89.9
8	95.0
9	100

(e) Progression rates of AIDS to death is captured by the average number of years that elapse from the onset of AIDS to death, which is assumed to be two years.

(f) Percentage of infants with AIDS that die in the first year of life is assumed to be 90 whereas in the second year it is 100 percent.

(g) Percentage distribution of new adult infections by male and female by age-group is assumed to be as follows in each year:

Age-group	Male	Female
15-19	7.0	12.8
20-24	10.4	14.3
25-29	11.7	8.5
30-34	6.7	5.2
35-39	3.9	3.2
40-44	3.0	2.4
45-49	1.9	1.5
50-54	1.5	1.2
55-59	0.8	0.9
60-64	0.8	0.9
65-69	0.5	0.5
70-74	0.2	0.2
Total	48.4	51.6

(h) The effect of AIDS on total fertility rate (TFR) is less clear. On the one hand, couples who, due to their own experience or that of friends and relatives, perceive an increase in child and adult mortality due to AIDS, may wish to have more children to offset this loss perhaps with the knowledge that there may be a chance that 70 percent of children born will not be infected with HIV. This may increase TFR. On the other hand, couples who take in children orphaned by AIDS may be reluctant to increase their family size and so may refrain from having more children, thus reducing TFR. The combined effect of both positive and negative effects on TFR cannot be measured, and therefore TFR remains unchanged in simulations of demographics with HIV-AIDS.

The inputs above are then fed into DEMPROJ model for each of 24 districts over the period 1987-2022 to arrive at HIV-AIDS impacts by district.

1.5.2 DEMPROJ MODEL RESULTS: DISTRICT AND NATION

The procedure followed here is first to arrive at the district-level impacts of HIV-AIDS for the period 1987-2022. All demographic consequences of HIV-AIDS by district for the principal variables are then aggregated to come to national level estimates. DEMPROJ model does not give the same results at the national level when district-level estimates are aggregated to yield national level results and are compared to the results of direct DEMPROJ

application at the national level. This discrepancy is not new and is to be expected especially when dealing with the shocks of HIV-AIDS registered at two different levels, district and nation. However, this study's findings of DEMPROJ model applications to obtain demographics without HIV-AIDS (Malawi 3 and Malawi 4) have not shown significant discrepancies at the two levels, but with the HIV-AIDS simulations some discrepancies have been noted. The latter observation has resulted in one choice: aggregation of district level estimates of HIV-AIDS impacts to arrive at the national level estimates should be the preferred mode for analysis.

1.5.2.1 Demographics of HIV-AIDS: National Estimates Based on District-Level Aggregation

The aggregation of district-level DEMPROJ-driven demographic impacts of HIV-AIDS at the national level has resulted in some numbers for certain variables that required further adjustments. For example, DEMPROJ yields HIVCURR in the second decade of the next century which is fairly high (it stays at the level of about 200,000 on an annual basis) compared to very little AIDSCURR and very few DEATHNEW. Eventually in an epidemiological model HIVCURR and AIDSCURR should converge when the epidemic is almost over. Since DEMPROJ applications show very few AIDSCURR and DEATHNEW, AIDSCUM is likely to reach a saturation level by the end of the second decade of the next century. DEMPROJ model results thus seem to be inconsistent, and it was necessary to do a large number of simulations with the epidemiological model to adjust the path of HIVCURR consistent with AIDSCURR and DEATHCUM particularly from 1998 onward. This adjustment has resulted in Table 19 for all the principal variables related to HIV-AIDS by categories of HIV infections (HIVNEW, HIVCUM and HIVCURR), AIDS and deaths.

Table 19 shows the following features:

1) The aggregate number of currently infected HIV population in 1993 is estimated to be 826,000, and in 1994 it is 977,000. This variable denoted by HIVCURR (which includes HIV-infected children) reaches a peak level of about 1.4 million in 1998 and declines thereafter. HIVCURR thus is much

lower than what AIDS Secretariat predicted in June 1993 by about 350,000 in 1993 and 348,000 in 1994.

2) A cumulative total of about 772,000 deaths is expected by the year 2000 (see DEATHCUM) whereas there is likely to be a cumulative number of 1,067,000 AIDS cases by that year (see AIDSCUM).

3) By 1994 about 82,000 people may have died of AIDS - a figure much lower than the recent AIDS Secretariat estimate of about 200,000. The difference may be attributed to the assumptions of conversion of HIV to AIDS, progression of AIDS to death and the nature of the model used.

4) AIDSNEW (the number of new AIDS cases) peaks out by the year 2001 with 221,000 cases, and thereafter declines gradually until the second decade of the next century when it almost vanishes. DEATHNEW (the number of new cases of death by AIDS) behaves the same way with a lag with the maximum of 200,000 per year during 2001-2004.

5) By 2022 the cumulative sum of AIDS cases (AIDSCUM) and that of deaths due to AIDS (DEATHCUM) come close to each other, which suggests that the epidemic is on the wane; by 2022 about 2.5 million people are likely to have died because of the HIV-AIDS epidemic.

6) For the medium term (up to year 2000) the toll due to AIDSNEW and DEATHNEW is not likely to be as heavy as what can be expected for later years (2001-2005) when the burden on health and community services will become considerable.

The aggregate results of Table 19 are decomposable into paediatric and adult HIV-AIDS effects by the same variables which are shown in Table 20 and Table 21.

Effects on Children of HIV-AIDS Epidemic

DEMPROJ model permits projections of age-specific cohorts of HIV and AIDS population broken by age groups, 0-4, 5-9 and 10-14. The level of such incidence with DEMPROJ, district by district, shows some major shifts of new AIDS cases over time, but not shifts of HIV cases. New AIDS cases of the model by district for the above age groups appear to be suspect in select years due to the presence of some negative numbers, though not large. This appears to suggest that the model faces difficulties in resolving the many parameters that are imposed on it. But since HIVCURR and AIDSCUM are variables in a simultaneous system, a vector of ratios of the representative numbers of children affected by HIV is invoked following Chin and Sonnenberg procedure in Tanzania (see World Bank, 1992). Based on Table 19 and a representative vector of ratios (paediatric HIVCUM in relation to total HIVCUM), the results of paediatric HIVCUM are obtained and thereafter HIVNEW. The paediatric and adult HIV-AIDS impacts are then separated and shown in Table 20 and Table 21.

Table 20 demonstrating paediatric HIV-AIDS shows the following features:

(1) Cumulative paediatric HIV (HIVCUM) reaches a number of 294,000 by the year 2022 whereas the maximum new HIV cases are found during 1995-1998 with an average of 28,000 per year. This is to be expected as the adult HIV (female) population also dominates during the same period.

(2) About 28,000 children are affected by AIDS during 2000-2005 on the average, of which the majority die with a lag of one year.

(3) By 2000 about 111,000 children are AIDS victims of which about 93,000 children are expected to die; by 2015 about 294,000 are AIDS victims and almost the same number die.

Effects on Adults of HIV-AIDS Epidemic

Table 21 demonstrating adult HIV-AIDS shows the following:

(1) In 1994 the expected HIV-infected adult population (net of AIDS and deaths) denoted by HIVCURR is about 946,000 whereas the cumulative adult HIV cases (HIVCUM) is 1.1 million. The difference is distributed between current outstanding AIDS cases (AIDSCURR) and cumulative deaths (DEATHCUM), the latter taking a toll of about 72,000.

(2) The maximum number of adult deaths due to AIDS is concentrated on an annual basis during the period 2000-2005 with an average of 180,000, and by the year 2010 about 2 million adults are expected to have succumbed to death due to AIDS.

(3) The largest burden of HIV infection for adults (HIVNEW) is during the period 1994-1998; 1996 appears to show the maximum of 207,000 infections. This suggests, given the model simulations, that Malawi is already in the peak of HIV crisis--a situation which, even if it does not worsen much further, will impose severe hardships in the immediate future.

1.5.3 ESTIMATION OF ORPHANS DUE TO AIDS

One of the social consequences of HIV-AIDS on the population is the growing apprehension that Malawi is likely to be burdened with a large orphan population in the future. Children become orphans when either parent dies from whatever cause and when the existing kinship-based families cannot take care of them. The estimation of orphanage due to AIDS is difficult since it must be determined that either or both parents (and perhaps all parents in a polygamous marriage) are dead due to AIDS and that the kinship structure cannot take care of the children. These data requirements are not easy to satisfy. The traditional culture has allowed extended families to take care of all orphans in the past, no matter whether orphanage has occurred from AIDS or not. This practice may be on the wane now because of the increasing economic hardships families are being subjected to.

The AIDS Secretariat in 1995 estimates Malawi's AIDS orphans in 1994 to be a cumulative figure of 200,000. Another Secretariat estimate suggests that the cumulative figure could be about 68,000 in 1994 (see AIDS Secretariat estimate in March 1993). Forecasts of the AIDS Secretariat by the year 2000 are 876,000 and 265,000 respectively in these two versions. It is not known how these numbers are arrived at since to forecast orphan population due to AIDS requires many assumptions that are difficult to fulfill because of data problems and the type of model used for forecasting. However given the standard WHO assumption of maternal death as a necessary condition for the AIDS Secretariat definition of "orphan", an attempt has been made with a simple model to estimate the orphan population (children in the 0-15 age group). The model is based on the number of adult female AIDS deaths multiplied by the average number of surviving children (after deaths due to diseases other than AIDS) per female adult less the number of children expected to die of AIDS. This is shown in Table 21(D) with the following results.

1) During 1993-1995 an average number of 30,000 orphans is expected per year, and by 1994 a cumulative total of about 78,000 orphans is likely. The latter is not very far from the estimate of the AIDS Secretariat in 1993.

2) From 1995 onward the orphan population grows at an increasing rate (with an average of 100,000 per year) so that by 2000, the orphan population (cumulative) grows to about 689,000, of which about 168,000 orphans are added in that year alone.

3) By 2010, even with some decline in the growth of orphans, the cumulative orphan population swells to about 1.9 million and then stabilizes at 2 million.

1.5.4 DEMOGRAPHIC ACCOUNTING WITH AND WITHOUT HIV-AIDS

The preceding discussion has highlighted the effects of AIDS on deaths of both adults and children during the period 1987-2022. By 2022, as noted, there will be a demise of about 2.5 million people, with 2.2 million deaths for adults and about 300,000 for children. To arrive at this figure in the study the strict number of deaths recorded by DEMPROJ

simulations has been bypassed because DEMPROJ cannot handle properly the time path of all epidemiological variables which require some adjustments. Nevertheless in a broad sense, DEMPROJ has shown promise (within the framework of five-year intervals) in articulating the overall demographic prospects. It is therefore useful to compare the broad spectrum of demographics generated by DEMPROJ solutions with and without HIV-AIDS.

The reference solution is the solution without the impact of HIV-AIDS called MALAWI 3, whereas the shocked solution with HIV-AIDS which is registered on top of MALAWI 3 is called MALAWI 3 AIDS. The latter is shown in the Appendix in greater detail. The same shock of HIV-AIDS on the optimistic solution (MALAWI 4, without AIDS) has not been judged to be worthwhile because analytically it is not likely to add much except to reduce the number of deaths due to AIDS only marginally. The results of Malawi 3 and Malawi 3 AIDS are demonstrated in Table 22, important features of which are recorded below.

1. There are fewer births (B) and greater deaths (D) in the solution with AIDS than in the solution without AIDS. The aggregate difference of deaths over the whole period 1987-2022 comes to about 958,000 (equal to the sum of differences in deaths multiplied by 5), and for births the number is 1,223,500. The sum of the two gives a total of 2.2 million loss of population in the year 2022 with birth-death accounting for the two solutions. The actual loss of population, however, is 1.76 million. The difference of about 440,000 is due to the difference between discrete and continuous time accounting where birth (B) and death (D) accounting conforms to the former.

2. Between 1987 and 2022 Malawi with HIV-AIDS is expected to have a labour force addition of 6.3 million (10.3 million in 2022 less 4 million in 1987) by the solution Malawi 3 AIDS. This study's estimated deaths due to AIDS amount to 2.2 million in labour force during the same period. This suggests that from the point of view of absolute labour force, Malawi faces no serious problem as net labour force addition is still considerable. The problem is in the loss of qualified labour force due to AIDS which may not be recouped from the sheer addition of labour force as determined by the simple demographics with AIDS. The projection of demographics with AIDS still

permits a net addition to labour force by above 450,000 births per year.

3. The population growth with AIDS (given by the rate of natural increase, RNI, in percent) slows down by roughly one percentage point per year during 1992-2007 compared to the growth rate recorded in the scenario without AIDS which averages about 2.6 percent during the same period. The largest relative decline in population growth occurs during 1997-2002: about 1.1 percent per year due to the greatest number of deaths due to AIDS.

4. The most disturbing results due to AIDS are the fall in life expectancy and the rise in infant and child mortality rate during the period 1992-2012. Life expectancy decline reaches a maximum of 5.8 years during 1997-2002; infant mortality rate (per thousand) reaches an upward surge of about 513 (from the level of 118 in the no-AIDS solution) during the same period. The DEMPROJ result of the rise in infant mortality rate (IMR) is likely to be suspect. As noted before, infant deaths recorded by DEMPROJ model simulations created some problems which needed some fine tuning to arrive at paediatric deaths due to AIDS. The revisions yielded an increase of about 28-55 points in the presence of AIDS over what is expected without AIDS. This makes IMR to be 156 (per thousand) during 1992-1997, 167 during 1997-2002 and 164 during 2002-2007, thereafter levelling off to 150 in later periods. Similarly child mortality rate (CMR) increase from DEMPROJ results has been adjusted even though it does not show that much discrepancy. Thus the health indicators due to AIDS present a very disturbing scenario for society during the period 1997-2007.

1.5.5 OCCUPATIONAL DISTRIBUTION OF ADULT DEATHS DUE TO HIV-AIDS

One of the most important elements determining the economic consequences of AIDS is the distribution of adult deaths due to AIDS by occupation. Earlier, the HIV seroprevalence by occupation among blood donors (primarily urban) during 1988-1994 was noted. There are no statistics on deaths by occupation. In general the convention is to apply HIV seroprevalence by occupation to AIDS incidence by occupation to arrive at deaths by AIDS. Following this rule, total deaths (urban and rural) due to AIDS can be decomposed

into deaths by occupation in the following simple way.

Let,

$D(t)$	= total deaths due to AIDS at time t	
$PREV(i,t)$	= HIV prevalence rate of occupation i at t	
$N(i,t)$	= number of people by occupation i at time t	
$HIV(i,t)$	= HIV prevalence of occupation i at time t	
$q(i,t)$	= proportion of people by occupation i at time t	
	$= N(i,t)/N(t)$	.....(14)
$g(i,t)$	$= HIV(i,t)/HIV(t)$	.....(15)
where $N(t)$	= sum of $N(i,t)$ over all i;	
$HIV(t)$	= sum of $HIV(i,t)$ over all i	
$D(i,t)$	= death by occupation i at time t;	
	$= g(i,t) * D(t)$	.....(16)
where $D(t)$	= sum of $D(i,t)$ over all occupation i	

The above system is solved for $D(i,t)$ given the parameters (vectors) such as $q(i,t)$, $PREV(i,t)$, $g(i,t)$ and actual numbers such as $D(t)$ and $N(t)$. An additional constraint on the system is given by the aggregate $PREV(t)$ which is defined as:

$$PREV(t) = HIV(t)/N(t) \qquad \text{.....(17)}$$

The procedure for solution is shown as follows:

Step 1: Given $D(t)$ and $N(t)$,
obtain $N(i,t) = q(i,t)*N(t)$

Step 2: $HIV(i,t) = PREV(i,t)*N(i,t)$

Step 3: Compute $D(i,t) = g(i,t)*D(t)$

The above formulation of occupational deaths with Malawi's total adult deaths due to AIDS is estimated to be 40,000 in 1993 (see Table 19) and total adult population to be

5,125,400 (see Table 17). This is shown in Table 23 where the adult seroprevalence rate by occupation PREV(i,t) is such that the aggregate prevalence rate in Malawi over all occupations comes to 14.7 percent. Table 23 requires some explanation:

1) Aggregate (urban plus rural) prevalence rate by occupation is constructed in a way that reflects best judgments on occupational seroprevalence, PRE(i,t), but satisfies the desired PRE(t) equal to 14.7 percent.

2) q(i,t) is the percentage of households employed (or declared to be participating) by occupation. This is taken from HESSEA data of 1991 (NSO, Lodh (1994)) and it includes all people, urban and rural, formal and informal.

3) PREV(i,t) for service workers include prostitutes and that for administrative/management include military/police where both record very high prevalence rates of over 40 percent.

4) g(i,t) is the proportion of HIV-infected adults by occupation to total HIV-infected adults; this is the ratio which is applied to total deaths to derive deaths by occupation.

5) The number of deaths is the highest in the occupation of agricultural workers (including fishermen) by virtue of the largest number of agricultural employment (and underemployment) in the total adult population, followed by professionals. The urban decomposition of deaths (not shown here) by occupation shows the highest number of deaths recorded in professional and transport worker categories.

6) The above demonstration is just a point estimate for the year 1993, but the incidence of death by occupation in other years will vary by PREV(i,t), given the same q(i,t), but with alternative values of N(t) and D(t) recorded at each point of time.

The above exercise suffers from one limitation, namely the application of ratios, $g(i,t)$, reflecting the distribution of adult HIV population in year t by occupation. This is not always applicable because the deaths in t by occupation, $D(i,t)$, should depend on prevalence rate by occupation t-m years before, where m is the sum of incubation period plus the period of progression of AIDS to death. However, if $PREV(i,t)$ across occupations moves in a similar pace over time, then $g(i,t)$ will not change. Thus if $PREV(i,t)$ is reduced to half, say, five years before (in 1988) equivalent to an aggregate PREV equal to 7.34, then $g(i,t)$ distribution remains unaffected although $HIV(i,t)$ will change. For all practical purposes, this condition is assumed, i.e., $g(i,t)$ remains unchanged, which simplifies the decomposition of AIDS deaths by occupation over time. In this way the time profile of adult AIDS deaths by occupation is obtained and forms a major input in the assessment of the economic impact of AIDS in Malawi. This profile is presented in Table 24, which illustrates the occupational hazards due to AIDS that Malawi is about to face in the near future.

SECTION II

2. THE ECONOMIC IMPACT OF HIV-AIDS, MALAWI, 1987-2022

2.0 The two most common methods of estimating economic costs of HIV-AIDS are through direct costs and indirect costs. Direct costs refer to costs of testing for HIV-AIDS and costs of treatment including palliative care, and indirect costs refer to those that impinge on society. The latter is more complicated not only in terms of data requirements for estimation but also conceptually. In Malawi, two studies have so far highlighted some aspects of the measurement of direct and indirect costs, namely, Forsythe (1992) and Cuddington (1993). In regard to indirect costs, Forsythe represents the human capital approach whereas Cuddington represents the macroeconomic approach.

The macro approach in general examines the total effect of the AIDS epidemic on macro economic aggregates (including income lost due to illness and death by AIDS) and is much broader than the human capital approach, which captures the loss of present value of all AIDS-stricken individuals' future earnings (due to illness or death) discounted to the time of death or initial illness. The macro impact, generally cast in a growth model scenario, is designed to assess the reductions in savings and worker productivity as a result of AIDS, leading to a lower per capita income despite the lower population (both level and growth) caused by AIDS. It is more broad-based in dealing with the overall economic effects of AIDS than the human capital approach, which appears to be better suited to the estimation of the marginal benefits of preventing a single case of HIV-AIDS (see, for example, Over, Bertozzi and Chin (1989)).

Ideally, the whole notion of human capital approach should be embedded in the macro approach and there should not be any conflict between them. However, when estimation of indirect costs is an immediate concern, the human capital approach is usually used since the macro framework demands a more consistent set of data and analytical rigor. In the present analysis the macro framework is first employed to elaborate on the economic impact of AIDS, and this will be followed by the human capital approach.

2.1 Multidimensional Nature of Economic Impact of HIV-AIDS

For any cost estimates of HIV-AIDS there are many channels through which economic impacts of the epidemic can be visualized. The following elements comprising and defining direct costs and indirect costs are taken from Over, Ainsworth, et al (1989) (Table 25).

Direct costs refer to

(1) cost of testing for HIV-AIDS and for out-patient care

(2) cost of in-patient care

(3) cost of avoidance and preventive measures and

(4) funeral costs.

Indirect costs refer to

(5) loss of earnings of deceased member

(6) cost of replacement of deceased member

(7) spending of time and resources by family and others to take care of HIV-AIDS patient

(8) disability/morbidity and resulting loss of productivity of HIV-AIDS patient

(9) increased insurance costs of both workers and enterprises

(10) loss of time in attendance of funerals

(11) increased burden of orphans

(12) "psychic" costs.

Clearly, a full-scale elaboration of economic impacts along all dimensions is a massive task because the data limitations do not permit it even with a proper analytical framework. Therefore this task is restricted to an estimation of economic impacts along the following lines:

(a) estimating the direct costs of HIV-AIDS

(b) utilizing the macro-economic approach to determine economic impact of AIDS using both direct and indirect costs (productivity loss)

(c) identifying the sectoral economic impacts of HIV-AIDS.

2.2 Estimation of Direct Costs of HIV-AIDS

AIDS in any society is likely to have an impact on both public and private expenditures related to costs of diagnosis and treatment of patients, starting from the onset of HIV infection to death due to AIDS. This includes hospital costs (in-patient and out-patient), costs incurred by households and costs borne by other institutions, i.e., enterprises which are prepared to share the costs related to patients' or employees' morbidity and mortality. In Malawi the severe resource constraints on hospital services appeared as early as 1988 with occupancy rates well over 100 percent in District hospitals (157 percent in Central hospitals, 166 percent in District hospitals and 93 percent at CHAM hospitals (Christian Hospitals Association of Malawi)) (see Ministry of Health, 1988). At that time, the HIV-AIDS epidemic did not appear to be as threatening as today. Even then, according to an estimate by Tapia (Tapia, 1989) each central hospital admitted about 40 to 50 HIV-AIDS patients per month while district hospitals had an average admission rate of 20 patients per month. However the patients in this estimate were not identified as seropositive or with full-blown AIDS but had symptoms of HIV infection and secondary illnesses associated with AIDS, such as TB, diarrhoea, weight loss, and chronic cough. In general, once the patient is diagnosed as having AIDS, he or she is discharged as soon as possible since AIDS has no cure at present and hospitals are not equipped to handle such cases. AIDS patients therefore often resort to other types of services such as traditional healers or private services. Direct costs of HIV-AIDS thus involve patients suffering from symptoms of HIV and not necessarily full-blown AIDS.

The estimate of the direct costs of an HIV-AIDS patient in Malawi (in-patient hospital costs reflecting drugs, laboratory procedures, personnel and overhead) is estimated to be MK258 for a single admission in 1989 (see Tapia, 1989 and Forsythe, 1992). This is based on limited information from 28 medical records from KCH, QECH and Dedza and Ntcheu

district hospitals by Tapia for an average length of stay of about 18 days. Allowing for two admissions per patient, the average cost increases to MK516 (in 1989 prices).

Laing and Pallangyo (1990) estimate that an average adult AIDS patient in Tanzania experiences 286 days of illness (representing days of care), and an average child AIDS case covers about 200 days of illness (see Tanzania, AIDS Assessment study by World Bank, 1992, Table III.4 and Table III.5). This includes both in-patient and out-patient days of care by episode such as diarrhea, oral thrush, and TB as well as by type of care rendered by hospital, primary care (rural health center and home care), and according to Laing and Pallangyo, renders an estimated cost of $290 per adult patient and $195 per child patient, if full drug availability is allowed. In actual fact the latter condition is hardly ever satisfied however, and the average cost obscures the fact that geographic variation exist. Poor people in rural areas have very limited access to modern health care and therefore should incur much lower costs (and perhaps die sooner). There is therefore some noticeable difference between Malawi and Tanzania estimates of direct costs of HIV-AIDS patient.

Roughly, Malawi estimates turn out to be about US$210 per patient (adult) in 1989, and Tanzania comes close to US$260 (after 40 percent discount of drug availability by Laing and Pallangyo) for each adult and US$178 per child in 1991. About US$220 per adult and US$150 per child at least can be reasonable assumptions for Malawi. These figures can form the basis for estimating the direct economic costs of HIV-AIDS patients, which are equivalent to what is called "the lifetime treatment costs". Under resource constraints these extra costs will crowd out other hospital activities for health care for other diseases, but this does not eliminate the increased burden of health care, i.e., social costs have increased and have to be counted.

In estimating the direct costs, other variables (for example, the costs avoidance and preventive measures) need to be considered but they are ignored here due to the lack of reliable data, with the exception of funeral costs. In the absence of any detailed information in Malawi in regard to funeral costs, one-half of the costs of HIV-AIDS treatment per patient has been set for this evaluation, which makes the funeral costs per adult death to be US$110 (MK300 in 1990 prices) and per child death to be US$75 (MK205 in 1990 prices). The total

costs of HIV-AIDS per HIV-AIDS patient can then be summarized as below:

Direct Costs of HIV-AIDS patients in Malawi, 1990

	Cost of Treatment		Funeral Cost	
	Malawi Kwacha	US$	Malawi Kwacha	US$
Per adult	600	220	300	110
Per child	411	150	205	75

With roughly US$180 as the per capita GDP of Malawi in 1990, treatment cost/GDP ratio of Malawi (for adults) is of the order of 1.2, which is one of the lowest in sub-Saharan Africa except perhaps Zimbabwe (see Forsythe, 1992). Lifetime costs of treating persons with HIV-AIDS in Sub-Saharan African (SSA) countries range from US$220 to US$1000 (per patient) with Malawi showing the lower bound and Zaire the maximum upper bound. These numbers vary not only by the per capita living standard (GDP) of a country but also by the scope of health service delivery capacity from the curative budget of the country, mainly that of the Ministry of Health. Budgetary restrictions can render lower quality of service with reduced expenditure per capita, which crowds out the growing in-patient/out-patient demand for health care in regard to HIV-AIDS. Hence direct cost estimates are likely to be substantially biased downward because of deterioration in service quality due to budgetary control and limited capacity to admit an increasing number of AIDS patients in hospitals.

To sum up, an evaluation of direct costs of HIV-AIDS requires the following data and assumptions on an annual basis:

(a) per capita hospital treatment cost of HIV patients, adult and children (denoted here by TCH(A) and TCH(C))

(b) percentage of HIV patients who obtain hospital in-patient/out-patient services (includes testing or other preventive service), denoted here by PHH

(c) per capita hospital in-patient cost for AIDS patients, adults (TCAIDS)

(d) percentage of AIDS patients who obtain hospital in-patient service, adults (PHA)

(e) number of current HIV population, adults and children (HIVCURR(A) and HIVCURR(C))

(f) number of current AIDS cases outstanding, adults (AIDSCURR(A) and AIDSCURR(C))

(g) funeral costs per adult and child (TCF(A) and TCF(C))

(h) number of deaths of adults and children due to AIDS (DEATHNEW(A) and DEATHNEW(C)).

The estimation is divided into two parts: (1) aggregate hospital costs (TTCH) and (2) aggregate funeral costs (TTCF) for the nation on an annual basis. These are presented in the following formulation for adults and children separately.

TTCH = TTCH(A) + TTCH(C) ..... (1)

TTCH(A) = TCH(A) * PHH * HIVCURR (A)

+ TCAIDS * PHA * AIDSCURR (A)

.....(2)

TTCH(C) = TCH (C) * PHH * HIVSCURR (C)

+ TCH (C) * PHA * AIDSCURR(C) .....(3)

1. Cost of HIV-AIDS treatment for adults alone range between MK43 million and MK95 million (in 1990 prices) during 1995-2005 with the peak in 2001 even using a very conservative proportion of admission of HIV patients to hospital care of 3 percent (PHH) and of AIDS patients to hospital care of 50 percent (PHA). This is much larger than the estimates made by Forsythe (1992) which is primarily due to the inclusion of costs of both HIV patients and AIDS patients as well as a larger incidence of HIV and AIDS (for adults) in this study's demographic projections. On the basis of the Ministry of Health's curative budget (78 percent of the total recurrent budget) projections over time (expressed in 1990 prices), the AIDS costs (for adults) as a share of the curative budget is expected to shoot up to about 87 percent in 2000 (from a level of 52 % in 1995) and then starts falling as AIDSCURR (current outstanding AIDS patients) starts declining. This suggests that the Ministry of Health's (MOH) curative budget (evaluated to be about MK 83 million in 1990 prices) may need to be at least doubled in the year 2000 to maintain the level of service of 1995 rendered for all curative care including that of HIV-AIDS patients. Otherwise, AIDS expenses are going to swallow a lion's share of MOH's budget at the cost of other services of hospital care. Furthermore, these expenses could be higher if there is a real increase in the cost of treating patients with AIDS relative to other diseases.

2. Funeral costs for adults, which are largely borne by households, add to increasing social costs. They are not insignificant, ranging around MK50 to MK55 million (in 1990 prices) during 2000-2004, when the maximum impact is likely to be felt. These costs will mostly be borne by increasing private dissavings with the accompanying loss of other consumption and investment requirements of households, thus diminishing households' productivity and general welfare.

3. The direct treatment costs of HIV-AIDS for children are much lower because of the lower incidence of HIV-AIDS in the demographic projections.

4. During the period 2000-2005 funeral costs due to AIDS alone (adults and children) alone for Malawians will amount to about MK60 million (in 1990 prices) annually which in current prices should be roughly of the order of MK240 million (equal to 60 multiplied by a factor of 4).

2.3 Indirect Cost of HIV-AIDS

The literature on the economic impact of HIV-AIDS in many countries suggests that the indirect costs far exceed the direct costs of HIV-AIDS. This is not surprising because the method of estimating indirect cost takes multiple channels of transmission of productivity loss due to HIV-AIDS, which reduces both the supply side of productive labour force and the demand side of purchasing power. On the supply side the following factors are involved:

(a) rising morbidity
(b) rising mortality and
(c) shift of the labour force towards younger and less-experienced workers.

Rising morbidity with higher HIV-AIDS prevalence will make workers less productive (even including those who do not have AIDS) by being sick and absent from work and being preoccupied by day-to-day concerns. The health expenditure associated with morbidity will reduce both private and public savings as well as non-health current expenditures to some extent. The fall in domestic savings will imply a reduction in capital formation which will adversely affect economic growth and per capita income in the long run. And finally, one particular effect of dissavings (both private and nation) is likely to reduce the human capital formation (includes learning by doing) for sick adults and for children due to diversion of school-going children's time to care for and support ill parents. In regard to rising mortality due to AIDS, the most important effect is the loss of the productive labour force with experience and human capital, which is the key to the maintenance and growth of the economy. This loss cannot always be recouped by the younger generation with little experience. Human capital may not be recouped from the pool of the unemployed and the young, which does not have the same stock of human capital. Also the demographic effect of AIDS shifts the population to the younger generation which in general will reduce the

working-age population and perhaps also the participation of the labour force on the supply side.

On the demand side, following factors may be considered:

(a) the shift in size and composition of the population will affect the level and composition of public expenditures; there will be a smaller number of younger people, which will place lower demands on the educational system although there will be fewer teachers as well;

(b) health expenditures will shift more to caretaking of AIDS patients and less caring for patients with other diseases, given the limited health service capacity as government revenues (financing aggregate government expenditures) may fall rather than rise with a declining work force;

(c) public dissavings (following increased government budget deficits due to AIDS) will crowd out private investment;

(d) private non-health consumption expenditures will fall in the face of a squeeze on personal disposable incomes (after HIV-AIDS expenses and funeral costs).

An attempt is made in this study to cover the above features in a simple macroeconomic model that assess the economic impact of HIV-AIDS. The version presented is a modified version of Cuddington model applied to Tanzania and Malawi (see Cuddington,1993 and 1994)

2.4 MACRO MODEL WITH HIV-AIDS, MALAWI

The model follows closely that of Cuddington, which is built on the pioneering work of the Solow(1956) growth model. It is primarily a supply-side, long-term version of the growth of an economy, given homogeneous capital and labour (without unemployment of labour and underutilization of capital), with particular assumptions of savings behaviour and

capital formation. The present model deviates from Cuddington in two important aspects.

First, it takes the existing unemployment structure into account to pose the question of whether the decline of the productive labour force due to AIDS can be recouped from the otherwise unemployed pool. And if so, what its role in model simulations should be.

Second, it takes into account the short-term fluctuations of macro growth for the historical period 1987-1994, before letting the growth model run its long-term course. These two aspects critically change the path of the economy for the entire period 1987-2022, although the conclusions are very similar to those Cuddington derives in regard to capital/labour ratio and aggregate growth prospects.

The model is described by the following set of equations:

Output (GDP): $Y_t = Ag^t E_t^b K_t^{1-b}$ ..... (7)

where,

Y = GDP at constant prices at each point of time, t;

A = Constant term used for the initial year;

g = total factor productivity (TFP) indicating technological change where $(g-1)$ is the productivity growth factor;

E = employed working age population (15-64) in efficiency units;

K = Capital stock at constant prices;

b = labour's share of output;

t = time (in calendar years) with $t = 0, 1, 2, ...$

Efficiency

Labour: $E_t = (1-Z_t{*}a_t)\, v_t\, L_t$ ..... (8)

where,

Z = fraction of worker year lost (morbidity) per AIDS-stricken worker;

a = proportion of working population subject to AIDS (AIDSCURR);
v = efficiency units per unit of labour (employable);

L = employable working age labour.

Efficiency

Unit of Labour : $v_t = .8 + .02\,(i_t - 15) - .003\,(i_t - 15)^2$

.....(9)

Where v captures the average experience of working age population which is proxied by a non-linear relation between two variables, average working age of the labour force (i) and the starting age, 15. This is done to reflect the decline of the average age of working labour force due to deaths by AIDS (AIDS -induced mortality), and therefore its productivity with a lower level of age-specific experience.

Direct Costs of
HIV-AIDS: $R_t = TTCH_t + TTCF_t$ .... (10)

Where, $TTCH_t$ = total costs of treatment of HIV-AIDS (described in section earlier);

$TTCF_t$ = total funeral costs due to deaths (described in section earlier);

R_t = total direct costs of HIV-AIDS

Domestic
savings: $S_t^* = s_t^* Y_t - R_t$ .....(11)

Where s_t = savings rate in the absence of HIV-AIDS;

S_t^* = aggregate domestic savings after direct costs of HIV-AIDS are financed from current output, Y_t.

Gross
Investment(I): $I_t = S_t^* + f_t^* Y_t$ .....(12)

Where, f_t = share of net capital inflow in GDP

Net
Investment(NI): $NI_t = I_t - h^* K_t$ .....(13)

Where, h = fixed depreciation rate of capital stock.

Capital
Stock (K): $K_t = K_{t-1} + NI_t$ .....(14)

Where, K_{t-1} = capital stock of the previous period, t-1.

Capital/Efficiency Labour Ratio (K/E)
(in the absence of HIV-AIDS)

$(K/E)_t$ = historically adjusted to fit the actual growth path of Malawi, 1987-1994, and thereafter set to increase by a certain amount.

The model is endogenous in all variables as soon as K/E is put into place, which is one of the most controversial variables in growth economics. Capital/labour ratio (K/L) or capital/efficiency labour ratio (K/E) should in general fall as savings rate falls with HIV-AIDS, but reduced labour force with higher wages may tilt the balance to the other way around requiring increased K/L or K/E. It is therefore difficult to predict in which way the ratio may turn in the long run, but some simulations can be run to obtain sensitivity of the results. In the so-called steady state of growth dynamics the K/L ratio should stabilize at a point subscribed by a ratio of savings rate (s^*, after AIDS) to the sum of rate of growth population (n^* after AIDS) and the depreciation rate, h, multiplied by output per worker (y^*), i.e.,

$$k^* = \frac{y^* s^*}{n^* + h} \qquad \text{.....(15)}$$

or $$k^*/y^* = s^*/(n^* + h) \qquad \text{.....(15a)}$$

This says that K/L falls as s^* falls (after AIDS) but rises as n^* falls (after AIDS): the trade-off between savings rate and population growth thus remains, and which one dominates in the long run remains to be seen.

2.5 Parameters Selection, Calibration and Simulation of Growth Model with AIDS

Simulation exercises based on the above model have been run with two scenarios :

(1) without HIV-AIDS called Model 1, and (2) with HIV-AIDS called Model 2. Model 1 is treated as the reference solution for Malawi's long-run growth prospects over 1987-2022 and it is free from the economic effects of HIV-AIDS. Model 2 incorporates all the possible economic effects of HIV-AIDS on the growth path of the Malawian economy for the same period. Both models yield the major macro variables over time where the differences in the variables (in magnitudes) would illustrate the economic impact of HIV-AIDS. Two particular differences in methods applied should be noted here when compared to Cuddington's approach (1993).

1. Cuddington's approach mimics the World Bank's scenario of Malawi using the Bank's Revised Minimum Standard Model (RMSM) simulations described in Malawi: Growth through Poverty Reduction (World Bank, 1990). It has no reference to the actual growth path during 1987-1994 of Malawi's economy which has exhibited major upheavals in GDP growth rate, domestic savings, capital inflows, investment and undoubtedly capital/output ratio and productivity growth. Therefore the macro model that can replicate this history should set the future path that is consistent with it.

   The usual claim (including Cuddington's) that the construction of a potential output (GDP) path of a model independent of the initial conditions of the economy is sufficient to signal the differential effects of HIV-AIDS on that path seems at best naive and at worst highly deceptive. Differential impact of any shock on any path of economic development subject to adjustment problems arising out of short-run disturbances is likely to be different at least in the medium term, if not in the long run, when judged against the impact of a similar shock to an economy which is already in the steady state. The whole economy is therefore calibrated to adjust for major deviations of variables like savings rate, investment, capital/output ratio and productivity growth during 1987-1994 before the consequences of HIV-AIDS are examined.

2. Cuddington does not consider the replacement issue of the loss of productive work force that is likely to arise out of deaths due to AIDS. It is known that

labour force keeps growing even with deaths by AIDS according to this study's demographic simulations (and Bulatao's simulations, which Cuddington uses), and so the question remains whether lost productive labour can be recouped from the labour force (still growing under demographic shocks with AIDS) or from the pool of the unemployed. This issue is not the same as using less efficient labour force as a substitution mechanism because substitution is not possible except after long training and experience. So taking care of efficiency loss by having younger population after AIDS is only half the story of modeling exercise; the other half is the possibility (or impossibility) of replacement of lost labour, particularly skilled labour in Malawi's context, which is in short supply. This demands some adjustment to the employability of Malawi's labour force (with younger people coming in and experienced labour force dying) after AIDS.

In the light of the above it is relevant now to set the parameters for Model 1 and Model 2 side by side. This is shown below.

Table 27

Model Parameters for Reference Solution (Model 1) and AIDS Solution (Model 2)

	Model 1	Model 2
Constant Factor (A) =	.846	same as Model 1
Share of Labour in GDP (b) =	.7	"
(Labour in efficiency units) K/Y = (Only in 1987)	2	"
Depreciation Rate (h) =	.05	"
Morbidity (Z) =	0	0.3
AIDS Prevalence Rate (a) =	0	a>0 (AIDS prevalence)over time
Direct costs of HIV-AIDS (R) =	0	R>O and variable over time.

Model 1 scenario (reference solution without AIDS) for the period 1987-2022 has been created with parameters listed above subject to the following calibration exercises in the historical period for some variables.

(a) g (total factor productivity) is adjusted each year to correspond to aggregate GDP after K/E ratio follows an increasing ratio over time; the latter follows the increasing trend similar to Cuddington;

(b) Savings rate and capital inflow share in GDP follow the actual historical path for the period 1987-1994; they show the variable rates of savings and capital inflows during the period, and thereafter projections are made up to 1998 following the Ministry of Economic Planning and Development forecast for the period 1995-1998; from 1999 onward savings rate is assumed to be 12 percent per annum up to 2022 whereas capital inflow share falls to 7 percent, and 6 percent for some years and to 5 percent in 2006 and kept at that level thereafter;

(c) Efficiency of labour (v) per unit of labour is based on equation (12) following the age composition of labour (within age group 15-64) given by the demographic projections in Malawi 3; it shows the following pattern without AIDS.

Average Age and Efficiency Age, Malawi 3
(Labour Force, Age Group (15-64)

	1987	1992	1997	2002	2007	2012	2017	2022
Average Age (15-64)	32.10	31.85	31.36	31.72	31.34	31.52	31.82	32.45
Efficiency Age (15-64)	32.99	32.70	32.09	32.53	32.07	32.28	32.68	33.45
Efficiency Factor (v)	1.027	1.027	1.024	1.026	1.023	1.024	1.027	1.031

Source: Demographic Projections, DEMPROJ Solution, Malawi 3.

There are variations of efficiency factor (v = efficiency age/average age) as well as average age over time. Even the average age does not increase over time - it actually declines for quite some time before it stabilizes. Efficiency age is roughly about 2.3 to 2.7 percent above the average age because of some population in the age group 30-45 (about 30 percent of the labour force) which is considered to be the most productive with age-specific experience. Efficiency factor falls when working age population falls due to AIDS (denoted by v*) with a shrinking of the productive age group 30-45 in the labour force given by projections of Malawi 3 AIDS.

Model 2 solution (AIDS) varies from Model 1 (without AIDS) because of chosen values of parameters/variables such as Z, a and R shown in Table 27 plus the additional adjustments noted below.

(a) Model 1 solution generates a certain unemployment rate (UR) over time, and this sets the upper ceiling for employability of labour force. It is then discounted by the factor of replaceability of lost labour force due to AIDS from the pool of unemployed or from the younger labour force after AIDS. The employment rate in Model 2 is set by the following adjustment.

$ER^* = (1-UR)^* \ REPRATE$ ..... (16)

Where, UR = unemployment rate in Model 1;

REPRATE = probability of replacing an average worker in Model 1 lost due to AIDS from labour force in Model 2;

ER* = employment rate of Model 2 which is conditioned by REPRATE and is assumed to fall by 0.5 percent per year in the projection period;

(b) Labour demand (in efficiency units) is represented by:

$E^* = ER^* * LF^* * v^* * (1-aZ)$.....(17).

(c) Labour demand is then assumed to work with any capital stock given by equation (17) after AIDS has taken its toll on domestic savings but supplemented by the same capital inflow share in GDP as in Model 1.

2.6 MACRO RESULTS OF AIDS IMPACTS

The solution results of Model 1 (without AIDS) and Model 2 (with AIDS) are presented in Table 28 and Table 29 respectively for the whole period, 1987-2022.

The major findings can be summarized as below.

1. GDP grows much slower in Model 2 (with AIDS) than Model 1(without AIDS). During the period 1998-2002 GDP growth declines by about 1.5 percent per year in Model 2 relative to Model 1. Over the long haul GDP level in different selected years shows the following differences in the table below.

GDP Levels (in millions of 1990 Kwacha)

	1992	1995	2000	2005	2010	2015	2020
Model 1 (without AIDS)	4510	4820	5964	7350	9140	11336	14431
Model 2 (with AIDS)	4457	4604	5308	6220	7599	9455	12121
Difference (Model 2 less Model 1)	-53	-216	-656	-1130	-1541	-1881	-2310
%Difference	-1.1	-4.5	-10	-15.4	-16.9	-16.6	-16.0

Source: Table 28 and Table 29

The above shows a significant loss of GDP for the Malawi economy ever recorded in a longterm perspective.

2. Capital/efficiency labour ratio has a tendency to grow faster in Model 2 than in Model 1 as the economy is trying to adjust a rapidly declining labour force (in efficiency terms) to a relatively less rapid decline in capital stock. An important issue here is the assumption made about a continuous decline in replacement (0.5 percent per year) possibility of employing the labour force after AIDS. As a result the unemployment rate has increased in almost every year even with declining labour force; this is because of a genuine shortage of qualified and experienced work force which the employers cannot recoup from the younger labour force.

3. The declining savings rate (s*) in Model 2 is much lower than in Model 1 from 1998 onward (which is set to 12 percent per annum). This has occurred because the costs of HIV-AIDS have reduced the net savings in the country and thereafter has hindered the capital formation via lower gross investment (and net investment) for economic growth.

4. Finally, a comparative table is drawn (Table 30) to signify differences in per capita GDP distilled from the two models showing explicitly both population and per capita GDP (both growth rates and levels). This shows the major differences in growth rate in per capita GDP of Model 1 and Model 2 particularly during 1998-2007 where Model 2 provides much lower growth rate in per capita growth despite significant population decline. This situation improves in the second decade of the next century as a catch-up mechanism is established with fewer deaths due to AIDS and a recuperation of the savings rate.

2.7 SECTORAL IMPACTS OF HIV-AIDS

The negative macroeconomic results of HIV-AIDS demand a breakdown by sectors whereby economic effects can be better understood for sectoral policy making in response to the HIV-AIDS epidemic. Since modeling expertise does not allow a bottom-up approach, i.e., from sectors to macro because of an absence of a full-blown input-output accounts, a

top-down approach to sectoral and spatial linkages of the macro system is proposed here. This requires the following mapping exercise involving some vector and matrix operations:

(a) Industrial breakdown of aggregate employment by formal and informal sectors
(b) Industrial breakdown of average earnings by formal and informal sectors
(c) Urban and rural decomposition of (a)
(d) Urban and rural decomposition of (b)
(e) Industry/Occupation matrix of rural employment
(f) Industry/Occupation matrix of urban employment
(g) Occupational breakdown of average earnings consistent with (e)
(h) Occupational breakdown of average earnings consistent with (f).

In economic analysis of HIV-AIDS impacts, the logic of linkages in all these dimensions involves the following chain in the bottom-up version.

(1) Identify HIV-AIDS impacts on occupations (morbidity and mortality) by urban and rural dimensions

(2) Link (1) with industry (sector) in urban and rural space by application of (e) and (f)

(3) Obtain industry (sector) employment and earnings under formal and informal activity classification through application of (c), (d), (b) and (a) to link (2)

(4) Obtain aggregate industry employment and earnings from link (3) to obtain macro results.

In Malawi the greatest difficulty in empirical applications of HIV-AIDS consists in (g) and (h) for which data are either not available or are spotty, which affect link (3). Some estimates of total employment loss by industry due to AIDS can be obtained whereby the number of deaths by occupation (urban or rural) is known through application of (e) and (f). But because within the same occupation, e.g., professionals, workers earn different incomes

in different sectors, the loss of earnings by occupation due to AIDS cannot be accurately estimated. Hence either a mean income has to be imposed on each occupation (urban and rural), or sectoral (industrial) income (earnings) loss has to be obtained by multiplying the loss in sectoral employment with the sectoral average earnings. The latter strategy is followed here.

2.7.1 Empirical Assessment of Sectoral Impacts

The empirical estimation of HIV-AIDS impact by sector is carried out in the following steps:

Step 1: Decomposition of total employment (L) in a benchmark year, chosen to be 1992, into formal and informal classification subdivided by industry

Step 2: Decomposition of formal and informal employment by industry into urban and rural component

Step 3: Decomposition of aggregate labour earnings (WL) into average earnings and employment by industry, formal and informal

Step 4: Decomposition of labour earnings (WL), formal and informal, by industry into urban and rural components

Step 5: Translation of occupational deaths, urban and rural, due to AIDS into industry space; (matrix conversion using industry/occupation matrix) year after year

Step 6: Multiply deaths due to AIDS by average earnings by industry, year after year, urban and rural, and obtain total earnings loss by industry

Step 7: Calculate human capital loss by industry using a social discount rate

of 5 percent and 10 percent respectively over the period 1992-2022; this offers the human capital approach to AIDS which ignores any consideration of the possibility of replacement of human capital loss from the existing labour force after AIDS.

Steps 1 through 4 are carried out in Table 30 for the baseline year 1992 which offers a whole range of labour force decomposition by formal/informal and urban/rural variety. Informal employment by industry is not available for that year and various simulations have been carried out to come to some reasonable estimates, with a total informal employment of roughly 3.74 million. Aggregate employment is assumed to be 4.3 million consistent with the macro solution derived in Model 1, given the total labour force in 1992 of the order of 4.6 million (DEMPROJ solution, MALAWI 3). Employment and labour force measures are both restricted to the age-group, 15-64.

Earnings (average) are given in 1990 prices where the appropriate 1992 deflators (PF and PINF) are estimated to be 140 and 128 for formal and informal sectors respectively. These deflators are calculated from the following two equations representing urban and rural CPI formation.

CPI (urban) = PF * 0.7 + PINF * 0.3.....(a)
CPI (rural) = PF * 0.3 + PINF * 0.7.....(b)

The coefficients in (a) and (b) are approximate and should not be construed as exact. But they are based on Household Expenditure and Smallscale Economic Activity (HESSEA) survey data (1990-91) of National Statistical Office (NSO) with some modifications.

The two equations yield the implicit prices of formal sector (PF) and informal sector (PINF), given CPI (urban) and CPI (rural), as follows:

PF = (CPI (urban) - PINF * 0.3)/0.7
PINF = (CPI (rural) - CPI (urban) * 0.4)/0.57

PF and PINF are used to convert all nominal average earnings by sector for the year 1992 into constant 1990 prices such that they are consistent with Model 1 and Model 2 results in the earlier section which provide implicit aggregate labour earnings in 1990 prices at the national level.

2.7.1.1. Summary Results of Employment and Earnings by Formal/Informal, Urban/Rural Classification, 1992

The benchmark aggregate figures for 1992 in respect of employment and earnings are presented in Table 31 by formal, informal, urban and rural classification, which is summarized from the results of Table 30. Since AIDS is likely to impact differently in urban and rural area, and in formal and informal sectors in varying degrees, a cross-classified table such as Table 31 is the most convenient framework to analyze such impacts. This representation highlights the following features of the baseline 1992 picture without AIDS:

(a) Although the aggregate urban share of employment in total employment is about 12.5 percent, the average earnings in urban employment is about MK1525 (1990 prices), which is about three times that in rural employment;

(b) Urban (formal) average earnings amount to MK1939, which is about three times the national average labour earnings (MK657);

(c) Average earnings in the formal Sector amount to MK1275 which is again much higher - about twice -than the informal sector;

(d) Therefore, if AIDS creates adverse effects on urban and formal sectors more heavily (which happens to be the case in Malawi) than rural and informal sectors, then the loss in earnings alone can have a disproportionate effect on the economy even though the employment share of urban and formal sectors is not very high (12.5 percent and 13 percent respectively) in the nation for the year 1992;

(e) As urbanization and formal sector continue to grow over time, which is assumed in the macro simulation (and in the demographics with declining fertility rate), AIDS impacts are likely to become much more severe in the long run.

2.7.1.2. Employment and Earnings Impacts of AIDS by Sector with Urban/Rural Classification, 1987-2022

The benchmark figures of 1992 in Tables 30 and 31 provide the initial inputs for modeling the top-down version of macroeconomic effects of AIDS. This is sub-divided into two aspects of AIDS impacts, namely, by sector and by urban/rural dimension. A simple disaggregated version is presented to highlight such decomposition over time which mimics step 1 through step 7 in a recursive (top-down) fashion discussed earlier.

DISAGGREGATED MODEL BY SECTOR

The model is composed of the following system of equations where t denotes time:

Adult Employment

Loss due to AIDS : $L(D)t = DEATHNEW(t) \times [1-URATE(t)]$ .....(18)

Adult Urban Employment

Loss due to AIDS : $L(U,D)t = URBAN(t) \times L(D)t$.....(19)

Adult Rural Employment

Loss due to AIDS : $L(R,D)t = L(D)t - L(U,D)t$.....(20)

Sectoral Employment

Loss, Urban (j) : $L(U,D,j)t = b(U,j) \times L(U,D)t$.....(21)

Sectoral Employment

Loss, Rural (j) : $L(R,D,j)t = b(R,j) \times L(R,D)$.....(22)

where, $\text{sum}[b(U,j)] = \text{sum}[b(R,j)] = 1$

b(U,j) and b(R,j) are time invariant,

i.e, fixed with the values 1992, but all

other variables are time variant.

DEATHNEW: Annual deaths (adults) due to AIDS

URATE : Unemployment rate (of Model 1)

URBAN : Urban share of total employment

b(U,j) : share of urban employment of sector j in total urban employment

b(R,j) : share of rural employment of sector j in total rural employment.

Average (nation)

Labour earnings : Wt = Wagebill/Employment = WLt/Lt.....(23)

WLt = 0.7 x GDPt x ut.....(24)

where, GDP = reference solution value of GDP without AIDS;

L = reference solution value of employment without AIDS;

0.7 = labour share in GDP;

ut = variable parameter (less than 1 required to adjust wage bill during 1987-1999; it is set to 1 after 2000).

Average (rural)

Labour earnings: W(R)t = W(R)t-1 x [1+(1-Wt/Wt-1)/qt].....(25)

where,

qt = variable (less than 1) adjusting the path of average rural wages up to 1996, and set to unity thereafter; in 1992, W(R) (average rural annual earnings), for example, is equivalent to MK533 as shown in Table 31.

Average (urban)

Labour earnings : W(U)t = [Wt -(1-URBAN) x W(R)t]/URBAN.....(26)

This equation is derived from W=W(U)* URBAN + W(R)*(1-URBAN) where URBAN has been adjusted judiciously over time such that during times of growth of W, W(U) is never allowed to decline at the cost of W(R); URBAN time path is an increasing one which ends with about 24 percent in the terminal year, 2022, whereas the initial URBAN value is equal to 12.5 percent in 1992.

Total Earnings

Loss, (Urban) : $Y(U)t = W(U)t \times L(U,D)t$.....(27)

Total Earnings

Loss, (Rural) : $Y(R)t = W(R)t \times L(R,D)t$.....(28)

Total Earnings

Loss by Sector,: $Y(U,j)t = C(U,j) \times Y(U)t$.....(29)

(Urban)

Total Earnings

Loss by Sector: $Y(R,j)t = C(R,j) \times Y(R)t$.....(30)

(Rural)

where, sum $[C(U,j)]$ over $j = 1, 2, 3, \ldots\ldots\ldots 12$ add up to unity;

sum $[C(R,j)]$ over $j = 1, 2, 3, \ldots\ldots\ldots 12$ add up to unity.

C(U,j) and C(R,j) are the basecase shares or coefficients calculated for the year 1992 and are assumed to be invariant over time. This implies that sectoral relative average earnings, both urban and rural, do not change over time - an assumption which may run counter to a structural adjustment (between sectors) paradigm in development economics. And this may put into question some of the relative advantages of the top-down approach. However sectoral dynamics of a bottom-up variety which can overcome such shortcomings are beyond the present capability of modeling expertise due to lack of data, if not for analytical rigor. Nevertheless, it is believed that the empirical approach (top-down) followed here yields some results which are of interest to sectoral dimensions of AIDS impacts, hitherto covered only partially.

Finally, for human capital approach to earnings loss for the nation the estimation procedure involves two steps ; (a) the determination of average years of life lost due to AIDS by urban and rural areas, and (b) the timing of cumulative earnings lost by year for urban and rural areas. In most empirical studies the latter is not often carefully articulated; for example, it is generally assumed that if the death of an AIDS victim means a loss of MK 1,000 in 1990 and he/she would have survived another 10 years if AIDS did not strike, then the future earnings loss is MK 10,000, ignoring for the time being the factor of time discounting by a social discount rate. What is bypassed in this methodology is the possibility

that the future earnings path may not be the same MK 1,000 year after year; in most cases it should be higher if the victim remains employed and greater productivity due to experience is built into his/her remuneration. The estimation here takes into account this time-variant average earnings even though in Malawi it may not be significant. Thereafter earnings loss is subjected to two social discount rates (5 percent and 10 percent respectively) to obtain the present value of earnings loss for urban and rural areas in Malawi. The procedure is summarized below.

With assumptions about average years of lost due to AIDS such as:

a) the urban average years of life (for an adult) lost due to AIDS assumed to be 20;

b) the rural average years of life (for an adult) lost due to AIDS assumed to be 14; and;

c) the national average years of life (for an adult) lost due to AIDS roughly equal to 15;

Let,

CUM(L,U,D)t= sum [L(U,D)t], t(time) starting from (t - 20) to t,
= lifetime man-years lost from all urban employees due to AIDS at time t.....(31)

CUM(L,R,D)t = sum [L(R,D)t], t(time) starting from (t - 14) to t,
= lifetime man-years lost from all rural employees due to AIDS at time t.
.....(32)

then,

Y(U)*t = CUM(L,U,D)t * Y(U)t .....(33)
= lifetime earnings loss of all urban employees due to AIDS at time t.

Y(R)*t = CUM(L,R,D)t * Y(R)t .....(34)
= lifetime earnings loss of all rural employees due to AIDS at time t.

$$Y^*t = Y(U)^*t + Y(R)^*t \quad \text{.....(35)}$$

= lifetime earnings loss of all employees due to AIDS at time.

Discounted present value of earnings forgone due to AIDS :

Y(U)D = sum [Y(U)*t/(1+r)to the power t] over time....(36)

Y(R)D = sum [Y(R)*t/(1+r)to the power t] over time....(37)

YD = Y(U)D + Y(R)D .....(38)

where, r = social discount rate.

The empirical correspondence of equations (18), (19), (20), (23) to (28) is shown in Table 32. The sectoral ramifications are presented in Table 33 for urban Malawi and in Table 34 for rural Malawi for the year 1992 which bring out the coefficients b(U,j), b(R,j), C(U,j) and C(R,j.). These coefficients set the time path of sectoral employment and earnings loss for the whole period 1987-2022. The results are shown in Tables 35 and 36 for urban Malawi and Tables 37 and 38 for rural Malawi. Lifetime earnings loss by urban and rural areas as well as their discounted values (evaluated in 1990) appropriate to human capital loss estimation are presented in Table 39.

2.7.1.3 Interpretation of empirical Results of Sectoral and National Impacts

The principal results of AIDS impacts by sector in urban and rural areas of Malawi can be summarized as follows:

1. The benchmark figures of employment and average earnings by sector and by urban/rural classification for 1992 are shown in Table 30 and serve as the initial inputs for modeling AIDS impacts. This table also shows the formal/informal dimensions of the sectors in the urban and rural locations, which have been organized for the first time in Malawi in a methodical manner. It shows that contrary to conventional wisdom, which equates formal sector development with urbanization, the urban content of formal sector manufacturing is only 53 percent, which suggests that 47 percent of formal manufacturing activity is located in rural areas (see also

Forsythe,1992). Another feature worth noting is that while the finance sector's average earnings is the highest (MK 4471 in 1990 prices in the formal sector), its employment share is only 3.3 percent of the total formal sector. Thus the loss of manpower in financial sector due to AIDS will hardly affect aggregate economic loss in a major way. Other interpretations for various sectors are easy to formulate, given the structure of data in Table 30.

2. As stated earlier, the summarized version of Table 30 is recast in Table 31 with a 2 x 2 matrix (spatial mapping of formal/informal sectors). This yields some ready insights into the macro dimensions of earnings loss wherever there could be a manpower loss due to AIDS. It has been noted in the demographic impacts of AIDS that the seroprevalence of HIV is much higher in urban areas (about 27 percent in 1994) than in rural areas (about 13 percent in 1994). This implies that a relatively higher incidence of AIDS in the urban sector can increase the share of earnings loss in the urban sector relative to the total earnings loss even though the urban employment share is relatively low (12.5 percent). On the other hand, the rural earnings loss will continue to dominate the aggregate loss because of sheer size of employment in the rural sector even with a lower HIV prevalence and incidence of AIDS.

3. The disposition of urban and rural deaths (of adults employed) due to AIDS for the period 1990-2022 is shown in Table 32. By definition, the share of urban to total deaths (of adults employed) follows the ratio of urban employment to total employment (URBAN) which increases over time. In earnings loss calculations it should be apparent that only deaths of adults who are employed are taken into account by multiplying deaths with average earnings, year after year. This renders the ratio of urban to rural earnings loss to increase from 44 percent in 1994 to about 54 percent in 2000, and to 58 percent in 2010. Aggregate earnings loss due to AIDS as a share of GDP continues to rise from a low 0.02 percent in 1990 to a peak of 2.14 percent in 2001, and thereafter it starts declining. The average earnings loss to GDP for the whole period, 1990-2022, amounts to about 0.54 percent which is a significant

decline for the economy considering only the loss of employees' earnings but neglecting other direct and indirect effects.

4. In Tables 33 and 34 the sectoral disposition of urban and rural employment and earnings is presented for 1992 and 1995 for illustrative purposes. Whereas urban employment loss keeps increasing, average earnings by sector do not rise (see Table 33) between 1992 and 1995 simply because the aggregate urban average earnings has declined during the period (from MK1525 to MK 1414). This is not the case in the rural sector where average earnings show a slight improvement (see Table 34). This shows that the path of earnings in the future is an important consideration to be kept in mind when evaluating economic loss by sector - a point which is not dealt with in some economic analyses of AIDS impacts that rely on fixed earnings of a given benchmark year as in Forsythe (1992).

5. In Tables 35 and 36 a more detailed time path of loss of urban workers and earnings by sector is shown. With regard to employment the largest loss takes place in manufacturing (75,700) followed by agriculture (72,800), trade (48,900), transport (41,600) and construction (38,100) for the entire period 1990-2022 (see Table 35). On the earnings side, the ranking changes where the largest loss is in manufacturing (MK 208 million), followed by community and social services (MK 100 million), trade (MK 69 million), transport (MK 58 million) and finance (MK 53 million) (see Table 36). This suggests that if minimizing economic loss has to be a target of an AIDS program (in a partial equilibrium setting here employed), the sectoral priorities should be geared to sectors such as manufacturing, community and social services (which include government employees), trade, transport. Thus employment loss by sector due to AIDS should not be considered to be an overriding criterion; it needs to be buttressed by earnings considerations.

6. In Tables 37 and 38 the decomposition of loss of workers and earnings due to AIDS by sector is presented for rural Malawi. It shows clearly that both the loss of workers and earnings is overwhelmingly in the agricultural sector. Over the entire period of 1990-2022, this loss in the agricultural sector is about 1.4 million for employment

(out of total loss of 1.5 million employees in rural Malawi) and about MK732 million for earnings (out of total loss of MK 1 billion). The other sectors have hardly contributed to total rural economic impacts because of the sheer size of the work force lost due to AIDS in the agriculture sector. As in the urban areas, the rural income loss is maximum during 2000-2005, which is largely determined by the size of the labour force lost rather than the increase in average earnings during the period.

7. In regard to human capital loss (which includes both cumulative losses of earnings each year and their discounted values), the results are staggering. Two points emerge:

a) The magnitudes of employment and earnings losses here are different from those reported in Tables 35 and 37 (for employment) and Tables 36 and 38 (for earnings) because of the process of cumulation. Although cumulative (defined as lifetime) employment losses follow bell-shaped distributions (both urban and rural) over time, the urban employment losses do not fall as fast as the rural counterpart, i.e., they remain more stubborn, relatively speaking, in the second decade of the next century. However, in respect of loss of cumulative earnings, the urban sector dominates the rural sector in the second decade of the century mainly because of loss of higher average earnings in urban vis-a-vis rural sector. The total loss of urban earnings amounts to about MK 11 billion whereas that of rural earnings (both undiscounted) amount to MK 16.5 billion. Thus the urban share of human capital loss due to AIDS is considerably higher than the rural share, relatively speaking. The time path of national earnings loss as a percentage of GDP (without AIDS, but not cumulated) shows a bell-shaped curve peaking out in the years 2008 and 2009 which registers as high an incidence as 17 percent. This share falls slowly thereafter. This is one of the most significant numbers ever reported for African countries.

b) The discounted urban and rural earnings losses (both at 5 percent and 10 percent discount rates) show the same urban dominance in the latter part of the second decade of the next century. The total national loss of earnings over

the entire period is MK 10.4 billion and MK 4.5 billion at 5 percent and 10 percent discount rates. For the economic interpretation of present value evaluation of economic losses due to AIDS, even the low number of MK 4.5 billion (in 1990 prices) with a very high discount rate of 10% represents a considerable drain on the wellbeing of the nation.

2.8 SPATIAL IMPACTS OF HIV-AIDS BY DISTRICT AND REGION

The decomposition exercise for employment by sector and by urban and rural areas separately has been a direct result of the static top-down approach. The experiment now is extended to spatial dimensions by district and region. Malawi has 24 districts and three regions, North, Center and South, as illustrated in the Malawi Population and Housing Census of 1987. Since 1987 there has been no comprehensive data update of employment by district and by sector, which is further distinguished by urban and rural classification. In the absence of any recent data in this field, the 1987 census benchmarks of distribution of shares in employment by district and by sector for urban and rural areas are used to determine employment impacts due to AIDS in districts and regions.

2.8.1 Simplified Method of Spatial Distribution of AIDS Impacts

The method used to generate AIDS impacts on employment by 24 districts and by sector is a simple vector and matrix multiplication process, given an aggregate (national) employment loss due to AIDS. This is shown below.

Let

E (i,j, urban) = employment share of sector j in district i for all urban areas, where sum of such shares over all districts in sector j is equal to unity;

E (i,j, rural) = employment share of sector j in district i for all rural areas, where sum of such shares over all districts in sector j is equal to unity;

SH(j, urban) = share of employment of sector j in all urban areas;

SH(j, rural) = share of employment of sector j in all rural areas; where, sum of the above shares in each add up to unity.

Then, employment loss (lifetime) in district i by sector j in each time period, t, is given by:

for urban areas,

$$H(i,j, \text{urban})t = CUM(L, U, D,)t * SH(j, \text{urban}) * E(i,j, \text{urban}) \quad \ldots\ldots\ldots\ldots\ldots\ldots (39)$$

for rural areas,

$$H(i,j, \text{rural})t = CUM(L,R,D)t * SH(j,\text{rural}) * E(i,j, \text{rural}) \quad \ldots\ldots\ldots\ldots\ldots\ldots (40)$$

where, CUM (L,U,D) and CUM (L,R,D) are urban and rural definitions of lifetime man-years lost due to AIDS at the national level (see equations (31) and (32)). As mentioned earlier, the shares such as $E(i,j)$ and $SH(j)$ by urban and rural dimensions are assumed to be invariant over time in the absence of better data.

2.8.2 Results of AIDS Impacts on Employment Loss by District and by Sector

To start with, the initial benchmarks of distribution of employment in 1987, officially described as "economically active population" of Malawi (see NSO, Population and Housing Census of 1987) are to be noted by district and by sector. This is shown in Table 40 which demonstrates a nine-sector classification over 24 districts. The 1987 census provides an additional sector called "other" which is a mixture of unclassified activities with no clear economic interpretation. In Table 40 the employment of this sector has been distributed across nine sectors using their sectoral weights. Table 40, which combines both urban and rural areas, provides the following aspects of district and regional distribution of employment loss by sector.

(a) Blantyre dominates all districts in all sectors except agriculture and community services;

(b) The maximum concentration of agricultural employment takes place in Lilongwe district followed by Mulanje, Machinga and Mangochi;

(c) The southern region dominates every other region in every sector of employment with the maximum in manufacturing (67 percent relative to 24 percent in the center); this has serious implications for AIDS impacts as AIDS victims are largely concentrated in the South since HIV seroprevalence has been historically high and persistent there;

(d) By district, the largest contributor to total employment (urban and rural combined) is Lilongwe district; this is simply because of its predominance in agricultural employment in the country which has outweighed the otherwise preponderant Blantyre district in all sectors except agriculture and community services.

The above aggregate picture of employment by district and sector is further decomposed into rural and urban dimensions in Tables 41 and 42 to highlight some extra features that permit a more detailed assessment of AIDS impacts. These tables show:

(1) On the rural side of employment, the South dominates the other regions in a major way (see Table 41), but by sector and by district there are some exceptions: Ntcheu and Dedza retain dominance in mining and Lilongwe retains dominance in agriculture and community services and remains the largest contributor to rural employment in the country (about 10.7 percent);

(2) On the urban side of employment structure (see Table 42), Lilongwe is dominant only in agriculture but is superseded by Blantyre in every other sector; however, the urbanization content of these two districts exhausts about 65 percent of the total urban employment of the country (Lilongwe, about 26

percent and Blantyre about 39 percent); by definition, AIDS impacts on urban workforce are likely to be on these two districts since they constitute such a large proportion of urban employment, and there are indications of persistent high seroprevalence in Blantyre, if not in Lilongwe.

The 1987 census benchmarks of employment used above with such a multi-dimensional (rural, urban, district, region, sector) classification have so far remained the only vehicle to conceptualize the spatial dimensions of AIDS impacts in the country. Malawi does not have any more recent information that is comprehensive across districts and sectors. It is likely that the numbers (particularly distribution shares) may not have changed even though during the period 1987-1995, urban growth in informal employment must have been considerable, especially in sectors such as trade, construction and community services (which include domestic services).

2.8.3 Lifetime Man-Years Loss Due to AIDS, 1995-2010, by District, Urban and Rural

The application of equations (39) and (40) which uses the distribution shares of Tables 40-42 create Tables 43-51 for years such as 1995, 2000, 2005 and 2010 with specific designations of urban and rural areas. The following description of such tables may be useful for easy explanation:

i) Table 43: Man-Years Loss due to AIDS (urban and rural combined), 1995, by sector and district
ii) Table 44: Man-Years Loss due to AIDS, Rural, 1995 by sector and district
iii) Table 45: Man-Years Loss due to AIDS, Urban, 1995 by sector and district
iv) Table 46: Man-Years Loss due to AIDS, Rural, 2000 by sector and district
v) Table 47: Man-Years Loss due to AIDS, Urban, 2000, by sector and district
vi) Table 48: Man-Years Loss due to AIDS, Rural, 2005, by sector and district
(vii) Table 49: Man-Years Loss due to AIDS, Rural, 2005, by sector and district
viii) Table 50: Man-Years Loss due to AIDS, Rural, 2010, by sector and district
(ix) Table 51: Man-Years Loss due to AIDS, Urban, 2010, by sector and district.

Each table so constructed here has two rows: (a) Share percent (which designates the national percentage of employment, urban or rural, in each of the nine sectors), and (b) national level of employment by sector, urban and rural (expressed in thousands), which add up to the aggregate national level of man-years loss due to AIDS taken from Model 2 describing macroeconomic effects.

Barring these two rows, all numbers are self-explanatory, i.e., each number represents the number of man-years (in thousands) lost due to AIDS by district, region, sector and nation for a particular year. Thus to take an example, by the year 2010, Blantyre is likely to lose about 46,220 man-years (not people, but the cumulative of people's productive (adult) years lost due to AIDS) in manufacturing alone in the urban areas, whereas Lilongwe can lose about 11,420 in the same year (see Table 51). For the same year, 2010, urban losses by region account for about 32,000 for the North, 122,000 for the Center and 190,000 for the South yielding a national loss of about 344,000 man-years due to AIDS (see Table 51). Urban losses by sector are different for different regions: for the South it is predominantly manufacturing followed by community services, agriculture, trade, transport, etc, whereas for the Center, it is community services followed by agriculture, trade, manufacturing, and so on.

In the same vein, rural losses can be interpreted, say, from Tables 46, 48 and 50 representing the situation in years 2000, 2005 and 2010 respectively. To take an example, in the year 2010, about 1.2 million man-years are lost in agriculture alone, of which about a half is borne by the South and slightly less by the Center. In the South for the same year in agriculture, the largest burden is borne by Mulanje, followed by Machinga and Mangochi, whereas in the Center the impact is disproportionately on Lilongwe. Apart from agriculture which accounts for about 90 percent of rural loss, the remaining burden is shared by community services, manufacturing, trade and transport, in a descending order. This pattern follows from all tables in all years because of the invariant structure of employment by sector.

2.9 ASPECTS NEGLECTED IN THE ESTIMATION OF ECONOMIC IMPACTS OF HIV-AIDS

The discussion in previous sections has highlighted various aspects of economic impact assessment of the HIV-AIDS epidemic in Malawi. It has utilized a variety of methods and assumptions to arrive at the magnitudes of some relevant variables at the macro, sector and even district levels in urban and rural dimensions. Yet there are many aspects of HIV-AIDS which have not been captured due to data inadequacy as well as lack of rigorous analytical underpinnings that accompany the complex socio-economic ramifications of the epidemic. These neglected aspects are highlighted in order that future research and policy directions for HIV-AIDS can have a sharper focus. Among them, the following merit attention.

1) From an analytical standpoint the most important but often neglected aspect of HIV-AIDS research is the epidemiological foundations of the "incidence rate" over time, i.e., the probability of HIV infection for an adult (hitherto uninfected) at each point of time in the midst of a susceptible uninfected population which is surrounded by an infected (both HIV and AIDS) population. This environment is further complicated by the presence of various STDs, the state of condom use and other socio-cultural aspects of marital and extra-marital sexual practices. There is no standard principle of incidence rate prediction even though mathematically the incidence rate has to peak out at some point in the future in the absence of direct interventions. As noted earlier, the incidence rate triggers the prevalence rate of HIV, given the progression rates of HIV to AIDS and AIDS to death. Continuous monitoring of incidence rate in different socio-cultural milieu should help to identify the factors that can explain the speed of the incidence rate, both its rise and fall. In this study's empirical illustration for Malawi an incidence rate has been hypothesized to peak out in 1996 and then follow a steady decline, leading to lower HIV seroprevalence in later years. This hypothesis is conjectural, if not for the peak but at least for the steady decline in the future. This may be considered quite optimistic but in the present state of

knowledge it is difficult to either accept or reject.

2) In the direct cost estimation of HIV-AIDS the following factors have been ignored for lack of data or plausible assumptions:

   (i) opportunity cost of time for relatives/friends in taking care of AIDS victims;

   (ii) cost of preventive measures against HIV infection;

   (iii) cost of treating HIV patients (out-patient and in-patient) at hospitals or health centers. HIV patients have hardly been costed since such patients do not show serious illness until AIDS strike them;

   (iv) cost of HIV-AIDS borne by business firms for illnesses of workers;

   (v) cost of treating AIDS patients by traditional healers or private health clinics.

3) In the indirect cost estimation the factors which have not been accounted for are:

   i) opportunity cost of time in attendance of funerals
   ii) increased burden of orphans
   iii) possibility of migration of survivors
   iv) changes in consumption and investment (by type of goods and services)
   v) diversion of resource allocation from education of the young to other activities like immediate health care of elderly and/or attention of younger generation to domestic activities
   vi) poor health of survivors (particularly children and elderly)
   vii) relocation of land and labour (factor utilization) from cash crops to food crops for immediate survival

viii) psychic costs - grief of survivors

ix) dissolution or reconstitution of household

x) increased business costs (covering insurance and replacement of costly personnel due to AIDS) leading to higher prices of goods and services

xi) changes in the fertility pattern and marriages resulting from uncertain household size composition

xii) cost of re-investment in training/hiring personnel in businesses/government affected by loss of personnel due to AIDS.

The above list obviously envisages a large number of uncertainties involving the demographic, social and economic future of the country with concomitant burden on human and economic resource reallocation. The cost of uncertainty in the absence of a viable social security system (due to entrenched poverty) is itself a strong negative influence on economic growth. Therefore the economic costs of HIV-AIDS in this study could be very well underestimated due to neglect of many of the factors listed above even though these estimates suggest a sharper decline in the economic wellbeing of the population than other conventional studies reported for other African countries.

SECTION III

3. POLICY IMPLICATIONS OF HIV-AIDS IN MALAWI

The previous sections of this study have elaborated on the various costs, direct and indirect, that Malawi is likely to encounter over the long run in the presence of the HIV-AIDS epidemic. Trapped in poverty that is engendered by a dualistic economy where the formal sector commands a relatively large portion of GDP (30 percent) with as little as 13 percent of the employed population and the informal sector (subsistence) sharing the rest, the country faces very difficult choices to combat the epidemic. The economic impact of AIDS falls disproportionately on the formal sector with the erosion of skilled labour force in urban agglomerations (except in estate agriculture). As the urban seroprevalence is likely to remain at least twice that of rural areas during the period 1990-2000, the primary policy initiative seems to lie in the control of the spread of HIV infections in urban areas. It is clear from this study as well as others that the route to rural spread of HIV is mainly urban via transient or migratory urban labor force (primarily males) getting infected and having close, albeit seasonal, affiliations with rural people (females). This situation becomes worse when the subsistence rural economy further deteriorates, which leads to an additional increase of migration of the labor force to urban areas in search of livelihood. In this respect poverty in rural areas can become an indirect cause of proliferation of urban HIV infections. The evidence here is not clear-cut, but the conjecture cannot be ruled out.

3.1 Formulation of Policy Alternatives

In formulating policy alternatives in the presence of impending negative socio-economic consequences of HIV-AIDS in the coming decades, the following primary strategies merit attention.

1) Investment in preventive, cost-effective actions to combat new HIV infections (starting in 1995);

2) Perusal of behaviorial characteristics of high risk groups, e.g. urban transient

workers, prostitutes, upper class and skilled professionals;

3) Social impact survey of AIDS-inflicted households to understand coping mechanisms and how their sufferings can be mitigated;

4) Financing the rising AIDS-related expenditures (both recurrent and development) in Malawi's hospitals to release the pressure on other illnesses which are being crowded out of health care;

5) Development of homebased care and health centers to cater to AIDS patients at decentralized level (includes information, education and communications (IEC) counselling of victims and their relatives);

6) Sex education at an early age (primary and secondary) and adult sex education in respect of HIV-AIDS;

7) AIDS education in the work place (both private and public) to ensure that the management is vested in AIDS prevention with specific programs;

8) Taking care of the growing orphan population;

9) Labor market studies in particular sectors, e.g., agriculture, civil service, manufacturing (food products, textiles, tobacco and tea processing, sugar refinery), construction, trucking activity, education etc;

10) Development of a more consistent statistical information system (includes sentinel surveillance) on a continuing basis through National AIDS Control Programme (NACP) under the AIDS Secretariat of the Ministry of Health;

11) A National Plan of ACTION for AIDS with decentralized strategies, monitoring systems and IEC campaigns.

These proposals need to be buttressed by a clear political will and considerable resources, both domestic and external. Making priorities depends on the existing capacity of particular institutions to implement them or on the necessity of new institutional back-up. The proposals can be divided into two principal areas: (a) preventive measures and (b) attenuating measures. Preventive measures include items (1), (2), (6), and (7) whereas attenuating measures include (3), (4), (5), (8), (9) and (10). National Action Plan, item (11), summarizes the thrust of all items in one. Whereas preventive measures can provide some signals of cost-effectiveness at least to the extent the economic benefits of prevention outweigh the costs of prevention, attenuating measures are also a social necessity since ignoring them can have dire and far-reaching social implications.

3.2 Cost-effectiveness of Some Preventive Measures

There is no standard blueprint for HIV/AIDS prevention. But there is a general agreement on a package of measures that can be used to prevent rapid growth of HIV infections. This package includes a combination of (a) vigorous IEC campaigns on HIV-AIDS, (b) safer sex practices with a more effective condom distribution and greater condom use, (c) control of STDs, and (d) more sex education in the workplace and in the educational institutions (primary, secondary, tertiary and adult). The optimal mix of this package for investment is difficult to prescribe because it depends on the country's resource capability as well as its socio-cultural norms which take time to change, particularly in relation to safe sex practices. WHO estimates that comprehensive prevention (primarily involving the above four elements) can avert about half of all new HIV infections particularly in Africa between now and the end of this decade. But it is not known what this comprehensive prevention program would cost in terms of resource requirements, both human and material, and how this can be financed. However it is useful to evaluate some scenarios regarding how many lives can be saved and what their beneficial economic impacts on society in terms of human capital saving could be. This may shed light on some critical judgments necessary to formulate a range of investment possibilities which can reduce the rapid pace of HIV infections and increase lifesaving. No precise cost-benefit ratios can be inferred from such scenarios, only insights.

In an assessment of the epidemiology of HIV-AIDS in section 1.5.2 it was postulated that Malawi is already in the midst of a very high HIV prevalence rate (about 20 percent in 1995 and 21 percent in 1996, after which time it declines by about 2 percent annually). This scenario implies severe economic impacts in the first decade of the next century. Opinions vary as to the likely date of the peak of the prevalence rate, but from the model point of view it is more or less certain (including judgments from EPIMODEL projections of the AIDS Secretariat) that postponement of the peak of prevalence rate does not significantly reduce the future economic costs. What matters is the level of the prevalence rate and its reduction over time. Since this study shows that Malawi has a very high HIV prevalence, new policies should be introduced to halt the process without delay. Some alternative scenarios of preventive investments have been developed to evaluate the effects of prevalence rate reduction (at the national level) starting from 1996 with a view to enabling an assessment of their beneficial impact on savings in discounted national lifetime earnings.

Two alternative national scenarios of savings of lifetime earnings with reduction in HIV seroprevalence for adults are superimposed on Model 2 (macro model with HIV-AIDS). New values of variables similar to Table 39 are created. The targets chosen are 20 percent and 40 percent reduction in the number of deaths of adults to be achieved by the year 2003 (with the assumption of a gap of average 8 years) with preventive investments against HIV infection beginning in 1996. The results are shown in Table 52 and can be summarized as follows.

1) A 20 percent reduction in HIV prevalence rate (with an investment package of preventive measures described earlier) from 1996 onward reduces deaths due to AIDS of about 12,370 adults annually, whereas a 40 percent reduction results in 24,684 lesser deaths (almost double) annually.

2) Corresponding to the above reductions in the prevalence rate, the discounted national earnings (at 5 percent discount rate) savings amount to MK908 million and MK1824 million (evaluated in 1990 Malawi Kwacha) for 20 percent and 40 percent reduction over the entire period 2003-2022; this amounts to annual savings of about MK48 million (for 20 percent) and MK96

million (for 40 percent) spread over a period of 19 years.

3) The critical maximum investments (where the cost-benefit ratio is equal to one) per year for the two scenarios are US$15.3 million and US$30.7 million.

4) The economic benefit per adult life saved amounts roughly to $1,240 in both simulations suggesting no particular economies of scale.

Table 52

Alternative Investment Scenarios for HIV Prevention, 1996-2022: Discounted Earnings Loss Saved (Human Capital in Millions of 1990 Malawi Kwacha) and Average Annual Number of Deaths Averted

Variables	20% Reduction in New HIV Infections (Starting 1996)	40% Reduction in New HIV Infections (Starting 1996)
Discounted National Earnings Saved (at 5%)	908 (in MK millions)	1824 (in MK millions)
	413 (in US$ millions)	829 (in US$ millions)
Critical Investment (Annual)	33.6 (in MK millions)	67.5 (in MK millions)
	15.3 (in US$ millions)	30.7 (in US$ millions)
Average Annual Deaths Averted (from 2003)	12,370	24,684

Source: Author's estimates, Filename Fertility 4, September, 1995

One critical assumption implied here is that investment should be cost-effective, that is, it should break even or the benefit-cost ratio should be one. Most studies in AIDS prevention assume a range of benefit-cost ratio between 2 and 4 (see Forsythe, 1992). If a ratio of 2 is taken as the minimum ratio possible, given constraints on capacity and adjustments to behaviorial norms in Malawi, then it is likely that an investment of about US$7.7 million per year may be necessary to prevent HIV infections sufficiently to avert about 12,400 adult deaths per year from the beginning of the first decade till the end of the second decade of the next century. On a per adult basis, this means that an investment of US$620 per adult is necessary to save one productive adult life. Judging from the severity of Malawi's situation, this amount seems quite worthwhile since considerable future economic benefits are likely to accrue to the nation, even ignoring other indirect benefits that are excluded from the calculus of human capital loss.

3.3 Behaviorial Policy Analysis

One of the important characteristics of high seroprevalence in urban areas is the behavior of particular socio-economic groups characterized as "high-risk". These groups fall in the following categories:

a) urban transient workers, often unaccompanied by their wives and children
b) prostitutes
c) upper-class and skilled professionals.

The sexual behavior of these groups is often characterized by multiple sex partners and unsafe sex practices (with limited use of condoms). There is very little empirical research to throw light on the factors responsible for such behavior. It is now established that all such groups have sufficient knowledge about the effectiveness of condom use in HIV infection, and yet the actual use of condoms is very low.

The urban transient workers resort to extra-marital sex mainly because of the absence of their wives - a result of low urban wages which prevent adequate shelter and living conditions. This in the absence of condoms use invites HIV infections which in turn can

proliferate the spread of HIV in the rural areas when the workers return to their homes. Prostitutes follow a dual price practice in offering sex services: one with condom use and the other without, the latter being the double of the price of the former. This price differential is undoubtedly low by all standards, and it suggests that prostitutes are poor and desperate enough to earn their livelihood without the protection of condoms in order to support their families. Urban poverty of women as a result of lack of reasonable earning opportunities (in urban areas) is a causal factor in this vicious circle of poverty-prostitution leading to the spread of HIV infections.

In respect of high HIV prevalence for upper-class and skilled professionals, the matter is more complicated. Lack of formal education is not the principal reason for the high seroprevalence since they are well educated. Cultural reasons along with false notions of the "good life" (drinking and extra-marital sex) are probably factors, but little research has been done in this area. Behavior change will only come partly from external IEC campaigns ; the rest remains with individuals choosing to follow safe sex practices.

3.4 Other Aspects of Policy-Related Issues

Three major issues from the policy agenda in section 3.1 are pertinent.

(a) Social Impact Survey of AIDS-Inflicted Households

There has been no survey in Malawi to study the coping mechanisms of AIDS-inflicted households. Presumably, the death of adults in any household due to any illness (whether malaria or AIDS) should capture similar coping mechanisms of survival for the remaining household members. But this is not always so because AIDS causes a larger amount of investment in time and resources (before death) than other illnesses due to the longer incubation period and greater costs of treatment of related secondary diseases. From the statistical point of view, data collection is difficult because deaths due to AIDS are not always registered by household member names for reasons of confidentiality and there is social aversion to allowing data collection from AIDS-inflicted households. New methods that protect household

members' rights to confidentiality in respect of data on their personal lives have to be developed while requisite data collection is implemented. The need for social impact surveys of AIDS-inflicted households is vital in Malawi to obtain information for a broader spectrum of social security measures to cope with the mounting difficulties of AIDS victims.

(b) Financing the Cost of AIDS-related Expenditures in Malawi's Hospitals

AIDS-related expenditures in Malawi's hospitals are growing rapidly. Projections show that by the year 2000 direct HIV-AIDS costs in hospitals as a proportion to Ministry of Health (MOH) curative budget can go as high as 87 percent. This is going to crowd out health services for other illnesses, thus worsening the standard of hospital health care. The curative budget constitutes about 78 percent of the total MOH budget. Reallocating government expenditures to the health sector can partially relieve financing AIDS costs, but the public sector budget will still remain very tight due to macroeconomic considerations of fiscal discipline in the medium term. There are only two choices: larger donor aid to sustain recurrent expenditures related to HIV-AIDS, and alternative home-based care for AIDS victims. The latter has not received very careful attention it deserves (see Better Health in Africa, World Bank, 1994). Home-based care is undoubtedly the most viable long-term solution to the sufferings of AIDS victims as well as victims of other serious diseases.

(c) Statistical Information System on HIV-AIDS

The current statistical information system based on epidemiology of HIV-AIDS in Malawi is carried out by National AIDS Control Program (NACP) at the AIDS Secretariat. It showed promising developments in the beginning of the 1990s, but currently it is under severe stress to articulate timely data development and analysis. First, the epidemiological model (EPIMODEL) in use is inadequate to generate detailed demographic projections with age-specific cohorts and important mortality rates for those cohorts. Nor is it capable of incorporating fertility rate assumptions for the future growth of the population, with and without HIV-AIDS. EPIMODEL

has outlived its rationale for AIDS-related impact studies designed to help policy analysis. The alternative to EPIMODEL is the DEMPROJ model (the Futures Group, Washington) suitably amended to take care of epidemiological aspects of HIV-AIDS as has been done in the present study. Finally, on the data collection side, the AIDS Secretariat data on HIV-AIDS have shown repeated under-reporting capacity due to limited staff in recent years. Also, on the analysis side, AIDS Secretariat is weak in interpreting data and providing meaningful analytical results. There is a technical vacuum currently in the Secretariat which needs to be filled by immediate and appropriate technical assistance from donors to rebuild national capacity with commensurate attention from the Malawi government.

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ANNEX

STATISTICAL TABLES

THE DEMOGRAPHIC AND ECONOMIC IMPACT

OF

HIV-AIDS IN MALAWI, 1987-2022

BY

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NOVEMBER 1995

Table 1

FORECASTS OF TFR FOR MALAWI, 1987-2022 : REFERENCE SOLUTION (SCENARIO A)

BASED ON URBANISATION AND LITERACY RATE :
URBANISATION = U (% OF URBAN TO TOTAL POPULATION)
LITERACY RATE = LR (% OF LITERACY FORECASTS TARGETTED)
Equation : TFR = 1.935 + 0.05 * (40 - U) + 0.15 * (70 - LR)

YEAR	TFR	U	LR	TFR*	ADJ	COEFF/ TIME	TIME	TFRADJ	COEFF*TIME	LIFE EXPECTANCY (Average)	LIFE EXPECTANCY MALE	LIFE EXPECTANCY FEMALE
1987	7.8	10.7	42	5.665	1.935	1.935	1	7.6	1.935	45.15	43.5	46.8
1992	6.7	12.3	46	4.985	1.715	0.387	5	6.92	1.935	46.4625	44.9125	48.1125
1994	6.5	13	48	4.65	1.85	0.276	7	6.585	1.935	46.9875	45.3375	48.6375
1995		13.43	49	4.4785		0.242	8	6.4135	1.935	47.25	45.6	48.9
1996		13.86	50	4.307		0.215	9	6.242	1.935	47.37	45.78	48.96
1997		14.3	52	3.985		0.193	10	5.92	1.935	47.49	45.96	49.02
1998		14.76	53	3.812		0.176	11	5.747	1.935	47.61	46.14	49.08
1999		15.22	54	3.639		0.161	12	5.574	1.935	47.73	46.32	49.14
2000		15.68	55	3.466		0.149	13	5.401	1.935	47.85	46.5	49.2
2001		16.14	56	3.293		0.138	14	5.228	1.935	48.15	46.8	49.5
2002		16.6	57	3.12		0.129	15	5.055	1.935	48.45	47.1	49.8
2003		17.14	58	2.943		0.121	16	4.878	1.935	48.75	47.4	50.1
2004		17.68	59	2.766		0.114	17	4.701	1.935	49.05	47.7	50.4
2005		18.22	60	2.589		0.107	18	4.524	1.935	49.35	48	50.7
2006		18.76	60	2.562		0.102	19	4.497	1.935	49.65	48.3	51
2007		19.3	60	2.535		0.097	20	4.47	1.935	49.95	48.6	51.3
2008		19.92	60	2.504		0.092	21	4.439	1.935	50.25	48.9	51.6
2009		20.54	60	2.473		0.088	22	4.408	1.935	50.55	49.2	51.9
2010		21.16	60	2.442		0.084	23	4.377	1.935	50.85	49.5	52.2
2011		21.78	60	2.411		0.081	24	4.346	1.935	51.19	49.84	52.54
2012		22.4	60	2.38		0.077	25	4.315	1.935	51.53	50.18	52.88
2013		23.1	60	2.345		0.074	26	4.28	1.935	51.87	50.52	53.22
2014		23.8	60	2.31		0.072	27	4.245	1.935	52.21	50.86	53.56
2015		24.5	63	1.825		0.069	28	3.76	1.935	52.55	51.2	53.9
2016		25.2	63	1.79		0.067	29	3.725	1.935	52.81	51.46	54.16
2017		25.9	63	1.755		0.064	30	3.69	1.935	53.07	51.72	54.42
2018		26.72	63	1.714		0.062	31	3.649	1.935	53.33	51.98	54.68
2019		27.54	63	1.673		0.060	32	3.608	1.935	53.59	52.24	54.94
2020		28.36	63	1.632		0.059	33	3.567	1.935	53.85	52.5	55.2
2021		29.18	63	1.591		0.057	34	3.526	1.935	53.95	52.6	55.3
2022		30	63	1.55		0.055	35	3.485	1.935	54.05	52.7	55.4

Source : Author's estimates. EP&D, Filename : Fertility, January 1995
Note : ADJ is calculated without the constant term, but TFRADJ includes constant term and TFR*; TFRADJ is the forecast TFR targeted.

(2)

Table 2

FORECASTS OF TFR FOR MALAWI, 1987-2022 : IMPROVED SOLUTION (SCENARIO B)

BASED ON URBANISATION AND LITERACY RATE
URBANISATION - U (% OF URBAN TO TOTAL POPULATION)
LITERACY RATE = LR (% OF LITERACY FORECASTS TARGETTED)
Equation : TFR = 1.935 + 0.05 * (40 - U) + 0.15 * (70 - LR)

YEAR	TFR	U	LR	TFR*	ADJ	COEFF/ TIME	TIME	TFRADJ	COEFF*TIME	LIFE EXPECTANCY (Average)	LIFE EXPECTANCY MALE	FEMALE
1987	7.6	10.7	42	5.665	1.935	1.935	1	7.6	1.935	45.15	43.5	46.9
1992	6.7	12.3	46	4.985	1.715	0.387	5	6.92	1.935	46.4625	44.8125	49.1125
1994	6.5	13	48	4.65	1.85	0.276	7	6.585	1.935	46.9875	45.3375	48.6375
1995		13.43	49	4.4785		0.242	8	6.4135	1.935	47.25	45.6	48.9
1996		13.86	50	4.307		0.215	9	6.242	1.935	47.37	45.78	48.96
1997		14.3	52	3.985		0.193	10	5.92	1.935	47.49	45.98	49.02
1998		14.76	53	3.812		0.176	11	5.747	1.935	47.61	46.14	49.08
1999		15.22	54	3.639		0.161	12	5.574	1.935	47.73	46.32	49.14
2000		15.68	55	3.466		0.149	13	5.401	1.935	47.85	46.5	49.2
2001		16.14	56	3.293		0.138	14	5.228	1.935	48.35	47	49.7
2002		17.6	57	3.07		0.129	15	5.005	1.935	48.85	47.5	50.2
2003		18.34	58	2.883		0.121	16	4.818	1.935	49.35	48	50.7
2004		19.08	59	2.696		0.114	17	4.631	1.935	49.85	48.5	51.2
2005		19.82	62	2.209		0.107	18	4.144	1.935	50.35	49	51.7
2006		20.56	62	2.172		0.102	19	4.107	1.935	50.91	49.56	52.26
2007		21.3	62	2.135		0.097	20	4.07	1.935	51.47	50.12	52.82
2008		22.12	62	2.094		0.092	21	4.029	1.935	52.03	50.68	53.38
2009		22.94	62	2.053		0.088	22	3.988	1.935	52.59	51.24	53.94
2010		23.76	62	2.012		0.084	23	3.947	1.935	53.15	51.8	54.5
2011		24.58	62	1.971		0.081	24	3.906	1.935	53.75	52.4	55.1
2012		25.4	62	1.93		0.077	25	3.865	1.935	54.35	53	55.7
2013		26.3	62	1.885		0.074	26	3.82	1.935	54.95	53.6	56.3
2014		27.2	62	1.84		0.072	27	3.775	1.935	55.55	54.2	56.9
2015		28.1	65	1.345		0.069	28	3.28	1.935	56.15	54.8	57.5
2016		29	65	1.3		0.067	29	3.235	1.935	56.87	55.52	58.22
2017		29.9	65	1.255		0.064	30	3.19	1.935	57.59	56.24	58.94
2018		30.9	65	1.205		0.062	31	3.14	1.935	58.31	56.96	59.66
2019		31.9	65	1.155		0.060	32	3.09	1.935	59.03	57.68	60.38
2020		32.9	65	1.105		0.058	33	3.04	1.935	59.71	58.4	61.02
2021		33.9	65	1.055		0.057	34	2.99	1.935	59.81	58.5	61.12
2022		34.9	65	1.005		0.055	35	2.94	1.935	60.21	58.9	61.52

Source : Author's estimates, EP&D, Filename : Fertility, January 1995
Note : ADJ is calculated without the constant term, but TFRADJ includes constant term and TFR*; TFRADJ is the forecast TFR targeted.

Table 3

Demographic Projections of Malawi without HIV-AIDS 1987- 2022 (Population in thousands)

Reference Solution (Malawi 3)	1987	1992	1997	2002	2007	2012	2017	2022
Total	7988	9418	10858	12362	13924	15565	17248	18923
Male	3867	4588	5316	6081	6878	7718	8579	9439
Female	4121	4830	5542	6281	7045	7847	8668	9484
Urban	853	1162	1552	2052	2686	3487	4469	5642
Rural	7135	8257	9305	10310	11238	12078	12779	13280
Labour Force% (15-64)	49.7	48.7	50.3	50.7	53.8	56.5	58.5	60.7
Dependency Ratio	.929	.975	.922	.915	.806	.722	.656	.596

	1987-92	92-97	97-02	02-07	07-12	12-17	2017-22
Total Fertility Rate (TFR)	7.39	6.50	5.72	5.04	4.43	3.90	3.43
Mortality							
Male LE	42.5	44.4	46.3	48.2	50.2	52.1	54.0
Female LE	45.7	47.4	49.1	50.8	52.6	54.3	56.0
Total LE	44.2	46.0	47.8	49.6	51.4	53.2	55.0
IMR	137	128	118	109	101	93	85
CMR	232	216	199	183	168	152	138

Optimistic Solution (Malawi 4)								
Total	7988	9418	10858	12361	13832	15330	16859	18448
Male	3867	4588	5316	6081	6831	7598	8381	9199
Female	4121	4830	5542	6281	7001	7732	8477	9250
Urban	853	1220	1689	2282	2995	3844	4870	6103
Rural	7135	8199	9169	10080	10837	11487	1988	12345
Labour Force%	49.7	48.7	50.3	50.7	54.2	57.5	60.3	62.6
Dependency Ratio	.929	.975	.922	.915	.792	.689	.604	.542

	1987-92	92-97	97-02	02-07	07-12	12-17	2017-22
Total Fertility Rate (TFR)	7.39	6.50	5.71	4.78	4.00	3.42	3.0
Mortality							
Male LE	42.5	44.4	46.4	48.8	52.0	55.2	59
Female LE	45.7	47.4	49.2	51.5	54.4	57.4	61
Total LE	44.2	46.0	47.8	50.2	53.2	56.3	60
IMR	137	128	118	107	93	80	65
CMR	232	216	198	178	152	129	102

Source: Author's estimates based on DEMPROJ Model Forecasts, 1995. (Appendix, Tables A and B)

Table 4

COMPARISON OF NATIONAL LEVEL POPULATION FORECASTS WITHOUT HIV-AIDS, MALAWI DEMPROJ FORECAST AT NATIONAL LEVEL (MALAWI 3) VERSUS AGGREGATION OF DISTRICT-LEVEL FORECASTS (MALAWI-AGG 3), 1987-2022 (IN THOUSANDS)

MALAWI 3 SOLUTION

YEAR	1987	1992	1997	2002	2007	2012	2017	2022
POPULATION	7988	9418	10858	12362	13924	15565	17248	18923
LABOUR FORCE% (15-64)	49.7	48.7	50.3	50.7	53.8	56.5	58.5	60.7
DEPENDENCY RATIO	0.929	0.975	0.922	0.915	0.806	0.722	0.656	0.506

MALAWI-AGG 3 SOLUTION

YEAR	1987	1992	1997	2002	2007	2012	2017	2022
POPULATION	7988	9412	10849	12358	13958	15595	17314	19035
LABOUR FORCE% (15-64)	49.7	49.6	50.6	50.6	53.7	56.3	58.3	60.3
DEPENDENCY RATIO	1.012	1.054	0.989	0.976	0.862	0.776	0.715	0.657

Source: Malawi 3 and Malawi-Agg 3 Solutions, April, 1995.

Table 5

HIV PREVALENCE RATE IN BLOOD DONORS BY DISTRICT, 1988–1994

District	1988			1989			1990			1991			1992			1993			1994			Total		
	positive	tested	HIV %	positive	tested	HIV %	positive	tested	HIV %	positive	tested	HIV %	positive	tested	HIV %	positive	tested	HIV %	positive	tested	HIV %	positive	tested	HIV %
01 CHITIPA	1	17	5.9	30	141	21.0	39	197	19.8	94	515	18.6	88	530	16.0	5	27	18.5	2	30	6.7	165	900	18.3
02 KARONGA	4	35	11.5	77	499	15.3	54	697	7.7	90	609	15.0	81	756	10.7	0	0	0.0	0	0	0	312	2660	11.7
03 NKHATA BAY	5	11	45.5	64	191	33.5	91	431	21.1	87	481	18.1	40	345	11.6	30	197	15.2	0	0	0	302	1751	16.6
04 RUMPHI	0	0	0.0	172	812	21.2	161	1195	13.5	182	1814	10.1	69	600	11.5	95	735	12.9	0	0	0.0	679	4956	13.7
05 MZIMBA	10	46	21.7	188	1247	15.1	525	2165	24.2	514	1692	30.4	199	1415	14.0	118	940	12.5	95	570	17.2	1549	7747	20.2
10 KASUNGU	16	276	5.8	68	614	11.1	140	696	20.1	466	2300	15.5	125	1894	6.6	100	1532	10.2	0	0	0	870	7174	13.5
11 NKHOTAKOTA	2	11	18.2	20	231	17.3	30	90	33.3	197	630	31.7	105	577	18.4	91	447	18.1	0	37	24.3	384	2022	19.0
12 NTCHISI	0	0	0.0	0	0	0	0	0	0	0	2	0.0	27	268	10.1	16	135	5.9	0	0	0	43	405	10.6
13 DOWA	21	152	13.8	80	700	11.4	102	1037	10.6	132	1450	9.1	111	1487	7.5	100	1060	15.9	3	20	15.0	639	6494	9.7
14 SALIMA	10	58	17.2	49	366	13.9	97	635	15.3	141	770	18.3	111	712	15.6	42	257	16.7	0	0	0	450	2790	16.1
15 LILONGWE	9	66	13.6	691	7022	20.9	883	4022	22.0	1588	5830	32.7	970	4300	22.6	470	3014	15.1	59	497	12.0	4647	25754	20.0
16 MCHINJI	13	112	11.6	72	357	20.2	321	1150	27.9	462	1740	26.4	200	1407	14.2	227	1445	15.7	25	100	25.1	1346	6400	20.7
17 DEDZA	12	56	21.4	35	283	12.4	32	230	13.9	79	842	9.4	68	720	9.4	57	740	7.7	22	240	9.2	292	2900	10.0
18 NTCHEU	0	0	0.0	92	466	19.7	71	571	12.4	217	1450	14.9	90	705	12.8	85	542	15.7	76	413	18.4	630	4217	15.2
20 MANGOCHI	0	0	0.0	37	261	14.1	153	724	21.1	136	710	19.2	120	649	18.5	0	0	0	0	0	0	446	2370	18.7
21 MACHINGA	0	0	0.0	95	464	20.4	100	528	18.9	152	1055	14.4	179	901	19.7	98	627	15.6	0	0	0	524	3461	15.1
22 ZOMBA	14	76	18.4	61	179	34.1	72	360	20.7	96	104	92.3	1	12	8.3	0	0	0	0	0	0	243	731	33.1
23 CHIRADZULU	0	0	0	39	299	13.0	60	370	16.2	106	492	21.5	99	355	28.0	255	962	26.5	0	0	0	459	2379	19.3
24 BLANTYRE	0	0	0	317	1313	24.1	1299	4709	27.6	502	2089	24.0	246	1127	21.7	68	286	23.8	0	0	0	2720	10723	25.4
25 MWANZA	0	0	0	25	156	16.0	52	236	22.0	29	221	13.1	31	213	14.5	41	343	12.0	45	280	16.1	223	1388	16.1
26 THYOLO	0	0	0	85	401	21.2	340	1589	21.4	313	1655	18.9	196	921	17.9	30	339	8.8	0	0	0	923	4794	19.3
27 MULANJE	0	0	0	47	334	14.0	94	723	13.0	112	630	17.7	185	664	27.9	139	487	24.9	23	187	10.1	601	3003	19.6
28 CHIKWAWA	0	0	0	75	493	15.1	91	699	13.0	84	569	14.8	69	487	14.0	94	623	15.2	4	30	13.3	654	3449	14.6
29 NSANJE	0	0	0	17	199	8.5	57	769	7.4	118	849	13.7	110	960	11.5	80	904	8.9	31	272	11.4	414	3951	10.5
Total	117	871	13.4	2153	12887	16.7	4807	23404	20.6	5886	23029	19.6	3949	21282	18.7	2111	14852	14.2	466	3013	15.0	19014	108535	17.5
Unknown and indeterminable		1916																						

Source : AIDS Secretariat, Ministry of Health, 1994.

Table 6

AGE AND SEX DISTRIBUTION OF HIV INFECTION IN BLOOD DONORS, 1988-1994

Age group	Female			Male			Unknown			Total		
	pos	tsum	HIV%	pos	tsum	HIV%	pos	tsum	HIV%	pos	tsum	HIV%
0 TO 14	0	12	0.0	1	13	7.7	2	4	50.0	3	29	10.3
15 TO 29	2466	13786	17.9	6122	35902	17.7	58	294	19.7	8646	49982	17.3
30 TO 44	1219	8301	14.7	5826	29352	19.8	38	226	16.8	7083	37879	18.7
45 TO 59	159	1709	9.3	936	7079	13.2	1	40	2.5	1096	8828	12.4
60 TO 74	3	84	3.6	45	508	8.9	1	6	16.7	49	598	8.2
UNSPECIFIED	102	616	16.6	446	2027	22.0	1489	5646	26.4	2037	8289	24.6
TOTAL SAMPLE COLLECTED	3949	24508	16.1	13376	74881	17.9	1589	6216	25.6	18914	105605	17.9

Key: pos= positive tsum= total sample of blood collected, from September, 1988 through December, 1994

Source: AIDS Secretariat, Ministry of Health, 1995.

Table 7

HIV-PREVALENCE BY OCCUPATION, BLOOD DONORS, 1988-1994 AND 1991

	1988-1994			1991		
OCCUPATION	HIV+	SAMPLE	INFECTED (%)	HIV+	SAMPLE	INFECTED (%)
EDUCATED	1606	6087	26.38	64	231	27.71
SKILLED	2950	10493	28.11	118	486	24.28
MIL.POLICE	683	1474	46.34	23	37	62.16
STUDENTS	1049	9034	11.61	38	297	12.79
MYP	94	405	23.21	15	53	28.30
HOUSEWIVES	2436	16475	14.97	110	670	16.42
UNSKILLED	1818	8990	20.22	86	483	17.81
FARMER/VILLAGE	5244	39102	13.41	261	1592	16.39
UNKNOWN	3034	13743	22.08	104	510	20.39
TOTAL	18914	105603	17.91	819	4359	18.79

SOURCE: NACP BLOOD DONORS STATISTICS, AND STEPHEN FORSYTHE (TABLE 17) FOR 1991.

Table 8

HIV seroprevalence at urban antenatal clinics, Malawi

YEAR	Locality	Population Group	No. Tested	No. HIV+	%HIV+
1985	Blantyre	Pregnant women	200	4	2.0
1986	Blantyre	Pregnant women	94	3	3.2
1987	Blantyre	Pregnant women	85	7	8.2
1988	Blantyre	Pregnant women	247	46	18.6
1989	Blantyre	Pregnant women	247	46	18.6
1990	Blantyre	Pregnant women	845	185	21.9
1991	Blantyre	Pregnant women	404	105	26.0
1992	Blantyre	Pregnant women	291	79	27.1
1993	Blantyre	Pregnant women	3061	924	30.2
1987	Lilongwe	Pregnant women	184	15	8.2
1988	Lilongwe	Pregnant women	214	35	16.4
1989	Lilongwe	Pregnant women	214	35	16.4
1990	Lilongwe	Pregnant women	201	36	17.9
1987	Mzuzu	Pregnant women	32	1	3.1
1989	Mzuzu	Pregnant women	118	20	16.9

Source: AIDS Secretariat, Ministry of Health, 1994

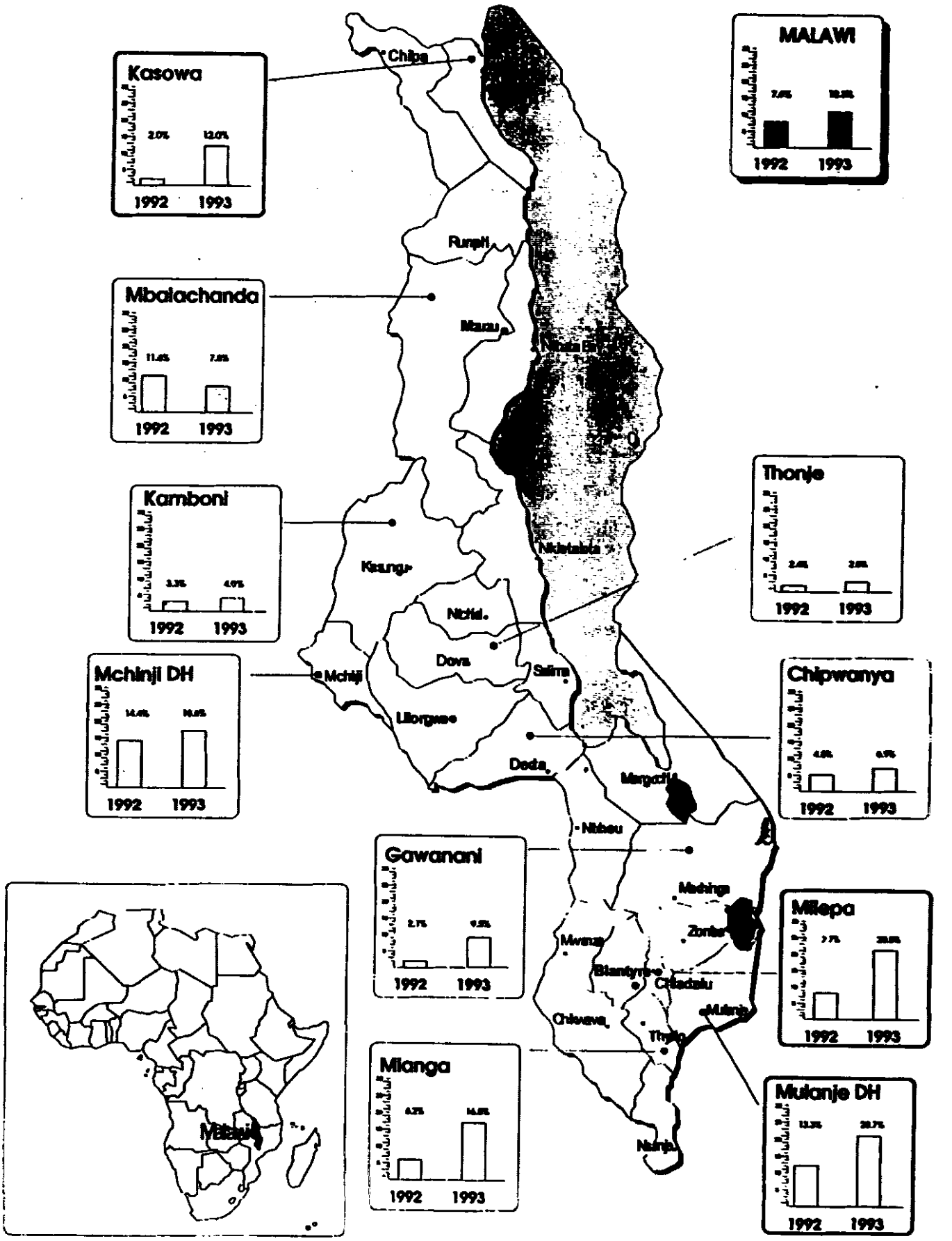
Table 9

HIV seroprevalence at rural antenatal clinics, Malawi

YEAR	Locality	Population Group	No. Tested	No. HIV+	%HIV+
1987	Southern Region	Pregnant women	25	2	8.0
1989	Southern Region	Pregnant women	64	4	6.3
1992	Southern Region	Pregnant women	247	20	8.1
1993	Southern Region	Pregnant women	384	72	18.8
1987	Central Region	Pregnant women	48	1	2.1
1989	Central Region	Pregnant women	67	4	6.0
1992	Central Region	Pregnant women	366	26	7.1
1993	Central Region	Pregnant women	397	30	7.6
1987	Northern Region	Pregnant women	57	0	0.0
1989	Northern Region	Pregnant women	118	15	12.7
1992	Northern Region	Pregnant women	146	12	8.2
1993	Northern Region	Pregnant women	216	21	9.7

Source: AIDS Secretariat, Ministry of Health, 1994

RURAL ANTENATAL WOMEN SENTINEL HIV-1 SEROPREVALENCE



(10)

Table 10

HIV seroprevalence of Rural Antenatal Women by Husband's Occupation, 1993

Occupation	Seroprevalence	Odds Ratio (infected/ uninfected)
Rural	8.23	1
Professional	17.80	2.4
Unskilled	18.18	2.5
Skilled	22.22	3.2
Students	25.00	3.7
Military/police	50.00	11.1
Total	12.34	

Note: Overall odds ratio for rural versus non-rural is 2.77 and is highly significant.

Source: M. Ciotti, 1994 (AIDS Secretariat, Lilongwe)

Table 11

HIV seroprevalence of Rural Antenatal Women by District, 1993.

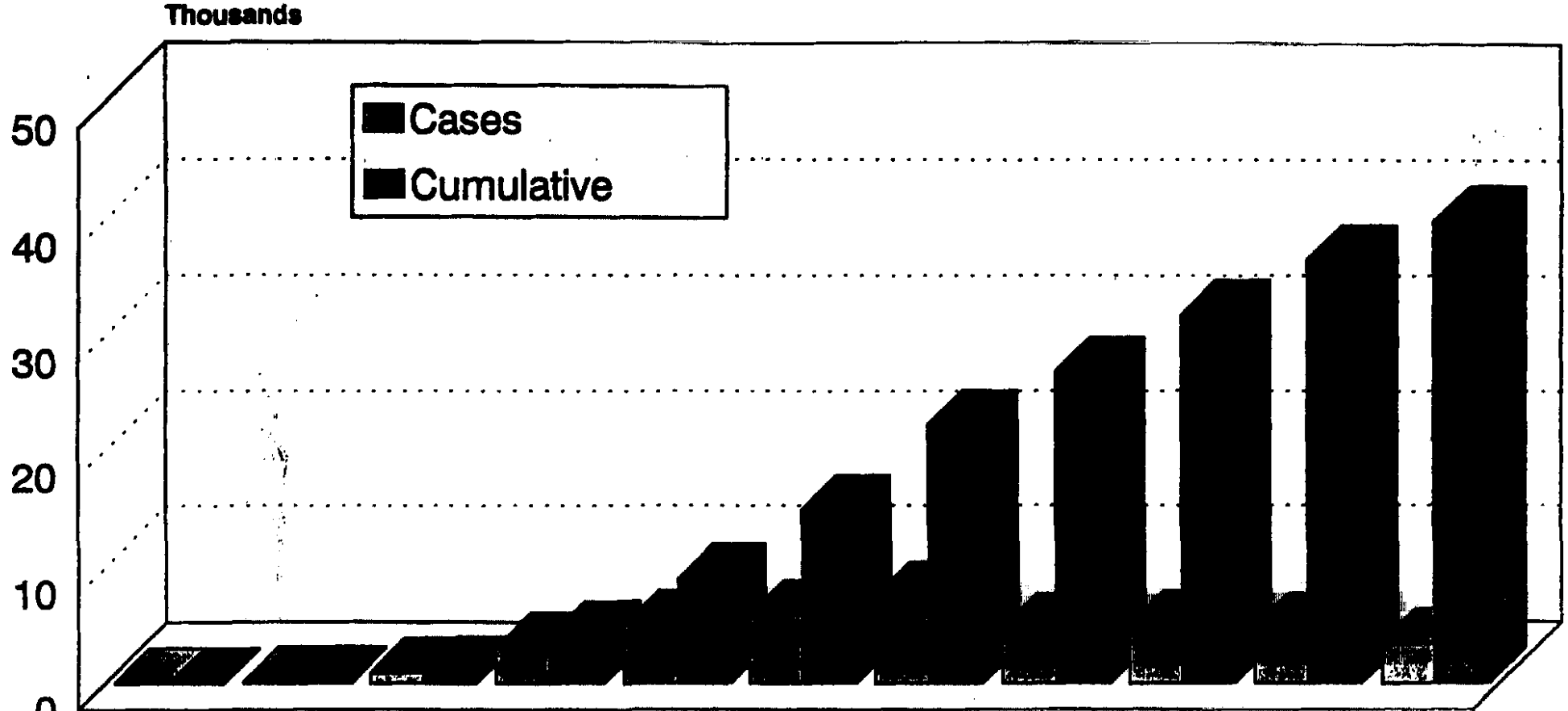
District	Number of HIV	Prevalence Rate (%)
Chiradzulu	24	20.51
Thyolo	14	16.47
Mulanje	25	28.74
Machinga	9	9.47
Kasungu	4	4.00
Dowa	3	2.75
Dedza	7	6.86
Mchinji	16	18.60
Karonga	12	12.00
Mzimba	9	7.76
Total	123	12.34

Source: C. Ciotti, 1994, AIDS Secretariat, Lilongwe

Note: The total sample size of 10 districts is 997.

Table 12

Malawi AIDS Cases Reported by Year 1985 - 1995 September



	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Cases	0.017	0.127	0.858	3.034	4.966	5.859	7.439	4.655	4.916	4.732	3.386
Cumulative	0.017	0.144	1.002	4.036	9.002	14.861	22.3	26.955	31.871	36.603	39.989

NACP, Data Office, [surveillance G:\working\95surv.prs]

Table 13

EPIMODEL SETTING OF PREVRATE AND HIV, 1993

POPULATION

	Urban	Rural	Total
Population	1,285,126	8,754,917	10,040,043
Percentage	12.8	87.2	100
PREVRATE (%)	30	9	11.7
HIVPOP	385,538	787,943	1,173,525

Source: EPIMODEL ESTIMATION, AIDS SECRETARIAT, MALAWI JUNE 1993

Table 14

Year	INCRATE (%)	YEARS after HIV	Slow Conversion of HIV to AIDS (Cumulative)	YEARS after HIV	Fast Conversion of HIV to AIDS (Cumulative)
1984	0.5	1	.002	1	0.1
1985	1.3	2	.009	2	0.2
1986	1.7	3	.031	3	0.3
1987	1.8	4	.074	4	0.4
1988	1.9	5	.135	5	0.5
1989	2	6	.208	6	0.6
1990	2.2	7	.290	7	0.7
1991	2.6	8	.371	8	0.8
1992	2.9	9	.445	9	0.9
1993	3.2	10	.512	10	1
1994	3.5	11	.573		
1995	3.7	12	.627		
1996	3.9	13	.676		
1997	3.8	14	.720		
1998	3.7	15	.758		
1999	3.5	16	.792		
2000	3.3	17	.823		
2001	3.2	18	.85		
2002	3	19	.85		
2003	2.8	20	.85		
2004	2.5	21	.85		
2005					

Note: INCRATE falls to zero by 2010 (see tables 15 and 16) and slow conversion rates are taken from DEMPROJ standard assumptions for Malawi. The latter says that about 15% of HIV cases never fall victims to AIDS.

TABLE 15

SIMULATION OF HIV/AIDS, SLOW AIDS CONVERSION
(VARIABLES IN THOUSANDS)

	ADULT POP (N)	HIVCUM	AIDSCUM	AIDSNEW	DEATHNEW	DEATHCUM	AIDSCURR	HIVCURR	SUSPOP (HIV-)	N*	DERIVED PREVRATE	INCRATE
1984	3897.5	19.5	0.0	0.0	0.0	0.0	0.0	19.4	3878.1	3897.5	0.5	0.5
1985	4026.4	69.9	0.3	0.2	0.2	0.2	0.1	69.6	3956.5	4026.2	1.7	1.3
1986	4159.5	137.2	1.2	0.9	0.8	0.7	0.5	136.0	4022.3	4158.8	3.3	1.7
1987	4297.0	209.6	3.8	2.6	1.7	2.5	1.3	205.9	4087.4	4294.5	4.8	1.8
1988	4427.8	287.2	9.3	5.5	4.0	6.5	2.7	278.0	4140.6	4421.3	6.3	1.9
1989	4558.6	370.0	18.9	9.7	7.6	14.1	4.8	351.1	4188.6	4544.5	7.7	2
1990	4689.4	452.2	33.9	15.0	12.3	26.4	7.5	428.3	4227.2	4663.0	9.2	2.2
1991	4820.2	572.1	55.0	21.1	18.0	44.4	10.5	517.1	4248.1	4775.8	10.8	2.6
1992	4951.0	695.3	82.6	27.7	24.4	68.8	13.8	612.5	4255.7	4882.2	12.5	2.9
1993	5125.4	831.5	117.3	34.7	31.2	100.0	17.3	714.2	4293.9	5025.4	14.2	3.2
1994	5299.8	981.8	159.4	42.1	38.4	138.4	21.1	822.3	4318.0	5161.4	15.9	3.5
1995	5474.2	1141.5	209.6	50.2	46.2	184.5	25.1	931.9	4332.7	5289.7	17.6	3.7
1996	5648.6	1310.5	268.4	58.8	54.5	239.0	29.4	1042.1	4338.1	5409.6	19.3	3.9
1997	5823.0	1475.3	336.4	68.0	63.4	302.4	34.0	1139.0	4347.7	5520.6	20.6	3.8
1998	5981.2	1636.2	413.8	77.4	72.7	375.1	38.7	1222.4	4345.0	5606.1	21.8	3.7
1999	6139.4	1788.3	500.6	86.8	82.1	457.2	43.4	1287.6	4351.1	5682.2	22.7	3.5
2000	6297.6	1931.9	596.4	95.7	91.3	548.5	47.9	1335.5	4365.7	5749.1	23.2	3.3
2001	6455.8	2071.6	700.2	103.8	99.8	648.3	51.9	1371.4	4384.2	5807.5	23.6	3.2
2002	6614.0	2203.1	810.5	110.3	107.1	755.4	55.1	1392.6	4410.9	5858.6	23.8	3
2003	6866.0	2326.6	925.3	114.8	112.5	867.9	57.4	1401.3	4539.4	5998.1	23.4	2.8
2004	7118.0	2440.1	1043.0	117.7	116.2	984.1	58.9	1397.1	4677.9	6133.9	22.9	2.5
2005	7370.0	2543.0	1162.3	119.3	118.5	1102.6	59.7	1380.7	4827.0	6267.4	22.0	2.2
2006	7622.0	2625.1	1282.0	119.8	119.5	1222.2	59.9	1343.0	4996.9	6399.8	21.0	1.7
2007	7874.0	2685.0	1401.0	119.0	119.4	1341.5	59.5	1284.0	5189.0	6532.5	19.7	1.2
2008	8140.0	2721.4	1517.7	116.7	117.9	1459.4	58.4	1203.6	5418.6	6660.6	18.0	0.7
2009	8406.0	2732.2	1630.4	112.6	114.7	1574.1	56.3	1101.8	5673.8	6831.9	16.1	0.2
2010	8672.0	2732.2	1737.0	106.7	109.6	1683.7	53.3	995.1	5939.8	6998.3	14.2	0

SOURCE : AUTHOR'S ESTIMATES, FILE : PREVHIV3, APRIL 1995.
NOTE : ADULT POP (N) IS TAKEN FROM ADULT POPULATION OF DEMOGRAPHICS WITHOUT HIV-AIDS SOLUTION MALAWI 3.

TABLE 16
SIMULATION OF HIV/AIDS, FAST AIDS CONVERSION
(VARIABLES IN THOUSANDS)

	ADULT POP (N)	HIVCUM	AIDSCUM	AIDSNEW	DEATHNEW	DEATHCUM	AIDSCURR	HIVCURR	SUSPOP (HIV-)	N*	DERIVED PREVRATE	INCRATE
1984	3897.5	19.5	1.9	1.9	0.0	0.0	1.9	17.5	3878.1	3897.5	0.5	0.5
1985	4026.4	69.9	8.9	7.0	5.4	5.4	3.5	61.0	3956.5	4020.9	1.5	1.3
1986	4159.5	137.2	22.7	13.7	10.4	15.8	6.9	114.5	4022.3	4143.7	2.8	1.7
1987	4297.0	209.6	43.6	21.0	17.3	33.1	10.5	166.0	4087.4	4263.9	3.9	1.8
1988	4427.8	287.2	72.3	28.7	24.8	58.0	14.4	214.9	4140.8	4369.8	4.9	1.9
1989	4558.6	370.0	109.3	37.0	32.9	90.8	18.5	260.7	4188.6	4467.8	5.8	2
1990	4689.4	462.2	155.6	46.2	41.6	132.4	23.1	306.6	4227.2	4557.0	6.7	2.2
1991	4820.2	572.1	212.8	57.2	51.7	184.2	28.6	359.3	4248.1	4638.0	7.8	2.6
1992	4951.0	695.3	282.3	69.5	63.4	247.5	34.8	413.0	4255.7	4703.5	8.8	2.9
1993	5125.4	831.5	365.4	83.1	76.3	323.9	41.6	466.0	4293.9	4801.5	9.7	3.2
1994	5299.8	981.8	461.7	96.2	89.7	413.6	48.1	520.1	4318.0	4886.2	10.6	3.5
1995	5474.2	1141.5	568.8	107.2	101.7	515.3	53.6	572.7	4332.7	4958.9	11.5	3.7
1996	5648.6	1310.5	686.2	117.3	112.2	627.5	58.7	624.3	4338.1	5021.1	12.4	3.9
1997	5823.0	1475.3	812.7	126.6	122.0	749.5	63.3	662.6	4347.7	5073.5	13.1	3.8
1998	5981.2	1636.2	947.6	134.9	130.7	880.2	67.4	688.6	4345.0	5101.0	13.5	3.7
1999	6139.4	1788.3	1089.5	141.8	138.4	1018.6	70.9	698.8	4351.1	5120.8	13.8	3.5
2000	6297.6	1931.9	1236.4	147.0	144.4	1163.0	73.5	695.4	4365.7	5134.6	13.5	3.3
2001	6455.8	2071.6	1386.4	149.9	148.5	1311.4	75.0	685.2	4384.2	5144.4	13.3	3.2
2002	6614.0	2203.1	1537.2	150.8	150.4	1461.8	75.4	665.9	4410.9	5152.2	12.9	3
2003	6866.0	2326.6	1686.7	149.5	150.1	1611.9	74.8	639.9	4539.4	5254.1	12.2	2.8
2004	7118.0	2440.1	1832.5	145.8	147.7	1759.6	72.9	607.6	4677.9	5358.4	11.3	2.5
2005	7370.0	2543.0	1972.7	140.1	143.0	1902.6	70.1	570.3	4827.0	5467.4	10.4	2.2
2006	7622.0	2625.1	2104.1	131.5	135.8	2038.4	65.7	520.9	4996.9	5583.6	9.3	1.7
2007	7874.0	2685.0	2225.1	121.0	126.2	2164.6	60.5	459.9	5189.0	5709.4	8.1	1.2
2008	8140.0	2721.4	2333.6	108.5	114.7	2279.3	54.3	387.8	5418.6	5860.7	6.6	0.7
2009	8406.0	2732.2	2428.0	94.4	101.5	2380.8	47.2	304.2	5673.8	6025.2	5.0	0.2
2010	8672.0	2732.2	2508.0	80.0	87.2	2468.0	40.0	224.2	5939.8	6204.0	3.6	0

SOURCE : AUTHOR'S ESTIMATES, FILE : PREVHIV3, APRIL 1995.
NOTE : ADULT POP (N) IS TAKEN FROM ADULT POPULATION OF DEMOGRAPHICS WITHOUT HIV-AIDS SOLUTION MALAWI 3 .

TABLE 17

AGGREGATE ADULT PREVALENCE RATE BY DISTRICT, 1987–2022

YEAR	BLANTYRE PREVRATE	CHIKAWAWA PREVRATE	CHIRADZULU PREVRATE	CHITIPA PREVRATE	DEDZA PREVRATE	DOWA PREVRATE	KARONGA PREVRATE	KASUNGU PREVRATE
1987	6.59	3.18	3.06	3.21	3.22	1.21	3.72	3.20
1988	13.79	4.87	5.95	4.02	3.85	1.51	5.29	3.44
1989	13.81	6.32	8.88	4.91	4.48	1.80	6.86	3.69
1990	17.00	7.72	11.79	5.82	5.10	2.12	8.30	4.02
1991	19.37	9.21	14.72	6.65	5.73	2.40	9.73	4.36
1992	21.09	10.65	17.61	7.40	6.35	2.69	11.06	4.60
1993	25.05	12.12	20.50	8.13	6.97	2.99	12.36	4.84
1994	26.73	14.92	22.61	11.93	9.33	6.34	16.15	9.44
1995	27.97	16.92	24.61	13.94	11.33	8.35	18.15	11.45
1996	28.22	17.92	25.61	14.95	12.34	9.36	19.16	12.46
1997	25.11	13.92	21.61	10.96	8.34	5.37	15.16	8.47
1998	22.79	11.93	19.61	8.97	6.35	3.37	13.17	6.49
1999	19.85	8.93	16.61	5.98	3.35	0.38	10.18	3.52
2000	16.09	3.94	11.61	1.00	1.01	0.08	5.19	2.69
2001	13.52	0.94	8.61	0.45	0.03	0.06	4.50	2.67
2002	12.57	0.14	7.61	0.40	0.00	0.04	4.11	2.66
2003	10.99	0.05	5.61	0.28	0.00	0.00	3.12	1.68
2004	9.41	0.00	4.61	0.22	0.00	0.00	3.13	1.70
2005	7.54	0.00	3.61	0.10	0.00	0.00	3.14	1.72
2006	5.56	0.00	2.61	0.07	0.00	0.00	2.15	0.68
2007	5.59	0.00	1.61	0.00	0.00	0.00	1.37	0.58
2008	3.92	0.00	0.61	0.00	0.00	0.00	0.38	0.48
2009	2.64	0.00	0.01	0.00	0.00	0.00		0.36
2010	1.33	0.00	0.00	0.00	0.00	0.00		0.26
2011	0.34	0.00	0.00	0.00	0.00	0.00		0.20
2012	0.00	0.00	0.00	0.00	0.00			0.13
2013	0.00	0.00	0.00	0.00	0.00			0.06
2014	0.00	0.00	0.00	0.00	0.00			0.00
2015	0.00	0.00	0.00		0.00			0.00
2016	0.00	0.00	0.00		0.00			0.00
2017								
2018								
2019								
2020								
2021								
2022								

Table 17
(continued)

YEAR	LILONGWE PREVRATE	MACHINGA PREVRATE	MANGOCHI PREVRATE	MICHINJI PREVRATE	MULANJE PREVRATE	MWANZA PREVRATE	MZIMBA PREVRATE	NKHATABAY PREVRATE
1987	4.23	3.19	3.21	3.12	3.09	3.17	3.46	3.21
1988	7.05	4.30	5.54	5.76	7.39	5.18	4.52	4.29
1989	8.95	5.42	7.86	8.42	11.68	7.18	5.64	5.38
1990	10.47	6.53	10.19	11.07	15.97	9.19	6.79	6.48
1991	12.02	7.65	12.52	13.73	20.27	11.20	8.00	7.59
1992	13.65	8.77	14.84	16.32	24.56	13.21	9.11	8.69
1993	15.29	9.88	17.14	18.90	28.80	15.19	10.07	9.72
1994	19.25	13.95	20.98	24.06	32.40	19.51	13.69	14.09
1995	21.39	15.96	22.98	26.06	34.40	21.51	15.76	16.09
1996	22.52	16.98	23.98	27.07	35.40	22.51	16.83	17.10
1997	22.68	12.99	19.98	23.07	31.40	18.52	12.90	13.11
1998	20.76	11.01	17.99	21.07	29.41	16.53	10.99	11.13
1999	18.84	9.02	15.99	19.07	27.41	14.54	9.09	9.16
2000	16.92	7.04	14.00	17.08	25.41	12.55	7.18	7.18
2001	15.00	5.05	12.00	15.08	23.41	10.56	5.27	5.21
2002	13.08	3.06	10.01	13.08	21.41	8.57	3.37	3.24
2003	11.17	1.08	8.02	11.09	19.42	6.57	2.84	1.27
2004	9.26	0.48	6.02	9.11	17.42	4.58	2.52	0.78
2005	7.34	0.38	4.03	7.12	15.42	2.58	2.17	0.65
2006	5.43	0.27	2.03	5.13	13.42	0.59	1.80	0.51
2007	4.19	0.16	1.13	3.15	11.43	0.15	1.41	0.36
2008	2.82	0.03	0.06	1.16	9.43	0.02	0.99	0.20
2009	1.99	0.00	0.00	0.34	7.43	0.00	0.54	0.03
2010	1.13	0.00	0.00	0.27	5.44	0.00	0.07	0.00
2011	0.24	0.00	0.00	0.20	3.44	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.12	1.45	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.04	1.05	0.00	0.00	0.00
2014	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00
2015	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2016	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2017								
2018								
2019								
2020								
2021								
2022								

Table 17
Continued

(20)

YEAR	NKHOTAKOTA PREVRATE	NSANJE PREVRATE	NTCHEU PREVRATE	NTCHISI PREVRATE	RUMPHI PREVRATE	SALIMA PREVRATE	THYOLO PREVRATE	ZOMBA PREVRATE
1987	3.42	3.33	2.05	2.05	4.38	4.23	4.11	4.49
1988	4.60	4.83	3.01	2.99	5.39	5.01	6.22	7.24
1989	5.76	6.32	3.97	3.94	6.40	5.79	8.34	10.01
1990	6.92	7.81	4.93	4.89	7.41	6.58	10.45	12.80
1991	8.08	9.30	5.90	5.83	8.31	7.39	12.48	15.61
1992	9.12	10.83	6.82	6.82	9.38	8.16	14.57	18.11
1993	10.18	12.34	7.75	7.75	10.33	8.80	16.62	20.42
1994	14.18	16.34	10.55	10.75	13.46	11.41	19.03	22.71
1995	16.20	18.35	12.55	12.76	15.47	13.43	21.03	24.78
1996	17.22	19.36	13.55	13.77	16.47	14.46	22.04	25.84
1997	13.25	15.36	9.55	9.77	12.48	10.49	18.04	21.90
1998	11.26	13.37	7.56	7.77	10.50	8.51	16.05	19.97
1999	9.28	11.38	5.57	5.76	8.52	6.53	14.05	18.04
2000	7.30	9.39	3.58	3.76	6.54	4.56	12.05	16.11
2001	5.32	7.40	1.58	1.75	4.56	2.58	10.06	14.18
2002	3.34	5.41	1.15	1.11	2.58	1.80	8.06	12.26
2003	2.31	3.42	0.13	0.08	1.61	1.18	6.07	10.34
2004	1.28	1.44	0.08	0.02	0.52	1.00	4.07	8.42
2005	1.14	0.36	0.03	0.00	0.32	0.80	2.07	6.50
2006	0.98	0.19	0.03	0.00	0.10	0.59	1.18	4.59
2007	0.81	0.10	0.00	0.00	0.00	0.37	0.15	3.59
2008	0.63	0.00	0.00	0.00	0.00	0.14	0.09	2.48
2009	0.43	0.00	0.00	0.00	0.00	0.13	0.03	2.16
2010	0.22	0.00	0.00	0.00	0.00	0.00	0.00	1.81
2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.44
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.05
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.64
2014	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20
2015	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2016	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2017								
2018								
2019								
2020								
2021								
2022								

Table 18

AGGREGATE PREVALENCE RATE, MALAWI, 1987-2022 (adults)
(Aggregation Over District-Level Prevalence Rates)

YEAR	PREVALENCE RATE %	URBAN POPULATION %	RURAL POPULATION %
1987	3.6	10.9	89.1
1988	5.9	11.1	88.9
1989	7.5	11.4	88.6
1990	9.4	11.7	88.3
1991	11.2	11.9	88.1
1992	12.9	12.1	87.3
1993	14.7	12.4	87.6
1994	18.0	12.6	87.4
1995	20.0	12.9	87.1
1996	20.9	13.1	86.9
1997	17.5	13.3	86.7
1998	15.5	13.6	86.4
1999	13.3	13.9	86.1
2000	10.9	14.2	85.8
2001	9.1	14.5	85.5
2002	7.7	14.7	85.3
2003	6.3	15.1	84.9
2004	5.2	15.5	84.5
2005	4.1	15.9	84.1
2006	3.1	16.2	83.8
2007	2.4	16.5	83.5
2008	1.7	16.9	83.1
2009	1.2	17.3	82.7
2010	0.8	17.6	82.4

Source: Author's estimates based District-level forecasts of PREVRATE, FILE: PREVRATE, April 1995.

Note: After 2010 PREVRATE in Malawi vanishes to zero; urban population and rural population over 1987-2022 have served as weights.

TABLE 19

AGGREGATE HIV- AIDS IMPACT ON POPULATION, MALAWI, BY CATEGORIES OF HIV, AIDS AND DEATHS, 1987-

	HIV			AIDS			DEATHS	
YEAR	HIVNEW	HIVCUM	HIVCURR	AIDSNEW	AIDSCUM	AIDSCURR	DEATHNEW	DEATHCUM
1987	0	0	0	0	0	0	0	0
1988	89	89	89	0	0	0	0	0
1989	141	230	227	3	3	3	0	0
1990	168	398	387	8	11	9	2	2
1991	177	575	544	20	31	23	6	8
1992	177	752	687	34	65	43	14	22
1993	188	940	826	49	114	69	23	45
1994	219	1159	977	68	182	100	37	82
1995	227	1386	1116	88	270	142	46	128
1996	237	1623	1242	111	381	175	78	206
1997	228	1851	1347	123	504	209	89	295
1998	196	2047	1385	158	662	244	123	418
1999	128	2175	1322	191	853	276	159	577
2000	80	2255	1188	214	1067	295	195	772
2001	56	2311	1023	221	1288	304	212	984
2002	40	2351	851	212	1500	309	207	1191
2003	26	2377	676	201	1701	300	202	1393
2004	22	2399	509	189	1890	295	202	1595
2005	20	2419	371	158	2048	277	176	1771
2006	18	2437	265	124	2172	257	144	1915
2007	16	2453	188	93	2265	230	120	2035
2008	14	2467	127	75	2340	197	108	2143
2009	12	2479	86	53	2393	163	87	2230
2010	10	2489	55	41	2434	135	69	2299
2011	7	2496	36	26	2460	109	52	2351
2012	7	2503	26	17	2477	86	40	2391
2013	6	2509	21	11	2488	62	35	2426
2014	5	2514	18	8	2496	46	24	2450
2015	5	2519	17	6	2502	33	19	2469
2016	4	2523	15	6	2508	25	14	2483
2017	3	2526	14	4	2512	19	10	2493
2018	2	2528	12	4	2516	17	6	2499
2019	2	2530	12	2	2518	15	4	2503
2020	2	2532	12	2	2520	13	4	2507
2021	2	2534	12	2	2522	11	4	2511
2022	0	2534	10	2	2524	9	4	2515

Source : Author's Estimates, Filename : PREVHIV 8, and Tables 20 and 21, October 1995.

TABLE 20 PEDIATRIC HIV-AIDS
(in thousands)
DEMPROJ SOLUTION (AGGREGATED DISTRICTS), HIV-AIDS SHOCKS TO REFERENCE SOLUTION, 1987-2022

	HIV			AIDS			DEATHS	
YEAR	HIVNEW	HIVCUM	HIVCURR	AIDSNEW	AIDSCUM	AIDSCURR	DEATHNEW	DEATHCUM
1987	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0
1990	3	3	2	1	2	1	0	0
1991	8	11	7	2	4	3	1	1
1992	8	19	11	4	8	6	2	3
1993	13	32	18	6	15	9	3	5
1994	22	54	31	9	24	14	4	10
1995	28	82	47	11	35	20	6	15
1996	30	112	63	14	50	25	9	25
1997	30	142	77	16	66	30	11	35
1998	27	169	83	21	86	36	15	50
1999	22	191	81	25	111	42	19	69
2000	20	211	73	28	139	46	23	93
2001	16	227	60	29	167	49	25	118
2002	15	242	47	28	195	52	25	143
2003	12	254	33	26	221	54	24	167
2004	8	262	9	32	253	65	21	188
2005	6	268	1	14	267	58	21	209
2006	4	272	1	4	271	45	17	226
2007	4	276	1	4	275	35	14	240
2008	3	279	1	3	278	25	13	253
2009	3	282	1	3	281	18	10	263
2010	3	285	1	3	284	13	8	271
2011	2	287	1	2	286	9	6	277
2012	2	289	1	2	288	6	5	282
2013	2	291	1	2	290	4	4	286
2014	1	292	1	1	291	2	3	289
2015	1	293	1	1	292	1	2	291
2016	1	294	1	1	293	0	2	293
2017	0	294	0	1	294	0	1	294
2018	0	294	0	0	294	0	0	294
2019	0	294	0	0	294	0	0	294
2020	0	294	0	0	294	0	0	294
2021	0	294	0	0	294	0	0	294
2022	0	294	0	0	294	0	0	294

Source : Author's Estimates, Filename : PREVHIV 9, October 1995.

Table 20A

DEATHS BY AIDS AND TOTAL DEATHS, 1990–2015

(IN THOUSANDS AND IN PERCENTAGES)

YEAR	TOTAL DEATHS	AIDS DEATHS	PERCENTAGE
1987	200	0	0
1988	201	0	0
1989	206	0	0
1990	214	2	0.93
1991	223	6	2.69
1992	232	14	6.03
1993	241	23	9.54
1994	252	37	14.68
1995	263	46	17.49
1996	272	78	28.68
1997	278	89	32.01
1998	281	123	43.77
1999	282	159	56.38
2000	281	195	69.40
2001	270	212	78.52
2002	274	207	75.55
2003	268	202	75.37
2004	260	202	77.69
2005	250	176	70.40
2006	240	144	60.00
2007	231	120	51.95
2008	224	108	48.21
2009	216	87	40.28
2010	209	69	33.01
2011	203	52	25.62
2012	198	40	20.20
2013	194	35	18.04
2014	191	24	12.57
2015	189	19	10.05

SOURCE: MALAWI3AIDS, DEMPROJ SOLUTION WITH AIDS (TOTAL DEATHS)
AND TABLE 19 FOR AIDS DEATHS (INCLUDE ADULTS AND CHILDREN).

NOTE: TOTAL DEATHS INCLUDE AIDS DEATHS.

TABLE 21 ADULT HIV-AIDS
(in thousands)
DEMPROJ SOLUTION (AGGREGATED DISTRICTS), HIV-AIDS SHOCKS TO REFERENCE SOLUTION, 1987-2022

	HIV			AIDS			DEATHS	
YEAR	HIVNEW	HIVCUM	HIVCURR	AIDSNEW	AIDSCUM	AIDSCURR	DEATHNEW	DEATHCUM
1987	0	0	0	0	0	0	0	0
1988	89	89	89	0	0	0	0	0
1989	141	230	227	3	3	3	0	0
1990	165	395	385	7	9	8	2	2
1991	169	564	537	18	27	20	5	7
1992	169	733	676	30	57	37	12	19
1993	175	908	808	43	99	60	20	40
1994	197	1105	946	59	158	86	33	72
1995	199	1304	1069	77	235	122	40	113
1996	207	1511	1179	97	331	150	69	181
1997	198	1709	1270	107	438	179	78	260
1998	169	1878	1302	137	576	200	108	368
1999	106	1984	1241	166	742	234	140	508
2000	60	2044	1115	186	928	249	172	679
2001	40	2084	963	192	1121	255	187	866
2002	25	2109	804	184	1305	257	182	1048
2003	14	2123	643	175	1480	254	178	1226
2004	14	2137	500	157	1637	230	181	1407
2005	14	2151	370	144	1781	219	155	1562
2006	14	2165	264	120	1901	212	127	1689
2007	12	2177	187	89	1990	195	106	1795
2008	11	2188	126	72	2062	172	95	1890
2009	9	2197	85	50	2112	145	77	1967
2010	7	2204	54	38	2150	122	61	2028
2011	5	2209	35	24	2174	100	46	2074
2012	5	2214	25	15	2189	80	35	2109
2013	4	2218	20	9	2198	58	31	2140
2014	4	2222	17	7	2205	44	21	2161
2015	4	2226	16	5	2210	32	17	2178
2016	3	2229	14	5	2215	25	12	2190
2017	3	2232	14	3	2218	19	9	2199
2018	2	2234	12	4	2222	17	6	2205
2019	2	2236	12	2	2224	15	4	2209
2020	2	2238	12	2	2226	13	4	2213
2021	2	2240	12	2	2228	11	4	2217
2022	0	2240	10	2	2230	9	4	2221

Source : Author's Estimates, Filename : PREVHIV 8, October 1995.

TABLE 21(D)

ESTIMATION OF MATERNAL ORPHANS DUE TO AIDS
(variables in thousands except for average children per female)

YEAR	ADULT DEATHNEW	FEMALES DEATHNEW	AVERAGE CHILDREN	ORPHANS GROSS	ORPHANS DEATH	ORPHANS NET	ORPHANS CUMULATIVE
1987	0	0	2.50	0	0	0	0
1988	0	0	2.50	0	0	0	0
1989	0	0	2.50	0	0	0	0
1990	1.70	0.84	2.50	2.10	0.30	1.80	1.80
1991	5.34	2.64	2.50	6.59	0.86	5.93	7.73
1992	12.32	6.09	2.50	15.22	1.68	13.54	21.27
1993	20.24	10.00	2.47	24.70	2.76	21.94	43.21
1994	32.56	16.08	2.44	39.25	4.44	34.81	78.01
1995	40.48	20.00	2.41	48.19	5.52	42.67	120.69
1996	68.64	33.91	2.38	80.70	9.36	71.34	192.03
1997	76.32	38.69	2.35	90.92	10.68	80.24	272.27
1998	106.24	53.47	2.32	124.05	14.76	109.29	381.56
1999	139.92	69.12	2.29	158.29	19.08	139.21	520.77
2000	171.60	84.77	2.26	191.58	23.40	168.18	688.95
2001	186.56	92.16	2.23	205.52	25.44	180.08	869.03
2002	182.16	89.99	2.20	197.97	24.84	173.13	1042.16
2003	177.76	87.81	2.17	190.58	24.24	166.32	1208.47
2004	180.95	89.39	2.14	191.29	21.05	170.24	1378.72
2005	155.23	76.68	2.11	161.80	20.77	141.04	1519.75
2006	127.01	62.74	2.08	130.50	16.99	113.51	1633.26
2007	105.84	52.28	2.05	107.18	14.16	93.02	1726.29
2008	95.26	47.06	2.02	95.05	12.74	82.31	1808.60
2009	76.73	37.91	1.99	75.43	10.27	65.17	1873.77
2010	60.86	30.06	1.96	58.93	8.14	50.78	1924.55
2011	45.86	22.66	1.93	43.73	6.14	37.59	1962.14
2012	35.28	17.43	1.90	33.11	4.72	28.39	1990.53
2013	30.87	15.25	1.87	28.52	4.13	24.39	2014.92
2014	21.17	10.46	1.84	19.24	2.83	16.41	2031.33
2015	16.76	8.28	1.81	14.98	2.24	12.74	2044.07
2016	12.35	6.10	1.78	10.86	1.65	9.21	2053.28
2017	8.82	4.36	1.75	7.62	1.18	6.44	2059.72
2018	6.17	3.05	1.72	5.25	0.31	4.94	2064.66
2019	4.00	1.98	1.69	3.34	0.00	3.34	2068.00
2020	4.00	1.98	1.66	3.28	0.00	3.28	2071.28
2021	4.00	1.98	1.63	3.22	0.00	3.22	2074.50
2022	4.00	1.98	1.60	3.16	0.00	3.16	2077.66

SOURCE : AUTHOR'S ESTIMATES, FILENEME: PREVHIV8, OCTOBER 1995

NOTE : AVERAGE NUMBER OF SURVIVING CHILDREN PER ADILT FEMALE WITHOUT AIDS IS BASED ON POPULATION CENSUS OF 1987. FROM 1993 IT HAS BEEN REDUCED BY 0.03 NUMBER EVERY YEAR TO ACCOMMODATE IMPROVED FAMILY PLANNING

TABLE 22

POPULATION ACCOUNTING WITH AND WITHOUT HIV–AIDS, 1967–2022

WITHOUT HIV–AIDS
(IN THOUSANDS UNLESS OTHERWISE INDICATED)
MALAWI 3 SOLUTION (DEMPROJ)

	1967	1992	1997	2002	2007	2012	2017	2022
POPULATION	7966	9418	10658	12362	13924	15585	17248	18923
LABOUR FORC	3969	4585	5457	6264	7495	8790	10097	11477
		1967–92	1992–97	1997–02	2002–07	2007–12	2012–17	2017–22
AVERAGE ANNUAL CHANGE								
BIRTHS (B)		469.4	484.9	503.2	516.9	531.2	540.3	540.7
DEATHS (D)		183.5	197.1	202.3	204.7	202.9	203.9	205.7
B – D		285.9	287.8	300.9	312.2	328.3	336.4	335
OTHER INDICATORS								
LIFE EXPECTANCY		44.2	46	47.8	49.6	51.4	53.2	55
INFANT MORTALITY RATE		137.1	127.6	118.1	109.4	101.1	92.9	85.2
CHILD MORTALITY RATE		232.3	215.6	198.9	183	167.5	152.3	138.3
CBR/1000		53.9	47.8	43.3	39.3	36	32.9	29.9
CDR/1000		21.1	19.4	17.4	15.6	13.8	12.4	11.4
RNI PERCENT		3.3	2.8	2.6	2.4	2.2	2.1	1.9

WITH HIV–AIDS
MALAWI 3 AIDS SOLUTION (DEMPROJ)

	1967	1992	1997	2002	2007	2012	2017	2022
POPULATION	7966	9362	10463	11423	12491	13677	15463	17166
LABOUR FORC	3969	4541	5188	5615	6550	7733	8961	10272
		1967–92	1992–97	1997–02	2002–07	2007–12	2012–17	2017–22
AVERAGE ANNUAL CHANGE								
BIRTHS (B)		466.6	466.3	457.5	455.1	476.2	503.3	516.9
DEATHS (D)		199.8	263.7	292.9	255.8	207	189	183.5
B – D		266.8	202.6	164.6	199.3	269.2	314.3	333.4
OTHER INDICATORS								
LIFE EXPECTANCY		44.1	43.6	42	44.4	48.4	52	54.2
INFANT MORTALITY RATE		137.1	156.3	167.1	163.8	129.6	105.7	93.0
CHILD MORTALITY RATE		232.3	231.9	221.0	205.1	178.4	158.6	141.2
CBR/1000		53.8	47	41.8	38.1	36.1	34.3	31.7
CDR/1000		23	26.6	26.7	21.4	15.7	12.9	11.2
RNI PERCENT		3.1	2	1.5	1.7	2	2.1	2.1

SOURCE : DEMPROJ SOLUTION, FILE NAME : AIDSDIF3, OCTOBER 1995
NOTE: DEMPROJ SOLUTION RESULTS OF IMR AND CMR HAVE BEEN ADJUSTED DOWNWARD CONSISTENT WITH THE RESULTS OF EPIDEMIOLOGICL MODEL YIELDING AIDS DEATHS OF INFANTS & CHILDREN.

TABLE 22 (CONTINUED)

POPULATION ACCOUNTING WITH AND WITHOUT HIV–AIDS, 1967–2022

(IN THOUSANDS UNLESS OTHERWISE INDICATED)

DIFFERENCE OF TWO SOLUTIONS (WITH AIDS LESS WITHOUT AIDS)

	1967	1992	1997	2002	2007	2012	2017	2022
POPULATION	0	−56	−375	−939	−1433	−1688	−1765	−1755
LABOUR FORC	0	−44	−269	−649	−945	−1057	−1116	−1205

	1967–92	1992–97	1997–02	2002–07	2007–12	2012–17	2017–22
AVERAGE ANNUAL CHANGE							
BIRTHS (B)	−2.8	−18.6	−45.7	−61.8	−55	−37	−23.8
DEATHS (D)	16.3	66.6	90.6	51.1	4.1	−14.9	−22.2
B − D	−19.1	−85.2	−136.3	−112.9	−59.1	−22.1	−1.6
OTHER INDICATORS							
LIFE EXPENTANCY	−0.1	−2.4	−5.8	−5.2	−3	−1.2	−0.8
INFANT MORTALITY RATE	0	28.7	49.0	54.4	28.5	12.8	7.8
CHILD MORTALITY RATE	0	16.3	22.1	22.1	10.9	4.3	2.9
CBR/1000	−0.1	−0.8	−1.5	−1.2	0.1	1.4	1.8
CDR/1000	1.9	7.2	9.3	5.8	1.9	0.5	−0.2
RNI PERCENT	−0.2	−0.8	−1.1	−0.7	−0.2	0	0.2

SOURCE : DEMPROJ SOLUTIONS, FILE NAME : AIDSDIF3, OCTOBER 1995

Table 26

PREVALENCE RATE BY OCCUPATION AND DECOMPOSITION OF DEATHS DUE TO AIDS
MALAWI, 1990, ILLUSTRATIVE CASE

	PROFESSIONAL & TECHNICAL	ADMINISTRATIVE & MANAGEMENT	CLERICAL	SALES WORKERS	SERVICE WORKERS	AGRICULTURAL WORKERS	PRODUCTION WORKERS	TRANSPORT WORKERS	OTHERS (UNSKILLED)	TOTAL
PREV(i,t)%	32.11	25.66	16.99	16.00	20.46	13.05	15.16	20.94	8.01	14.88
q(i,t)%	5.11	0.9	2	7.24	2.96	62.55	8.54	4.47	16.24	100
N(i,t)	261906	46129	102909	371079	151190	2888886	487709	229105	558966	5125400
HIV(i,t)	84109	11791	19491	59668	46067	351620	57465	56754	69971	752946
g(i,t)%	11	2	3	8	6	47	8	8	9	100
D(i,t)	4472	827	1066	3157	2290	19696	3066	3124	3545	40000

Legend :
PREV(i,t) is prevalence rate (urban and rural) by occupation in 1990 assumed with current knowledge;
q(i,t) is percentage of people employed by occupation in 1991, see HESSEA data of NSO, 1991 and Ledh (1994).
N(i,t) is number of adults by occupation based on total adults estimated by reference solution, Malawi 8;
g(i,t) is percentage of HIV by occupation in relation to total HIV adults;
D(i,t) is deaths by occupation.

NOTE: SERVICE WORKERS INCLUDE COMMERCIAL SEX WORKERS; ADMINISTRATIVE CATEGORY INCLUDES MILITARY/POLICE.
OTHERS INCLUDE HOUSEWIVES AND STUDENTS.

Source: Author's estimates, Filename :Occupind, April 1995.

Table 24

ESTIMATION OF ADULT DEATHS DUE TO AIDS BY OCCUPATION, 1987 – 2022

	PROFESSIONAL & TECHNICAL	ADMINISTRATIVE & MANAGEMENT	CLERICAL	SALES WORKERS	SERVICE WORKERS	AGRICULTURAL WORKERS	PRODUCTION WORKERS	TRANSPORT WORKERS	OTHERS (UNSKILLED)	TOTAL DEATHS
2000 (DEATH SHARE)	11	8	9	5	6	47	6	9	9	100
YEAR										
1987	0	0	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0	0	0
1990	190	27	44	184	97	796	130	183	151	1700
1991	757	110	182	556	406	3290	538	550	554	7040
1992	2184	305	501	1528	1108	9048	1479	1512	1719	19960
1993	4487	621	1024	3126	2267	18506	3029	3093	3509	39800
1994	8067	1131	1867	5699	4131	33725	5514	5635	5896	72160
1995	12603	1765	2914	8891	6449	52644	8607	8797	9952	112640
1996	20696	2841	4699	14309	10577	84724	13851	14157	16065	181280
1997	29022	4069	6715	20491	14861	121329	19859	20279	23005	259600
1998	41128	5766	9515	29035	21057	171916	28106	28726	32607	367640
1999	56756	7959	13134	40079	29066	237310	38797	39653	44996	507760
2000	75960	10647	17573	53624	38900	317510	51906	53064	60203	679360
2001	96906	13571	22399	68350	49589	404702	66164	67624	76738	866620
2002	117171	16419	27111	82726	59997	489657	80062	81849	92879	1048060
2003	137044	19212	31709	96790	70172	572916	93665	95751	108691	1226640
2004	157274	22046	36390	111043	80531	657499	107491	109863	124668	1408790
2005	174626	24481	40406	123299	89417	730099	119352	121966	138422	1562022
2006	189627	26471	43691	133321	96697	789596	129056	131904	149677	1689030
2007	200969	28180	46426	141675	102746	838981	137143	140170	159067	1794670
2008	211309	29628	48892	149194	108189	883981	144422	147609	167496	1890126
2009	219867	30829	50877	155251	112592	919244	150285	153601	174299	1966660
2010	229691	31779	52452	160054	116076	947687	154995	158354	179691	2027719
2011	231816	32499	53656	163675	118701	969122	158499	161956	183758	2079582
2012	235762	33051	54561	166450	120721	985611	161135	164691	186862	2109862
2013	239214	33535	55349	168806	122466	1000068	163494	167102	189617	2139782
2014	241580	33867	55967	170567	123699	1009961	165111	168756	191459	2160900
2015	243454	34129	56390	171890	124659	1017769	166392	170069	192976	2177656
2016	244854	34328	56650	172864	125368	1023535	167335	171028	194072	2190006
2017	245820	34461	56879	173561	125870	1027687	168009	171716	194864	2198828
2018	246510	34558	57067	174048	126224	1030542	168461	172189	195401	2205000
2019	246966	34621	57141	174364	126459	1032412	168756	172511	195756	2209000
2020	247406	34683	57244	174679	126692	1034261	169052	172823	196110	2213000
2021	247852	34746	57348	174995	126911	1036151	169348	173136	196468	2217000
2022	248299	34809	57451	175311	127140	1038040	169705	173448	196819	2221000

SOURCE : AUTHOR'S ESTIMATES BASED ON TABLE 23 AND DEATHS IN TABLE 21, APRIL 1996.

Table 25

The Economic Impact of Adult Fatal Illness on the Household

Type of Economic Impact	Timing of Impact			
	(A) Prior to an Illness	(B) During an Illness	(C) Immediately after death	(D) Long-term impact of death
(1) Production and Earnings	organization of economic activity Choice of area of residence	Reduced productivity of affected person Reallocation of labour	Lost output of deceased member	Reallocation of land and labour
(2) Consumption and Investment	Insurance Preventive health care Precautionary savings Transfers to other household	Medical cost of treatment Dissavings Changes in consumption and investment Receipt of transfers	Funeral costs Receipt of transfers Payment of legal fees	Changes in type of and amount of consumption and investment
(3) Household Health and Composition	Household size Fertility	Change in allocation of time to health maintenance	Loss of member	Dissolution or reconstitution of Household Migration Poor health or survivor
(4) Psychic Costs		Disutility of ill individual	Grief of survivors	

Source: M. Over, M. Ainsworth, P. Mujinja, G. Koda, G. Lwihula, I. Semali, "The Economic Impact of Fatal Illness in Sub-Saharan Africa: A Research Proposal", World Bank and University of Dar es Salaam, Table 4, p.15, November, 1989.

TABLE 26 (A)

DIRECT COSTS OF HIV-AIDS, ADULTS
(IN THOUSANDS OF MALAWI KWACHA, 1990 PRICES)

YEAR	HIV-AIDS	FUNERAL	TOTAL	COST ELEMENTS TCH(A)	TCF(A)	PHH	PHA
1987	0	0	0	600	300	3	50
1988	0	0	0	600	300	3	50
1989	1602	0	1602	600	300	3	50
1990	4841	510	5351	600	300	3	50
1991	9194	1602	10796	600	300	3	50
1992	15637	3696	19333	600	300	3	50
1993	23324	6072	29396	600	300	3	50
1994	32424	9768	42192	600	300	3	50
1995	42885	12144	55029	600	300	3	50
1996	55913	20592	76505	600	300	3	50
1997	66280	23496	89776	600	300	3	50
1998	76525	32472	108997	600	300	3	50
1999	85858	41976	127834	600	300	3	50
2000	92650	51480	144130	600	300	3	50
2001	94753	55968	150721	600	300	3	50
2002	93725	54648	148373	600	300	3	50
2003	91539	53328	144867	600	300	3	50
2004	87777	54285	142062	600	300	3	50
2005	77981	46570	124551	600	300	3	50
2006	72271	38102	110374	600	300	3	50
2007	68261	31752	100013	600	300	3	50
2008	61823	28577	90400	600	300	3	50
2009	53748	23020	76768	600	300	3	50
2010	44990	18257	63247	600	300	3	50
2011	37575	13759	51334	600	300	3	50
2012	30673	10584	41257	600	300	3	50
2013	24409	9261	33670	600	300	3	50
2014	17758	6350	24109	600	300	3	50
2015	13454	5027	18481	600	300	3	50
2016	9909	3704	13613	600	300	3	50
2017	7668	2646	10314	600	300	3	50
2018	5922	1852	7774	600	300	3	50
2019	5171	1200	6371	600	300	3	50
2020	4571	1200	5771	600	300	3	50
2021	3971	1200	5171	600	300	3	50
2022	3371	1200	4571	600	300	3	50

SOURCE : AUTHOR'S ESTIMATES, FILENME , PREVHIV9.WK3, OCTOBER,1995

TABLE 26 (AA)

ADULT AIDS COSTS SHARE IN MINISTRY OF HEALTH BUDGET

	MOH(TOTAL) BUDGET RECURRENT (CURRENT PRICES) (MILLIONS MK)	MOH(TOTAL) BUDGET RECURRENT (1990 PRICES)	CURATIVE SHARE	CURATIVE BUDGET RECURRENT (1990 PRICES)	AIDSCOST/ BUDGET (%)
1990	71.50	71.50	0.78	55.77	8.68
1991	76.90	68.97	0.78	53.80	17.09
1992	106.28	77.69	0.78	60.60	25.80
1993	150.55	87.02	0.78	67.88	34:36
1994	266.66	112.41	0.78	87.68	36.96
1995	426.00	106.50	0.78	83.07	51.63
1996	514.40	111.83	0.78	87.22	64.10
1997	621.13	117.42	0.78	91.58	72.37
1998	750.02	123.29	0.78	96.16	79.58
1999	905.65	129.45	0.78	100.97	85.03
2000	1093.57	135.92	0.78	106.02	87.39
2001	1320.48	142.72	0.78	111.32	85.12
2002	1594.48	149.86	0.78	116.89	80.18
2003	1925.34	157.35	0.78	122.73	74.58
2004	2324.84	165.22	0.78	128.87	68.11
2005	2807.25	173.48	0.78	135.31	57.63
2006	3389.75	182.15	0.78	142.08	50.87
2007	4093.13	191.26	0.78	149.18	45.76
2008	4942.45	200.82	0.78	156.64	39.47
2009	5968.01	210.86	0.78	164.47	32.68
2010	7206.37	221.41	0.78	172.70	26.05
2011	8701.69	232.48	0.78	181.33	20.72
2012	10507.30	244.10	0.78	190.40	16.11
2013	12687.56	256.30	0.78	199.92	12.21
2014	15320.23	269.12	0.78	209.91	8.46
2015	18499.18	282.58	0.78	220.41	6.10
2016	22337.76	296.71	0.78	231.43	4.26
2017	26972.84	311.54	0.78	243.00	3.16
2018	32569.70	327.12	0.78	255.15	2.32
2019	39327.92	343.47	0.78	267.91	1.93
2020	47488.46	360.65	0.78	281.30	1.62
2021	57342.32	378.68	0.78	295.37	1.34
2022	69240.85	397.61	0.78	310.14	1.09

NOTE: (a) MOH BUDGET (IN 1990 PRICES) HAS BEEN AUGUMENTED BY 5 PERCENT ANNUALLY FROM 1996 ONWARD (SOCIAL SECTOR EMPHASIS).
(b) 78 % IS THE SHARE OF CURATIVE BUDGET IN TOTAL RECURRENT BUDGET.
(c) MOH CURRENT BUDGET FROM 1996 HAS AN INFLATION FACTOR OF 15%.

TABLE 26 (B)

DIRECT COSTS OF HIV–AIDS, CHILDREN
(IN THOUSANDS OF MALAWI KWACHA, 1990 PRICES)

YEAR	HIV–AIDS	FUNERAL	TOTAL	COST ELEMENTS TCH(C)	TCF(C)	PHH	PHA
1987	0	0	0	411	205.5	3	50
1988	0	0	0	411	205.5	3	50
1989	99	0	99	411	205.5	3	50
1990	323	62	385	411	205.5	3	50
1991	723	136	858	411	205.5	3	50
1992	1330	345	1675	411	205.5	3	50
1993	2154	567	2721	411	205.5	3	50
1994	3220	912	4132	411	205.5	3	50
1995	4641	1134	5775	411	205.5	3	50
1996	5875	1923	7798	411	205.5	3	50
1997	7139	2195	9333	411	205.5	3	50
1998	8406	3033	11439	411	205.5	3	50
1999	9553	3921	13474	411	205.5	3	50
2000	10365	4809	15173	411	205.5	3	50
2001	10884	5228	16112	411	205.5	3	50
2002	11288	5105	16393	411	205.5	3	50
2003	11502	4981	16483	411	205.5	3	50
2004	13481	4326	17807	411	205.5	3	50
2005	11992	4268	16260	411	205.5	3	50
2006	9322	3492	12814	411	205.5	3	50
2007	7234	2910	10144	411	205.5	3	50
2008	5232	2619	7851	411	205.5	3	50
2009	3739	2110	5848	411	205.5	3	50
2010	2682	1673	4355	411	205.5	3	50
2011	1832	1261	3093	411	205.5	3	50
2012	1273	970	2243	411	205.5	3	50
2013	835	849	1684	411	205.5	3	50
2014	459	582	1041	411	205.5	3	50
2015	204	461	664	411	205.5	3	50
2016	70	339	409	411	205.5	3	50
2017	20	242	263	411	205.5	3	50
2018	0	63	63	411	205.5	3	50
2019	0	0	0	411	205.5	3	50
2020	0	0	0	411	205.5	3	50
2021	0	0	0	411	205.5	3	50
2022	0	0	0	411	205.5	3	50

SOURCE : AUTHOR'S ESTIMATES, FILENME , PREVHIV9.WK3, OCTOBER,1995

TABLE 26 (C)

DIRECT COSTS OF HIV-AIDS, ADULTS &CHILDREN

(IN THOUSANDS OF MALAWI KWACHA, 1990 PRICES)

YEAR	HIV-AIDS	FUNERAL	TOTAL
1987	0	0	0
1988	0	0	0
1989	1701	0	1701
1990	5164	572	5736
1991	9917	1738	11654
1992	16967	4041	21008
1993	25478	6639	32117
1994	35644	10680	46325
1995	47526	13278	60804
1996	61788	22515	84303
1997	73418	25691	99109
1998	84931	35505	120436
1999	95411	45897	141308
2000	103015	56289	159304
2001	105637	61196	166833
2002	105013	59753	164766
2003	103041	58309	161351
2004	101258	58611	159869
2005	89973	50637	140610
2006	81594	41594	123188
2007	75495	34662	110157
2008	67055	31196	98251
2009	57487	25130	82617
2010	47672	19931	67603
2011	39407	15020	54427
2012	31947	11554	43500
2013	25245	10110	35355
2014	18217	6932	25150
2015	13658	5488	19146
2016	9978	4044	14022
2017	7689	2888	10577
2018	5922	1916	7838
2019	5171	1200	6371
2020	4571	1200	5771
2021	3971	1200	5171
2022	3371	1200	4571

TABLE 28

MACRO-ECONOMIC PERFORMANCE & PROSPECTS, MALAWI, 1987-2022: SELECT VARIABLES, WITHOUT AIDS

(ALL VARIABLES ARE EXPRESSED IN MILLIONS OF 1990 MALAWI KWACHA EXCEPT LABOUR WHICH IS IN THOUSANDS; OTHER VARIABLES ARE IN RATIOS/PERCENTAGES OR IN UNITS EXPLLAINED IN THE TEXT)

YEAR	CAPITAL/ EFF.LABOUR (K/E)	PROD. (EFF LABOUR) (Y/E)	EFF.LABOUR EMPLOYED (E)	EFFICIENCY OF LABOUR (e)	LABOUR EMPLOYED (L)	CAPITAL STOCK (K)	SAVINGS RATE (S/Y=s)	SAVINGS (S)	CAPITAL INFLOW SHARE (F/Y=f)	GROSS INVESTMENT (I)	NET INVESTMENT (NI)	GDP (OUTPUT) (Y)	GDP GROWTH (%)	LABOUR FORCE (LF)	UNEMPLOYMENT RATE (%) (UR)
1987	2.120	1.060	3907	1.087	3705	8070	0.128	617	0.040	679	274	4035	N.A	3889	6.86
1988	2.177	1.069	3901	1.087	3798	8499	0.076	617	0.127	947	469	4169	3.31	4092	7.16
1989	2.229	1.029	4084	1.087	3947	9011	0.041	172	0.191	969	519	4179	0.09	4215	6.37
1990	2.254	1.060	4209	1.087	4096	9486	0.109	469	0.101	949	474	4544	8.80	4339	5.54
1991	2.289	1.094	4446	1.087	4290	10044	0.069	697	0.149	1090	988	4862	7.00	4492	2.94
1992	2.265	1.022	4414	1.087	4289	10439	0.014	64	0.169	919	394	4510	-7.23	4595	6.23
1993	2.345	1.109	4604	1.088	4350	10562	-0.027	-137	0.188	882	194	4996	10.78	4789	7.76
1994	2.460	0.994	4404	1.085	4095	10956	0.077	339	0.069	628	94	4379	-12.34	4694	12.85
1995	2.432	1.070	4605	1.085	4394	10867	0.080	340	0.129	849	301	4920	10.07	5109	13.99
1996	2.521	1.117	4604	1.084	4298	11364	0.069	342	0.124	805	397	5089	4.34	5359	16.76
1997	2.516	1.116	4706	1.084	4600	11843	0.087	509	0.109	1021	488	5354	4.49	5457	15.70
1998	2.535	1.117	4808	1.084	4799	12393	0.122	657	0.092	1170	560	5499	4.36	5580	14.72
1999	2.535	1.124	5084	1.084	4993	12937	0.120	696	0.070	1096	444	5714	4.80	5784	14.19
2000	2.535	1.132	5359	1.085	5142	13504	0.120	716	0.070	1133	469	5984	4.37	5947	13.65
2001	2.535	1.142	5442	1.085	5209	13796	0.120	746	0.070	1181	491	6216	4.34	6111	13.13
2002	2.535	1.153	5521	1.086	5481	14249	0.120	777	0.060	1196	454	6479	4.22	6274	12.64
2003	2.535	1.164	5911	1.085	5699	14730	0.120	812	0.060	1219	491	6764	4.41	6519	13.04
2004	2.545	1.179	5999	1.085	5943	15239	0.120	847	0.060	1270	508	7095	4.30	6792	13.59
2005	2.565	1.195	6149	1.084	6004	15773	0.120	882	0.060	1322	534	7380	4.19	7007	14.31
2006	2.575	1.213	6315	1.084	6199	16261	0.120	919	0.060	1302	488	7669	4.16	7251	14.93
2007	2.585	1.231	6492	1.083	6343	16781	0.120	959	0.060	1359	519	7960	4.36	7495	15.37
2008	2.595	1.251	6680	1.084	6526	17334	0.120	1002	0.060	1420	564	8355	4.97	7754	15.83
2009	2.615	1.274	6854	1.084	6695	17922	0.120	1049	0.060	1484	588	8730	4.49	8013	16.45
2010	2.635	1.298	7039	1.084	6876	18549	0.120	1097	0.060	1554	588	9140	4.70	8272	16.89
2011	2.655	1.319	7235	1.084	7066	19210	0.120	1146	0.060	1622	691	9541	4.38	8531	17.17
2012	2.675	1.337	7441	1.084	7266	19909	0.120	1193	0.060	1691	665	9946	4.24	8790	17.34
2013	2.695	1.356	7659	1.085	7473	20639	0.120	1246	0.060	1764	732	10379	4.36	9051	17.43
2014	2.715	1.375	7886	1.085	7692	21410	0.120	1301	0.060	1843	772	10841	4.46	9313	17.41
2015	2.735	1.395	8127	1.086	7922	22226	0.120	1360	0.060	1927	816	11336	4.57	9574	17.26
2016	2.755	1.416	8381	1.086	8165	23089	0.120	1424	0.060	2019	863	11869	4.69	9836	16.98
2017	2.775	1.438	8650	1.087	8423	24004	0.120	1492	0.060	2115	914	12439	4.81	10097	16.58
2018	2.795	1.461	8935	1.088	8694	24974	0.120	1566	0.060	2219	970	13054	4.94	10373	16.19
2019	2.815	1.485	9239	1.089	8982	26006	0.120	1646	0.060	2332	1031	13716	5.07	10649	15.66
2020	2.835	1.508	9560	1.089	9288	27104	0.120	1732	0.060	2453	1098	14431	5.21	10925	14.89
2021	2.855	1.535	9904	1.090	9614	28275	0.120	1825	0.060	2585	1171	15205	5.36	11201	14.17
2022	2.875	1.562	10270	1.091	9952	29526	0.120	1925	0.060	2727	1251	16042	5.51	11477	13.20

TABLE 29

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MACRO-SOLUTION OF AIDS IMPACT, MALAWI, 1987-2022

(ALL VARIABLES ARE EXPRESSED IN MILLIONS OF 1990 MALAWI KWACHA EXCEPT LABOUR WHICH IS THOUSANDS; OTHER VARIABLES ARE IN PERCENTAGES OR IN UNITS EXPLAINED IN THE TEXT)

YEAR	CAPITAL/ EFF.LABOUR (K/E)	PROD. EFF.LABOUR (Y/E)	EFF.LABOUR EMPLOYED (E)	EFFICIENCY OF LABOUR (e)	LABOUR EMPLOYED (L)	CAPITAL STOCK (K)	SAVINGS RATE ($S^a/Y=s^a$)	SAVINGS (S^a)	GROSS INVESTMENT (I)	NET INVESTMENT (NI)	GDP (OUTPUT) (Y)	GDP GROWTH (%)	LABOUR FORCE (LF^{pop})	UNEMPLOYMENT RATE (UR^p)
1987	2.120	1.080	3807	1.027	3705	8070	0.128	518	578	274	4035	N.A	3966	6.6
1988	2.181	1.069	3893	1.027	3790	8491	0.078	317	846	421	4162	3.16	4093	7.1
1989	2.231	1.030	4087	1.027	3980	9007	0.041	172	688	516	4160	−0.06	4198	6.3
1990	2.268	1.081	4183	1.027	4073	9477	0.107	485	948	470	4523	8.74	4312	5.5
1991	2.273	1.096	4410	1.027	4296	10027	0.069	532	1051	550	4892	8.22	4427	2.9
1992	2.394	1.028	4345	1.028	4237	10404	0.018	56	699	376	4457	−7.76	4541	6.7
1993	2.404	1.117	4389	1.028	4285	10502	−0.030	−146	523	98	4892	9.54	4670	8.8
1994	2.507	1.005	4211	1.025	4116	10567	0.072	304	589	55	4232	−13.31	4800	14.2
1995	2.542	1.094	4247	1.024	4158	10795	0.049	196	776	238	4604	8.79	4929	15.6
1996	2.650	1.134	4190	1.024	4106	11105	0.058	277	885	310	4750	3.16	5059	18.8
1997	2.658	1.134	4323	1.023	4242	11462	0.085	418	951	377	4903	3.23	5189	18.2
1998	2.689	1.138	4424	1.024	4340	11895	0.108	545	1007	413	5036	2.72	5273	17.7
1999	2.709	1.148	4500	1.023	4414	12190	0.105	549	904	295	5166	2.57	5359	17.6
2000	2.724	1.159	4594	1.023	4495	12468	0.104	551	923	299	5308	2.75	5444	17.4
2001	2.749	1.170	4654	1.023	4563	12792	0.103	569	944	304	5446	2.61	5530	17.4
2002	2.749	1.181	4750	1.023	4660	13054	0.103	579	915	262	5608	2.97	5615	17.0
2003	2.734	1.191	4877	1.022	4793	13336	0.103	600	949	282	5808	3.56	5802	17.3
2004	2.729	1.203	4999	1.020	4916	13642	0.104	627	989	308	6015	3.56	5989	17.9
2005	2.738	1.219	5103	1.019	5027	13971	0.105	655	1028	329	6220	3.41	6176	18.6
2006	2.739	1.235	5208	1.017	5142	14283	0.106	683	1005	292	6461	3.40	6363	19.1
2007	2.740	1.252	5323	1.016	5256	14583	0.107	716	1049	320	6656	3.66	6550	19.6
2008	2.725	1.269	5494	1.015	5428	14943	0.109	759	1107	360	6960	4.41	6787	20.0
2009	2.724	1.289	5633	1.014	5575	15345	0.111	806	1169	402	7284	4.36	7023	20.6
2010	2.728	1.312	5793	1.014	5733	15792	0.113	857	1237	447	7599	4.82	7280	21.0
2011	2.732	1.330	5960	1.013	5899	16279	0.114	905	1301	487	7928	4.30	7496	21.3
2012	2.739	1.346	6136	1.013	6073	16805	0.115	953	1366	528	8259	4.20	7733	21.4
2013	2.743	1.362	6335	1.013	6281	17374	0.117	1006	1436	569	8630	4.50	7983	21.5
2014	2.749	1.380	6542	1.014	6459	17968	0.119	1062	1513	614	9028	4.61	8232	21.5
2015	2.758	1.399	6760	1.015	6667	18547	0.118	1119	1591	659	9455	4.72	8492	21.4
2016	2.769	1.418	6989	1.016	6886	19354	0.119	1178	1674	706	9912	4.84	8731	21.1
2017	2.781	1.439	7230	1.016	7117	20109	0.119	1240	1760	754	10404	4.98	8981	20.7
2018	2.794	1.461	7494	1.018	7356	20914	0.119	1305	1852	806	10933	5.09	9239	20.3
2019	2.808	1.484	7754	1.019	7610	21775	0.119	1374	1949	861	11504	5.22	9497	19.8
2020	2.823	1.508	8040	1.021	7879	22695	0.120	1449	2055	920	12121	5.36	9756	19.2
2021	2.838	1.532	8345	1.022	8165	23680	0.120	1530	2169	985	12798	5.51	10014	18.4
2022	2.853	1.559	8670	1.024	8470	24797	0.120	1619	2293	1056	13512	5.58	10272	17.8

SOURCE : AUTHOR'S ESTIMATES BASED ON REFERENCE SOLUTION SUBJECT TO PARAMETER CHANGES DUE TO AIDS, FILE : COSSDOG2.WIS.

TABLE 30

COMPARISON OF PER CAPITA GDP, MODEL 1 (WITHOUT AIDS) & MODEL 2 (WITH AIDS)

(POPULATION IN THOUSANDS; GDP IN MILLIONS OF 1990 KWACHA)

	MODEL 1				MODEL 2			
YEAR	POPULATION	POP%	PER CAPITA GDP	PER CAPITA GDP%	POPULATION	POP%	PER CAPITA GDP	PER CAPITA GDP%
1987	7966	N.A	505	N.A	7966	N.A	505	N.A
1988	8274	3.58	504	−0.26	8263	3.44	504	−0.27
1989	8560	3.46	487	−3.25	8536	3.33	487	−3.28
1990	8846	3.34	514	5.36	8812	3.22	513	5.35
1991	9132	3.23	532	3.64	9087	3.12	532	3.59
1992	9418	3.13	479	−10.05	9362	3.02	476	−10.47
1993	9706	3.06	515	7.46	9586	2.39	509	6.97
1994	9994	2.97	438	−14.87	9810	2.34	431	−15.29
1995	10282	2.88	469	6.98	10035	2.29	459	6.36
1996	10570	2.80	476	1.50	10259	2.23	463	0.90
1997	10858	2.72	484	1.70	10483	2.19	468	1.02
1998	11159	2.77	491	1.54	10671	1.79	472	0.91
1999	11460	2.70	499	1.47	10859	1.76	476	0.79
2000	11760	2.62	507	1.70	11047	1.73	480	1.00
2001	12061	2.56	515	1.64	11235	1.70	485	0.90
2002	12362	2.49	524	1.68	11423	1.67	491	1.28
2003	12674	2.53	534	1.84	11637	1.87	499	1.66
2004	12987	2.46	543	1.79	11850	1.84	508	1.70
2005	13299	2.41	553	1.73	12064	1.80	516	1.56
2006	13612	2.35	562	1.77	12277	1.77	524	1.60
2007	13924	2.30	574	2.02	12491	1.74	534	1.69
2008	14252	2.36	586	2.16	12768	2.22	545	2.14
2009	14580	2.30	599	2.14	13045	2.17	557	2.14
2010	14909	2.25	613	2.40	13323	2.12	570	2.44
2011	15237	2.20	626	2.13	13600	2.08	583	2.18
2012	15565	2.15	639	2.05	13877	2.04	595	2.12
2013	15902	2.16	653	2.14	14198	2.31	608	2.13
2014	16236	2.12	668	2.29	14519	2.26	622	2.29
2015	16575	2.07	684	2.45	14841	2.21	637	2.46
2016	16911	2.03	702	2.61	15162	2.16	654	2.62
2017	17248	1.99	721	2.77	15483	2.12	672	2.78
2018	17583	1.94	742	2.94	15820	2.18	691	2.85
2019	17916	1.91	766	3.11	16157	2.13	712	3.02
2020	18253	1.87	791	3.26	16494	2.09	735	3.21
2021	18588	1.84	818	3.46	16831	2.04	760	3.40
2022	18923	1.80	848	3.64	17168	2.00	787	3.58

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TABLE 30a

ESTIMATES OF EMPLOYMENT AND AVERAGE EARNINGS BY SECTOR, 1992
(AVERAGE ANNUAL EARNINGS ARE IN 1990 PRICES)

	AGRICULTURE	MINING	MANU	ELEC&WATER	CONS	TRADE	TRANSPORT	FINANCE	COMMUNITY	TOTAL
FORMAL EMPLOYMENT										
NATION (%)	6.51	0.01	1.74	0.11	1.05	0.51	0.61	0.42	2.04	13.00
DISTRIBUTION	50.07	0.11	13.37	0.88	8.07	3.91	4.68	3.26	15.67	100.00
FORMAL:										
EMPLOYMENT	279901	616	74718	4905	45133	21842	26073	18250	87561	559019
INFORMAL:										
EMPLOYMENT	3212644	0	112199	1870	74800	112199	74800	1870	149599	3739981
(INFORMAL)%	85.90	0.00	3.00	0.05	2.00	3.00	2.00	0.05	4.00	100.00
EMPLOYMENT (1992,TOTAL)	3492545	616	186917	6775	119933	134041	100873	20120	237160	4299000
URBAN% (FORMAL)	8	58	53	82	86	59	82	95	54	37
URBAN-FORMAL	22392	357	39601	4022	38814	12887	21380	17338	47294	204084
URBAN% (INFORMAL)	3	0	60	70	20	50	50	70	50	9
URBAN-INFORMAL	80316	0	67320	1309	14960	56100	37400	1309	74800	333513
URBAN-TOTAL (EMPLOMENT)	102708	357	106920	5331	53774	68986	58780	18646	122093	537597
EMPLOYMENT%	19	0	20	1	10	13	11	3	23	100
RURAL% (FORMAL)	92	42	47	18	14	41	18	5	46	63
RURAL-FORMAL	257509	259	35117	883	6319	8955	4693	913	40287	354935
RURAL% (INFORMAL)	98	0	40	30	80	50	50	30	50	91
RURAL-INFORMAL	3132328	0	44880	561	59840	56100	37400	561	74800	3406469
RURAL-TOTAL (EMPLOYMENT)	3389837	259	79997	1444	66159	65055	42093	1473	115087	3761403
EMPLOYMENT%	90	0	2	0	2	2	1	0	3	100
AGG.EMP	3492545	616	186917	6775	119933	134041	100873	20120	237160	4299000
CHECK	0	0	0	-0	-0	-0	0	-0	0	-0
EMPLOYMENT%	81	0	4	0	3	3	2	0	6	100

Continued next page

TABLE 20 Cont'd

ESTIMATES OF EMPLOYMENT AND AVERAGE EARNINGS BY SECTOR, 1992
(AVERAGE ANNUAL EARNINGS ARE IN 1990 PRICES)

	AGRICULTURE	MINING	MANU	ELEC&WATER	CONS	TRADE	TRANSPORT	FINANCE	COMMUNITY	TOTAL
FORMAL										
AVE.EARNINGS	393	400	3707	4279	914	1656	1514	4471	1257	1275
TOT.EARNINGS	109961107	246400	276990300	20996966	36751157	36815871	39461971	81603571	110101629	712946100
INFORMAL										
AVE.EARNINGS	422		2344	2500	660	1406	1406	0	1172	565
TOT.EARNINGS	1355394052	0	282967414	4674976	50940967	157780448	105188966	0	175411609	2112368833
TOTAL										
AGG.EARNINGS	1465295159	246400	559957714	25661369	87691524	194596620	144649937	81603571	285513438	2825037933
AVE.EARNINGS	420	400	2899	3798	750	1452	1494	4056	1203	667
URBAN(FORMAL)										
TOT.EARNINGS	8796889	142912	146604659	17206942	31605995	21723429	32375217	77523393	59454987	395639323
URBAN(INFORMAL)										
TOT.EARNINGS	33593351	0	157780448	3272493	10168079	78990224	52569483	0	87855905	424240983
URBAN(TOTAL)										
TOT.EARNINGS	42390240	142912	304385207	20481326	41774069	100613653	84944699	77523393	147110792	819880391
AVE.EARNINGS	416	400	2949	3942	777	1458	1446	4158	1205	1825
RURAL(FORMAL)										
TOT.EARNINGS	101164219	103488	130185441	3777551	5145162	15095942	7106755	4080179	50846841	317308577
RURAL(INFORMAL)										
TOT.EARNINGS	1321450701	0	105188966	1402493	40672293	78990224	52569483	0	87855905	1687751964
RURAL(TOTAL)										
TOT.EARNINGS	1422614919	103488	235372407	5180044	45817455	93986167	59700238	4080179	138702646	2005157542
AVE.EARNINGS	420	400	2942	3599	698	1445	1419	2799	1202	533

NOTE : 1) URBANIZATION SHARE OF FORMAL SECTOR BY INDUSTRY IS OBTAINED FROM "EMPLOYMENT & EARNINGS", NSO, 1987, QOUATED ALSO IN FORSYTHE (1992), TABLE 12.
2) FORMAL AVERAGE EARNINGS ARE TAKEN FROM FORSYTHE (1992) BUT DIVIDED BY AN IMPLICIT DEFLATOR FOR FORMAL SECTOR IN 1992 TO OBTAIN EARNINGS IN 1990 PRICES.
3) INFORMAL SECTOR EMPLOYMENT BY INDUSTRY HAS BEEN GUESSED TO OBTAIN A TOTAL INFORMAL EMPLOYMENT FIGURE OF 3.74 MILLION.
4) URBANIZATION SHARE IN INFORMAL SECTOR BY INDUSTRY HAS NEEN GUESSED SINCE THIS DATA HAS BEEN VERY DIFFICULT TO OBTAIN FROM ANY MALAWIAN STUDY.
5) INFORMAL AVERAGE EARNINGS BY INDUSTRY HAVE BEEN GUESSED TO CONFORM TO AN AGGREGATE AVERAGE EARNINGS OF ABOUT MK 700-800.
6) INFORMAL AVERAGE EARNINGS BY INDUSTRY HAVE BEEN DEFLATED BY AN IMPLICIT DEFLATOR FOR INFORMAL SECTOR FOR 1992 TO ARRIVE AT EARNINGS IN 1990 PRICES.

TABLE 31

AVERAGE EARNINGS AND EMPLOYMENT, FORMAL, INFORMAL, URBAN AND RURAL, MALAWI 1992
(EARNINGS ARE IN MALAWI KWACHA IN CONSTANT 1990 PRICES)

	FORMAL	INFORMAL	AGGREGATE	RATIO of: FORMAL/ INFORMAL
URBAN :				
AVE.EARNINGS	1939	1272	1525	1.52
EMPLOYMENT	204064	333513	537597	0.61
EMPLOYMENT%	4.75	7.76	12.51	
RURAL :				
AVE.EARNINGS	694	495	533	1.60
EMPLOYMENT	354935	3406468	3761403	0.10
EMPLOYMENT%	8.26	79.24	87.49	
AGGREGATE:				
AVE.EARNINGS	1275	565	657	2.26
EMPLOYMENT	559019	3739981	4299000	0.15
EMPLOYMENT%	13.00	87.00	100	
RATIO of				
URBAN/RURAL:				
AVE.EARNINGS	2.17	2.57	2.86	
EMPLOYMENT	0.57	0.10	0.14	

NOTE : EMPLOYMENT % IS PERCENTAGE OF TOTAL EMPLOYMENT;
AGGREGATES MAY NOT ADD DUE TO ROUNDING.

TOTAL EMPLOYMENT EARNINGS =	MK MILLION	2825
FORMAL EMPLOYMENT EARNINGS =	MK MILLION	713
INFORMAL EMPLOYMENT EARNINGS =	MK MILLION	2112
INFORMAL EMPLOYMENT EARNINGS % =		75
INFORMAL EMPLOYMENT SHARE % =		87

SOURCE : AUTHOR'S ESTIMATES, FILENAME: EMPDISTR2.WK3, JULY 1995.

TABLE 32 ECONOMIC IMPACT OF DEATHS DUE TO AIDS, MACRO RESULTS, URBAN & RURAL DECOMPOSITION

(DEATHS AND EMPLOYMENT IN THOUSANDS, VALUES IN MILLIONS OF MALAWI KWACHA IN 1990 PRICES EXCEPT FOR AVERAGE EARNINGS WHICH ARE IN 1990 MALAWI KWACH

YEAR	TOTAL DEATHS (ADULTS) DEATHNEW	URBAN DEATHNEW (EMPLOYED) L(U,D)	RURAL DEATHNEW (EMPLOYED) L(R,D)	TOTAL GDP (WITHOUT AIDS)	TOTAL EMPLOYMENT (WITHOUT AIDS) L	TOTAL WAGEBILL(WL) (WITHOUT AIDS) WL	AVERAGE EARNINGS(W) (WITHOUT AIDS) W	URBAN AVERAGE EARNINGS (WITHOUT AIDS) W(U)	RURAL AVERAGE EARNINGS (WITHOUT AIDS) W(R)	URBAN EMPLOYMENT SHARE (URBAN)	GROWTH AVERAGE EARNINGS(W) (WITHOUT AIDS) (GW)
1987	0.00	0.00	0.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	571.55	0.11	
1988	0.00	0.00	0.00	[illegible]	[illegible]	[illegible]	687.71	[illegible]	574.20	0.11	0.01
1989	0.00	0.00	0.00	4172.62	[illegible]	[illegible]	[illegible]	1672.21	544.00	0.12	−0.04
1990	1.70	0.19	1.42	4544.12	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.12	0.05
1991	5.34	0.83	4.55	[illegible]	4330.42	3048.03	703.40	1657.44	571.26	0.12	0.01
1992	12.32	1.45	10.11	4510.32	[illegible]	[illegible]	697.24	[illegible]	[illegible]	0.13	−0.07
1993	20.24	2.53	16.14	[illegible]	4880.11	3128.83	712.58	1667.74	578.00	0.14	0.00
1994	32.58	4.13	24.22	4579.00	4294.94	2749.50	[illegible]	[illegible]	517.62	0.15	−0.10
1995	46.46	5.28	35.56	4619.92	[illegible]	3019.00	[illegible]	1414.00	537.37	0.15	0.06
1996	60.64	9.22	47.82	[illegible]	4997.57	3150.83	716.40	1416.15	561.92	0.16	0.04
1997	76.32	11.39	64.69	[illegible]	4880.94	[illegible]	749.56	1417.58	[illegible]	0.17	0.04
1998	106.24	16.80	75.51	[illegible]	4786.11	[illegible]	766.76	1417.61	624.36	0.18	0.03
1999	139.92	22.80	97.16	5713.70	[illegible]	3919.60	769.80	1419.07	641.46	0.19	0.03
2000	171.60	29.76	118.60	[illegible]	5141.04	4174.46	811.96	1419.70	[illegible]	0.20	0.03
2001	199.56	32.81	139.56	6216.10	[illegible]	4551.27	819.76	1423.26	665.74	0.20	0.01
2002	162.16	32.23	126.80	6479.46	5496.76	4594.92	827.42	1429.21	672.02	0.20	0.01
2003	177.76	31.62	122.96	6761.36	5629.27	4736.06	835.36	1440.44	678.46	0.20	0.01
2004	190.96	32.30	124.09	7035.39	5849.35	4999.77	845.21	1454.57	686.40	0.21	0.01
2005	155.23	27.74	105.27	7350.36	6003.81	5146.35	857.02	1467.94	696.06	0.21	0.01
2006	127.01	22.76	80.29	7656.89	6169.19	5309.19	868.94	1480.84	706.65	0.21	0.01
2007	100.94	19.04	70.53	7969.65	6346.23	5562.76	881.69	1495.14	716.09	0.21	0.01
2008	80.28	17.20	62.97	8294.88	6526.32	5849.40	896.12	1512.94	727.01	0.21	0.02
2009	76.73	13.88	60.23	8729.92	6685.14	6110.95	912.74	1532.91	741.31	0.22	0.02
2010	60.86	11.06	39.53	9140.34	6875.59	6369.24	930.57	1555.47	755.79	0.22	0.02
2011	46.86	9.34	29.61	9540.84	7068.13	6579.59	948.16	1572.47	767.84	0.22	0.02
2012	35.28	6.40	22.67	9946.72	7265.16	6862.00	966.14	1589.74	779.18	0.22	0.01
2013	30.87	5.72	19.79	10379.18	7473.39	7204.73	972.06	1602.52	788.50	0.22	0.01
2014	21.17	3.96	13.52	10848.76	7691.62	7598.54	988.60	1619.16	801.30	0.23	0.01
2015	16.76	3.17	10.70	11336.33	7921.83	7835.43	1001.72	1636.72	813.57	0.23	0.02
2016	12.36	2.36	7.88	11867.96	8165.96	8007.57	1017.45	1656.16	[illegible]	0.23	0.02
2017	8.82	1.71	5.60	12439.17	8422.82	8707.42	1033.83	1674.57	[illegible]	0.23	0.02
2018	6.17	1.21	3.96	13039.89	[illegible]	9137.88	1051.07	1695.27	[illegible]	0.23	0.02
2019	4.00	0.80	2.56	13716.29	[illegible]	9601.39	1069.01	1716.96	[illegible]	0.24	0.02
2020	4.00	0.91	2.59	14401.36	9297.74	10101.83	1087.57	1739.69	[illegible]	0.24	0.02
2021	4.00	0.93	2.61	15204.52	9613.82	10643.16	1107.07	1763.46	[illegible]	0.24	0.02
2022	4.00	0.94	2.69	16041.96	9961.70	11229.30	1127.29	1788.36	915.53	0.24	0.02
TOTAL	2221.00	360.81	1521.36	292464.12	22812.24	[illegible]	N.A.	N.A.	N.A.		

SOURCE : AUTHOR'S ESTIMATES, FILENAME : FERTIL2.WK3, JULY 1995

TABLE 32 (contd)

YEAR	MACRO UNEMPLOYMENT RATE (URATE)	RATIO W(U)/W(F)	URBAN EARNINGS LOSS Y(U)	RURAL EARNINGS LOSS Y(R)	TOTAL EARNINGS LOSS Y	TOTAL EARNINGS LOSS/GDP%	URBAN/ RURAL LOSS
1987	8.00	2.77	0.00	0.00	0.00	0.00	
1988	7.19	2.76	0.00	0.00	0.00	0.00	
1989	6.37	2.80	0.00	0.00	0.00	0.00	
1990	5.54	2.82	0.31	0.80	1.12	0.02	0.39
1991	2.94	2.80	1.05	2.80	3.85	0.07	0.40
1992	6.23	2.86	2.20	5.39	7.59	0.17	0.41
1993	7.76	2.71	3.98	9.35	13.31	0.27	0.42
1994	12.85	2.61	5.57	12.53	18.11	0.41	0.44
1995	13.88	2.54	7.44	18.45	25.89	0.50	0.46
1996	16.76	2.46	13.09	27.89	40.94	0.81	0.47
1997	19.70	2.36	18.08	30.00	48.09	0.92	0.49
1998	14.72	2.27	28.81	47.15	75.96	1.39	0.51
1999	14.19	2.21	32.50	62.32	94.82	1.68	0.52
2000	13.55	2.15	42.24	78.21	120.45	2.02	0.54
2001	13.13	2.15	48.58	88.58	132.89	2.14	0.54
2002	12.84	2.14	46.30	85.28	131.57	2.03	0.54
2003	13.04	2.13	46.71	83.42	130.13	1.91	0.55
2004	13.50	2.12	48.98	85.16	132.15	1.87	0.56
2005	14.31	2.11	40.72	73.27	113.99	1.55	0.56
2006	14.89	2.10	38.88	60.19	99.07	1.23	0.56
2007	15.37	2.09	28.47	50.51	78.98	0.89	0.56
2008	15.88	2.08	28.01	45.99	74.00	0.80	0.57
2009	16.45	2.07	21.28	37.24	58.52	0.67	0.57
2010	16.88	2.06	17.20	29.88	47.07	0.51	0.58
2011	17.17	2.05	13.18	22.73	35.91	0.38	0.58
2012	17.34	2.04	10.30	17.84	27.94	0.29	0.58
2013	17.43	2.03	9.17	15.60	24.76	0.24	0.59
2014	17.41	2.02	6.41	10.84	17.25	0.16	0.59
2015	17.36	2.01	5.19	8.70	13.89	0.12	0.60
2016	16.89	2.00	3.91	6.52	10.43	0.08	0.60
2017	16.56	1.99	2.87	4.74	7.61	0.06	0.60
2018	16.19	1.99	2.08	3.36	5.44	0.04	0.61
2019	15.86	1.98	1.37	2.24	3.61	0.03	0.61
2020	14.98	1.97	1.41	2.28	3.70	0.03	0.62
2021	14.17	1.96	1.48	2.34	3.80	0.02	0.62
2022	13.20	1.95	1.51	2.41	3.91	0.02	0.63
TOTAL			569.09	1032.21	1592.30	0.54	

SOURCE : AUTHOR'S ESTIMATES. FILENAME : FERTILIZ.WK3, JULY 1990

TABLE 33

URBAN SECTORAL DISPOSITION OF EARNINGS AND EMPLOYMENT LOSS DUE TO AIDS

(EMPLOYMENT IN THOUSANDS, AND EARNINGS IN 1990 PRICES)

	SECTORS									
1992	AGRICULTURE	MINING	MANU	E&W	CONSTRUCTION	TRADE	TRANSPORT	FINANCE	COMMUNITY	TOTAL
EMP.SHARE%	19.11	0.07	19.89	0.99	10.00	12.83	10.93	3.47	22.71	100.00
AVE.EARNINGS	415.55	400.00	2848.72	3541.86	776.84	1468.45	1445.86	4157.53	1204.90	1525.06
EMP.LOSS	0.28	0.00	0.29	0.01	0.14	0.19	0.16	0.05	0.33	1.45
TOTAL EARNINGS LOSS (MK MILLIONS)	0.11	0.00	0.82	0.06	0.11	0.27	0.23	0.21	0.40	2.20
LOSS (MK MILLIONS)%	5.21	0.02	37.15	2.50	5.10	12.27	10.36	9.46	17.94	100.00
1995										
EMP.SHARE%	19.11	0.07	19.89	0.99	10.00	12.83	10.93	3.47	22.71	
AVE.EARNINGS	395.51	371.09	2642.82	3564.16	720.69	1363.04	1341.06	3857.03	1117.82	1414.85
EMP.LOSS	1.01	0.00	1.05	0.05	0.53	0.68	0.58	0.18	1.19	5.26
TOTAL EARNINGS LOSS (MK MILLIONS)	0.39	0.00	2.77	0.19	0.38	0.91	0.77	0.70	1.34	7.44
LOSS (MK MILLIONS)%	SAME AS 1992									

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TABLE 94 RURAL SECTORAL DISPOSITION OF EARNINGS AND EMPLOYMENT LOSS DUE TO AIDS

(EMPLOYMENT IN THOUSANDS, AND EARNINGS IN 1980 PRICES)

1992

	SECTORS									
	AGRICULTURE	MINING	MANU	E&W	CONSTRUCT/TRADE	TRANSPORT	FINANCE	COMMUNITY	TOTAL	
EMP.SHARE%	90.12	0.01	2.13	0.04	1.76	1.78	1.12	0.04	3.06	100.00
AVE.EARNINGS	419.67	400.00	2942.25	5557.54	692.54	1444.72	1416.50	2769.04	1301.72	695.09
EMP.LOSS	9.11	0.00	0.21	0.00	0.16	0.17	0.11	0.00	0.31	10.11
TOTAL EARNINGS LOSS (MK MILLIONS)	3.82	0.00	0.69	0.01	0.12	0.25	0.16	0.01	0.37	5.39
LOSS (MK MILLIONS)%	70.95	0.01	11.74	0.25	2.23	4.69	2.98	0.20	6.90	100.00
			1995.00							
EMP.SHARE%	90.12	0.01	2.13	0.04	1.76	1.78	1.12	0.04	3.06	100.00
AVE.EARNINGS	428.78	418.22	3076.28	5780.94	724.09	1510.62	1482.69	2895.16	1255.46	657.57
EMP.LOSS	28.66	0.00	0.63	0.01	0.52	0.51	0.33	0.01	0.91	29.98
TOTAL EARNINGS LOSS (MK MILLIONS)	11.70	0.00	1.94	0.04	0.35	0.77	0.49	0.03	1.14	16.46
LOSS (MK MILLIONS)%	SAME AS 1992									

TABLE 35 URBAN EMPLOYMENT LOSS BY SECTOR (IN THOSANDS)

	EMP.LOSS (TOTAL)	AGRICULTURE	MINING	MANU	E&W	CONSTRUCTION	TRADE	TRANSPORT	FINANCE	COMMUNITY	TOTAL
1987	0	0	0	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0	0	0	0
1990	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
1991	0.6	0.1	0.0	0.1	0.0	0.1	0.1	0.1	0.0	0.1	0.6
1992	1.4	0.3	0.0	0.3	0.0	0.1	0.2	0.2	0.1	0.3	1.4
1993	2.5	0.5	0.0	0.5	0.0	0.3	0.3	0.3	0.1	0.5	2.5
1994	4.1	0.8	0.0	0.8	0.0	0.4	0.5	0.5	0.1	0.9	4.1
1995	6.3	1.0	0.0	1.0	0.1	0.5	0.7	0.6	0.2	1.2	6.3
1996	9.2	1.5	0.0	1.5	0.1	0.9	1.2	1.0	0.3	2.1	9.2
1997	11.3	2.2	0.0	2.3	0.1	1.1	1.5	1.2	0.4	2.8	11.3
1998	16.8	3.2	0.0	3.3	0.2	1.7	2.2	1.8	0.6	3.8	16.8
1999	22.9	4.4	0.0	4.6	0.2	2.3	2.9	2.5	0.8	5.2	22.9
2000	29.6	5.7	0.0	5.9	0.3	3.0	3.8	3.3	1.0	6.8	29.6
2001	32.5	6.2	0.0	6.5	0.3	3.3	4.2	3.6	1.1	7.4	32.5
2002	32.2	6.2	0.0	6.4	0.3	3.2	4.1	3.5	1.1	7.3	32.2
2003	31.6	6.0	0.0	6.3	0.3	3.2	4.1	3.5	1.1	7.2	31.6
2004	32.3	6.2	0.0	6.4	0.3	3.2	4.1	3.5	1.1	7.3	32.3
2005	27.7	5.3	0.0	5.5	0.3	2.8	3.6	3.0	1.0	6.3	27.7
2006	22.8	4.3	0.0	4.5	0.2	2.3	2.9	2.5	0.8	5.2	22.8
2007	19.0	3.6	0.0	3.8	0.2	1.9	2.4	2.1	0.7	4.3	19.0
2008	17.2	3.3	0.0	3.4	0.2	1.7	2.2	1.9	0.6	3.9	17.2
2009	13.9	2.7	0.0	2.8	0.1	1.4	1.8	1.5	0.5	3.2	13.9
2010	11.1	2.1	0.0	2.2	0.1	1.1	1.4	1.2	0.4	2.5	11.1
2011	8.4	1.6	0.0	1.7	0.1	0.8	1.1	0.9	0.3	1.9	8.4
2012	6.5	1.2	0.0	1.3	0.1	0.6	0.8	0.7	0.2	1.5	6.5
2013	5.7	1.1	0.0	1.1	0.1	0.6	0.7	0.6	0.2	1.3	5.7
2014	4.0	0.8	0.0	0.8	0.0	0.4	0.5	0.4	0.1	0.9	4.0
2015	3.2	0.6	0.0	0.6	0.0	0.3	0.4	0.3	0.1	0.7	3.2
2016	2.4	0.5	0.0	0.5	0.0	0.2	0.3	0.3	0.1	0.5	2.4
2017	1.7	0.3	0.0	0.3	0.0	0.2	0.2	0.2	0.1	0.4	1.7
2018	1.2	0.2	0.0	0.2	0.0	0.1	0.2	0.1	0.0	0.3	1.2
2019	0.8	0.2	0.0	0.2	0.0	0.1	0.1	0.1	0.0	0.2	0.8
2020	0.8	0.2	0.0	0.2	0.0	0.1	0.1	0.1	0.0	0.2	0.8
2021	0.8	0.2	0.0	0.2	0.0	0.1	0.1	0.1	0.0	0.2	0.8
2022	0.8	0.2	0.0	0.2	0.0	0.1	0.1	0.1	0.0	0.2	0.8
TOTAL	390.8	72.8	0.3	76.7	3.8	38.1	48.9	41.8	13.2	88.5	390.8

SOURCE : AUTHOR'S ESTIMATES, FILENAME : FERTILI2.WK3

TABLE 36
URBAN EARNINGS LOSS BY SECTOR (IN MILLIONS OF MALAWI KWACHA, 1990 PRICES)

	EARN.LOSS (TOTAL)	AGRICULTURE	MINING	MANU	E&W	CONSTRUCTION	TRADE	TRANSPORT	FINANCE	COMMUNITY	TOTAL
1987	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
1988	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
1989	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
1990	0.31	0.02	0.00	0.12	0.01	0.02	0.04	0.03	0.03	0.06	0.31
1991	1.05	0.05	0.00	0.39	0.03	0.05	0.13	0.11	0.10	0.19	1.05
1992	2.20	0.11	0.00	0.82	0.06	0.11	0.27	0.23	0.21	0.40	2.20
1993	3.98	0.21	0.00	1.47	0.10	0.20	0.49	0.41	0.37	0.71	3.98
1994	5.57	0.29	0.00	2.07	0.14	0.28	0.68	0.58	0.53	1.00	5.57
1995	7.44	0.39	0.00	2.77	0.19	0.38	0.91	0.77	0.70	1.34	7.44
1996	13.05	0.68	0.00	4.85	0.33	0.67	1.60	1.35	1.23	2.34	13.05
1997	16.08	0.84	0.00	5.97	0.40	0.82	1.97	1.66	1.52	2.88	16.08
1998	23.81	1.24	0.00	8.85	0.59	1.21	2.92	2.47	2.25	4.27	23.81
1999	32.50	1.69	0.01	12.07	0.81	1.66	3.99	3.37	3.07	5.83	32.50
2000	42.24	2.20	0.01	15.69	1.06	2.15	5.18	4.38	3.99	7.58	42.24
2001	46.59	2.43	0.01	17.31	1.16	2.37	5.72	4.83	4.41	8.36	46.59
2002	46.39	2.41	0.01	17.23	1.16	2.36	5.69	4.81	4.39	8.32	46.39
2003	45.71	2.38	0.01	16.98	1.14	2.33	5.61	4.74	4.32	8.20	45.71
2004	46.99	2.45	0.01	17.46	1.17	2.39	5.77	4.87	4.44	8.43	46.99
2005	40.72	2.12	0.01	15.13	1.02	2.07	5.00	4.22	3.85	7.31	40.72
2006	33.69	1.75	0.01	12.51	0.84	1.72	4.13	3.49	3.19	6.04	33.69
2007	28.47	1.48	0.00	10.58	0.71	1.45	3.49	2.95	2.69	5.11	28.47
2008	26.01	1.35	0.00	9.66	0.65	1.33	3.19	2.70	2.46	4.67	26.01
2009	21.28	1.11	0.00	7.91	0.53	1.08	2.61	2.21	2.01	3.82	21.28
2010	17.20	0.90	0.00	6.39	0.43	0.88	2.11	1.78	1.63	3.09	17.20
2011	13.18	0.69	0.00	4.89	0.33	0.67	1.62	1.37	1.25	2.38	13.18
2012	10.30	0.54	0.00	3.83	0.26	0.52	1.26	1.07	0.97	1.85	10.30
2013	9.17	0.48	0.00	3.41	0.23	0.47	1.13	0.95	0.87	1.65	9.17
2014	6.41	0.33	0.00	2.38	0.16	0.33	0.79	0.66	0.61	1.15	6.41
2015	5.19	0.27	0.00	1.93	0.13	0.26	0.64	0.54	0.49	0.93	5.19
2016	3.91	0.20	0.00	1.45	0.10	0.20	0.48	0.41	0.37	0.70	3.91
2017	2.87	0.15	0.00	1.06	0.07	0.15	0.35	0.30	0.27	0.51	2.87
2018	2.08	0.11	0.00	0.76	0.05	0.10	0.25	0.21	0.19	0.37	2.08
2019	1.37	0.07	0.00	0.51	0.03	0.07	0.17	0.14	0.13	0.25	1.37
2020	1.41	0.07	0.00	0.52	0.04	0.07	0.17	0.15	0.13	0.25	1.41
2021	1.46	0.08	0.00	0.54	0.04	0.07	0.18	0.15	0.14	0.26	1.46
2022	1.51	0.08	0.00	0.56	0.04	0.08	0.18	0.16	0.14	0.27	1.51
TOTAL	560.09	29.16	0.10	208.07	13.99	26.54	66.73	56.05	52.96	100.50	560.09

SOURCE : AUTHOR'S ESTIMATES, FILENAME : FERTIL12.WK3

TABLE 37

RURAL EMPLOYMENT LOSS BY SECTOR (IN THOSANDS)

	EMP.LOSS (TOTAL)	AGRICULTURE	MINING	MANU	E&W	CONSTRUCT	TRADE	TRANSPORT	FINANCE	COMMUNITY	TOTAL
1987	0	0	0	0	0	0	0	0	0	0	
1988	0	0	0	0	0	0	0	0	0	0	
1989	0	0	0	0	0	0	0	0	0	0	
1990	1.42	1.28	0.00	0.03	0.00	0.02	0.02	0.02	0.00	0.04	1.4
1991	4.55	4.10	0.00	0.10	0.00	0.08	0.08	0.05	0.00	0.14	4.5
1992	10.11	9.11	0.00	0.21	0.00	0.18	0.17	0.11	0.00	0.31	10.1
1993	16.14	14.55	0.00	0.34	0.01	0.28	0.28	0.18	0.01	0.49	16.1
1994	24.22	21.82	0.00	0.52	0.01	0.43	0.42	0.27	0.01	0.74	24.2
1995	29.55	26.66	0.00	0.63	0.01	0.52	0.51	0.33	0.01	0.91	29.5
1996	47.92	43.19	0.00	1.02	0.02	0.84	0.83	0.54	0.02	1.47	47.9
1997	54.69	49.29	0.00	1.16	0.02	0.96	0.95	0.61	0.02	1.67	54.6
1998	75.51	68.05	0.01	1.61	0.03	1.33	1.31	0.85	0.03	2.31	75.5
1999	97.16	87.56	0.01	2.07	0.04	1.71	1.68	1.09	0.04	2.97	97.1
2000	118.60	106.89	0.01	2.52	0.05	2.09	2.05	1.33	0.05	3.63	118.6
2001	129.56	116.76	0.01	2.76	0.05	2.28	2.24	1.45	0.05	3.96	129.5
2002	128.90	114.36	0.01	2.70	0.05	2.23	2.19	1.42	0.05	3.88	128.9
2003	122.98	110.81	0.01	2.62	0.05	2.16	2.13	1.38	0.05	3.76	122.9
2004	124.06	111.80	0.01	2.64	0.05	2.18	2.15	1.39	0.05	3.80	124.0
2005	105.27	94.87	0.01	2.24	0.04	1.85	1.82	1.18	0.04	3.22	105.2
2006	85.29	76.87	0.01	1.81	0.03	1.50	1.48	0.95	0.03	2.61	85.2
2007	70.53	63.57	0.00	1.50	0.03	1.24	1.22	0.79	0.03	2.16	70.5
2008	62.97	56.75	0.00	1.34	0.02	1.11	1.09	0.70	0.02	1.93	62.9
2009	50.23	45.27	0.00	1.07	0.02	0.88	0.87	0.56	0.02	1.54	50.2
2010	39.53	35.62	0.00	0.84	0.02	0.70	0.68	0.44	0.02	1.21	39.5
2011	29.61	26.68	0.00	0.63	0.01	0.52	0.51	0.33	0.01	0.91	29.6
2012	22.67	20.43	0.00	0.48	0.01	0.40	0.39	0.25	0.01	0.69	22.6
2013	19.76	17.81	0.00	0.42	0.01	0.35	0.34	0.22	0.01	0.60	19.7
2014	13.52	12.19	0.00	0.29	0.01	0.24	0.23	0.15	0.01	0.41	13.5
2015	10.70	9.64	0.00	0.23	0.00	0.19	0.19	0.12	0.00	0.33	10.7
2016	7.89	7.11	0.00	0.17	0.00	0.14	0.14	0.09	0.00	0.24	7.8
2017	5.65	5.09	0.00	0.12	0.00	0.10	0.10	0.06	0.00	0.17	5.6
2018	3.96	3.57	0.00	0.08	0.00	0.07	0.07	0.04	0.00	0.12	3.9
2019	2.58	2.32	0.00	0.05	0.00	0.05	0.04	0.03	0.00	0.08	2.5
2020	2.59	2.33	0.00	0.05	0.00	0.05	0.04	0.03	0.00	0.08	2.5
2021	2.61	2.35	0.00	0.05	0.00	0.05	0.05	0.03	0.00	0.08	2.6
2022	2.63	2.37	0.00	0.05	0.00	0.05	0.05	0.03	0.00	0.08	2.6
TOTAL	1521.36	1371.08	0.10	32.36	0.56	26.76	26.31	17.05	0.60	46.55	1521.3

SOURCE: AUTHOR'S ESTIMATES, FILENAME, FERTLI2.WK3.

TABLE 38

RURAL EARNINGS LOSS BY SECTOR (IN MILLIONS OF MALAWI KWACHA, 1990 PRICES)

	EARN.LOSS (TOTAL)	AGRICULTURE	MINING	MANU	E&W	CONSTRUCT	TRADE	TRANSPORT	FINANCE	COMMUNITY	TOTAL
1987	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
1988	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
1989	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
1990	0.80	0.57	0.00	0.09	0.00	0.02	0.04	0.02	0.00	0.06	0.80
1991	2.60	1.84	0.00	0.31	0.01	0.06	0.12	0.08	0.01	0.18	2.60
1992	5.59	3.62	0.00	0.63	0.01	0.12	0.25	0.16	0.01	0.37	5.59
1993	9.35	6.63	0.00	1.10	0.02	0.21	0.44	0.28	0.02	0.64	9.35
1994	12.55	8.69	0.00	1.47	0.03	0.29	0.59	0.37	0.03	0.86	12.55
1995	16.49	11.70	0.00	1.94	0.04	0.38	0.77	0.49	0.03	1.14	16.49
1996	27.89	19.79	0.00	3.27	0.07	0.64	1.31	0.83	0.06	1.92	27.89
1997	33.03	23.43	0.00	3.86	0.09	0.75	1.55	0.98	0.07	2.28	33.03
1998	47.15	33.45	0.00	5.53	0.12	1.08	2.21	1.40	0.10	3.25	47.15
1999	62.32	44.22	0.00	7.32	0.16	1.42	2.92	1.86	0.13	4.30	62.32
2000	78.21	55.49	0.00	9.18	0.20	1.79	3.67	2.33	0.16	5.39	78.21
2001	86.28	61.20	0.00	10.12	0.22	1.97	4.04	2.57	0.18	5.95	86.28
2002	85.28	60.50	0.00	10.01	0.22	1.95	4.00	2.54	0.17	5.88	85.28
2003	83.42	59.19	0.00	9.79	0.22	1.91	3.91	2.48	0.17	5.75	83.42
2004	85.16	60.42	0.00	10.00	0.22	1.95	3.99	2.54	0.17	5.87	85.16
2005	73.27	51.99	0.00	8.60	0.19	1.67	3.43	2.18	0.15	5.06	73.27
2006	60.19	42.70	0.00	7.07	0.16	1.38	2.82	1.79	0.12	4.15	60.19
2007	50.51	35.84	0.00	5.93	0.13	1.15	2.37	1.50	0.10	3.48	50.51
2008	45.83	32.52	0.00	5.38	0.12	1.05	2.15	1.36	0.09	3.16	45.83
2009	37.24	26.42	0.00	4.37	0.10	0.85	1.75	1.11	0.08	2.57	37.24
2010	29.88	21.20	0.00	3.51	0.08	0.68	1.40	0.89	0.06	2.06	29.88
2011	22.73	16.13	0.00	2.67	0.06	0.52	1.07	0.68	0.05	1.57	22.73
2012	17.64	12.52	0.00	2.07	0.05	0.40	0.83	0.53	0.04	1.22	17.64
2013	15.60	11.07	0.00	1.83	0.04	0.36	0.73	0.46	0.03	1.06	15.60
2014	10.84	7.69	0.00	1.27	0.03	0.25	0.51	0.32	0.02	0.75	10.84
2015	8.70	6.17	0.00	1.02	0.02	0.20	0.41	0.26	0.02	0.60	8.70
2016	6.52	4.62	0.00	0.77	0.02	0.15	0.31	0.19	0.01	0.45	6.52
2017	4.74	3.36	0.00	0.56	0.01	0.11	0.22	0.14	0.01	0.33	4.74
2018	3.38	2.40	0.00	0.40	0.01	0.08	0.16	0.10	0.01	0.23	3.38
2019	2.24	1.59	0.00	0.26	0.01	0.05	0.10	0.07	0.00	0.15	2.24
2020	2.29	1.62	0.00	0.27	0.01	0.05	0.11	0.07	0.00	0.16	2.29
2021	2.34	1.66	0.00	0.28	0.01	0.05	0.11	0.07	0.00	0.16	2.34
2022	2.41	1.71	0.00	0.28	0.01	0.06	0.11	0.07	0.00	0.17	2.41
TOTAL	1032.21	732.33	0.05	121.16	2.67	23.59	48.38	30.78	2.10	71.19	1032.21

SOURCE: AUTHOR'S ESTIMATES, FILENAME, FERTL12.WK3.

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TABLE 39

HUMAN CAPITAL LOSS DUE TO AIDS, URBAN AND RURAL DECOMPOSITION, MALAWI, 1990–2022
(EARNINGS LOSS IN MILLIONS OF MALAWI KWACHA (1990 PRICES), EMPLOYMENT IN THOUSANDS)

YEAR	URBAN AVERAGE EARNINGS (WITHOUT AIDS) W(U)	RURAL AVERAGE EARNINGS (WITHOUT AIDS) W(R)	CUMULATIVE URBAN EMPLOYMENT LOSS CUM(L,U,D)	CUMULATIVE RURAL EMPLOYMENT LOSS CUM(L,R,D)	LIFETIME URBAN EMPLOYMENT LOSS CUM(L,U,D)*	LIFETIME RURAL EMPLOYMENT LOSS CUM(L,R,D)*	LIFETIME URBAN EARNINGS LOSS Y(L,U,D)*	LIFETIME RURAL EARNINGS LOSS Y(L,R,D)*	LIFETIME NATION EARNINGS LOSS Y(L,D)*	LIFETIME URBAN/ RURAL EARNINGS LOSS RATIO
1987	1566.62	571.95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1988	1567.60	574.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1989	1572.21	544.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1990	1662.29	588.19	0.19	1.42	0.19	1.42	0.31	0.80	1.12	0.39
1991	1657.44	571.26	0.62	5.97	0.62	5.97	1.36	3.41	4.77	0.40
1992	1525.00	599.00	2.27	16.08	2.27	16.08	3.46	8.57	12.02	0.40
1993	1567.74	579.06	4.79	32.22	4.79	32.22	7.51	18.66	26.17	0.40
1994	1349.36	517.62	8.92	56.43	8.92	56.43	12.04	29.21	41.25	0.41
1995	1414.65	557.37	14.18	88.01	14.18	88.01	20.07	47.94	68.01	0.42
1996	1416.15	591.92	23.40	133.93	23.40	133.93	33.14	77.94	111.08	0.43
1997	1417.59	603.89	34.73	188.63	34.73	188.63	49.24	118.91	168.15	0.43
1998	1417.91	624.36	51.53	264.14	51.53	264.14	73.06	164.92	237.98	0.44
1999	1419.07	641.46	74.43	361.30	74.43	361.30	105.62	231.76	337.38	0.46
2000	1419.70	659.40	104.19	479.90	104.19	479.90	147.91	316.45	464.36	0.47
2001	1433.35	685.74	136.69	609.46	136.69	609.46	195.93	405.74	601.67	0.48
2002	1439.21	672.02	168.92	736.38	168.92	736.38	243.12	494.84	737.96	0.49
2003	1445.44	678.46	200.55	859.32	200.55	859.32	289.88	583.01	872.89	0.50
2004	1454.97	686.46	232.94	983.37	232.94	983.37	338.78	675.05	1013.83	0.50
2005	1467.84	696.06	260.59	1088.64	260.59	1087.23	382.50	756.77	1139.27	0.51
2006	1480.84	705.65	283.34	1173.94	283.34	1167.97	419.52	824.18	1243.70	0.51
2007	1495.14	716.09	302.38	1244.47	302.38	1228.40	452.10	879.64	1331.74	0.51
2008	1512.24	727.81	319.58	1307.44	319.58	1275.22	483.28	928.13	1411.41	0.52
2009	1532.91	741.31	333.46	1357.67	333.46	1301.24	511.17	964.62	1475.79	0.53
2010	1555.47	755.79	344.52	1397.20	344.52	1311.19	535.89	990.99	1526.87	0.54
2011	1572.47	767.84	352.90	1428.61	352.71	1292.67	554.98	992.48	1547.09	0.56
2012	1588.74	778.18	359.39	1449.49	358.57	1250.85	568.96	981.17	1550.13	0.58
2013	1602.52	789.50	365.11	1469.25	362.85	1208.11	581.47	951.44	1532.91	0.61
2014	1619.18	801.30	369.07	1482.77	364.28	1121.47	589.94	898.53	1488.47	0.66
2015	1636.72	813.57	372.24	1493.47	363.32	1013.57	594.66	824.61	1419.27	0.72
2016	1655.18	826.35	374.81	1501.35	360.42	891.89	596.57	737.02	1333.59	0.81
2017	1674.57	839.65	376.32	1507.00	352.92	770.84	590.99	647.07	1238.06	0.91
2018	1695.27	853.66	377.53	1510.96	342.80	651.84	581.14	556.28	1137.42	1.04
2019	1716.96	868.23	378.33	1513.54	326.90	530.16	561.11	460.30	1021.41	1.22
2020	1739.69	883.38	379.14	1516.12	304.71	428.90	530.10	378.88	908.99	1.40
2021	1763.48	899.14	379.97	1518.73	278.78	350.76	496.34	315.39	801.72	1.54
2022	1788.36	915.53	380.81	1521.36	244.12	292.97	456.57	268.22	704.79	1.69
TOTAL	N.A	N.A	N.A	N.A	N.A	N.A	10979.22	16528.00	27508.23	N.A

SOURCE : AUTHOR'S ESTIMATES, FILENEME : FERTILI3.WK3, JULY 1995.

N.A. STANDS FOR NOT APPLICABLE FOR SUMMATION.

TABLE 39 Cont'd

HUMAN CAPITAL LOSS DUE TO AIDS, URBAN AND RURAL DECOMPOSITION, MALAWI, 1990-2022
(EARNINGS LOSS IN MILLIONS OF MALAWI KWACHA (1990 PRICES), EMPLOYMENT IN THOUSANDS)

YEAR	LIFETIME NATIONAL EARNINGS LOSS% (Y(L,D)*/ GDP%)	DISCOUNTED URBAN EARNINGS LOSS(5%) Y(U)D	DISCOUNTED RURAL EARNINGS LOSS(5%) Y(R)D	DISCOUNTED NATIONAL EARNINGS LOSS(5%) YD	DISCOUNTED URBAN EARNINGS LOSS(10%) Y(U)D	DISCOUNTED RURAL EARNINGS LOSS(10%) Y(R)D	DISCOUNTED NATIONAL EARNINGS LOSS(10%) YD
1987	0.00						
1988	0.00						
1989	0.00						
1990	0.02	0.31	0.80	1.12	0.31	0.80	1.12
1991	0.10	1.30	3.25	4.54	1.24	3.10	4.34
1992	0.27	3.13	7.77	10.91	2.88	7.08	9.94
1993	0.52	6.49	16.12	22.61	5.65	14.02	19.68
1994	0.94	9.90	24.03	33.94	8.22	19.95	28.17
1995	1.41	15.72	37.56	53.28	12.46	29.77	42.23
1996	2.21	24.73	58.16	82.89	18.71	43.99	62.70
1997	3.10	34.99	80.95	115.95	25.27	58.45	83.72
1998	4.34	49.45	111.62	161.07	34.08	76.94	111.02
1999	5.90	68.08	149.39	217.48	44.79	98.29	143.08
2000	7.79	90.80	194.27	285.07	57.03	122.00	179.03
2001	9.68	114.55	237.23	351.78	68.67	142.21	210.88
2002	11.39	135.36	275.56	410.92	77.46	157.67	235.14
2003	12.90	153.73	309.18	462.91	83.97	168.88	252.85
2004	14.37	171.11	340.95	512.06	89.21	177.76	266.97
2005	15.50	183.99	364.02	548.01	91.57	181.17	272.75
2006	16.24	192.19	377.57	569.75	91.30	179.37	270.67
2007	16.67	197.25	383.78	581.03	89.44	174.03	263.46
2008	16.89	200.91	385.66	586.47	86.92	166.93	253.85
2009	16.90	202.29	381.73	584.02	83.58	157.72	241.30
2010	16.70	201.97	373.49	575.46	79.68	147.30	226.98
2011	16.22	199.09	356.23	555.31	74.85	134.11	208.96
2012	15.59	194.50	335.41	529.91	69.59	120.53	190.43
2013	14.77	189.31	309.76	499.07	64.94	106.25	171.19
2014	13.73	182.89	278.64	461.53	59.88	91.23	151.12
2015	12.52	175.60	243.51	419.11	54.88	76.11	130.99
2016	11.24	167.79	207.28	375.06	50.06	61.84	111.90
2017	9.95	159.29	173.32	331.61	45.08	49.36	94.44
2018	8.71	149.24	141.90	290.15	40.30	38.57	78.87
2019	7.45	138.82	111.33	248.15	35.57	29.02	64.39
2020	6.30	122.85	87.66	210.52	30.38	21.71	52.09
2021	5.27	107.17	69.50	176.67	25.34	16.43	41.77
2022	4.39	91.62	56.29	147.91	20.68	12.70	33.38
TOTAL	N.A	3931.64	6484.43	10416.07	1624.14	2885.32	4509.45

SOURCE : AUTHOR'S ESTIMATES, FILENEME : FERTILIS.WK3, JULY 1995.

N.A. STANDS FOR NOT APPLICABLE FOR SUMMATION.

TABLE 40
DISTRIBUTION OF EMPLOYMENT IN DISTRICTS BY INDUSTRY (RURAL & URBAN COMBINED), MALAWI, 1987

	AGRICULTURE	MINING	MANUFACTURING	ELEC&WATER	CONSTRUCTION	TRADE	TRANSPORT	FINANCE	COMMUNITY	TOTAL
NORTH										
Chitipa	1.13	0.07	0.92	0.76	0.74	0.44	0.30	0.26	1.03	1.08
Karonga	1.66	2.08	0.70	1.50	1.23	0.97	0.58	0.44	1.06	1.57
Rumphi	1.12	3.85	0.69	1.05	2.40	1.16	0.52	0.21	1.31	1.13
Nkhata-Bay	1.69	1.42	2.50	2.25	3.12	1.64	0.57	0.34	1.31	1.71
Mzimba	5.19	3.73	2.92	6.25	8.31	5.07	4.03	3.22	5.82	5.16
Mzuzu	0.18	0.01	0.25	1.81	1.10	0.42	0.53	0.62	0.52	0.22
sum	10.96	10.64	7.96	13.61	16.90	9.69	6.51	5.12	11.06	10.89
CENTRAL										
Kasungu	4.42	1.46	1.09	1.99	2.85	2.59	0.71	1.05	2.22	4.12
Nkhotakota	1.63	1.35	6.03	1.30	1.66	2.45	0.50	0.36	1.16	1.92
Ntchisi	1.79	0.23	0.26	0.29	0.51	0.40	0.19	0.05	0.54	1.62
Dowa	4.89	1.45	0.73	1.26	0.96	1.60	1.00	0.34	1.57	4.43
Salima	2.53	2.55	2.00	0.94	2.52	3.77	2.29	0.64	2.43	2.54
Lilongwe	11.37	6.64	8.01	22.41	14.02	12.92	19.45	30.46	20.19	11.84
Mchinji	3.67	1.01	0.53	1.94	1.37	1.82	0.94	0.44	1.35	3.36
Dedza	5.36	13.32	3.74	1.56	3.77	2.13	1.27	0.53	2.54	5.07
Ntcheu	4.39	13.56	2.13	3.26	3.32	1.76	2.14	0.52	2.84	4.16
sum	40.26	41.56	24.41	34.67	30.91	29.56	26.39	34.24	34.76	39.05
SOUTHERN										
Mangochi	6.93	1.60	4.76	2.15	4.76	7.69	4.06	1.49	3.26	6.66
Machinga	7.61	3.88	4.51	2.54	5.01	5.63	3.66	0.96	3.50	7.19
Zomba	5.63	9.72	6.10	10.09	8.43	7.92	3.37	3.37	7.96	5.85
Chiradzulu	2.79	2.76	3.64	2.04	2.77	2.47	2.26	0.84	2.12	2.77
Blantyre	3.25	14.45	27.80	27.56	19.12	22.33	42.67	52.14	24.84	6.09
Mwanza	1.76	1.00	0.37	1.83	1.06	0.68	0.22	0.16	1.01	1.65
Thyolo	5.45	5.25	7.19	1.59	4.40	3.55	3.92	1.16	4.12	5.34
Mulanje	8.20	7.03	8.60	2.56	4.84	7.66	3.43	1.34	4.72	7.94
Chikawa	4.59	1.51	4.61	1.33	1.39	1.84	1.24	1.01	1.92	4.31
Nsanje	2.40	0.97	1.09	0.86	1.03	1.62	1.72	0.41	1.84	2.27
sum	46.75	47.75	67.73	51.54	52.21	60.83	64.90	60.72	54.21	50.06
TOTAL	100	100	100	100	100	100	100	100	100	100

SOURCE : MALAWI POPULATION & HOUSING CENSUS, 1987, CORRECTED FOR ADJUSTMENTS TO SECTOR CLASSIFIED AS "OTHER".

TABLE 41
RURAL DISTRIBUTION OF EMPLOYMENT IN DISTRICTS BY INDUSTRY, MALAWI, 1987

NORTH	AGRICULTURE	MINING	MANUFACTURING	ELEC&WATER	CONSTRUCTION	TRADE	TRANSPORT	FINANCE	COMMUNITY	TOTAL
Chitipa	1.15	0.08	1.06	0.67	0.66	0.46	0.41	0.69	1.63	1.15
Karonga	1.70	2.24	1.09	3.19	1.65	1.66	1.60	3.45	2.23	1.70
Rumphi	1.10	3.61	0.91	1.39	3.21	1.19	0.99	1.39	1.95	1.15
Nkhata-Bay	1.70	1.53	3.51	4.10	4.46	2.12	1.70	1.67	2.22	1.79
Mzimba	5.22	3.66	3.19	4.54	7.40	4.95	3.66	3.32	5.74	5.19
Mzuzu	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06
sum	10.94	11.31	9.69	13.88	17.76	10.30	8.34	10.66	13.79	11.03
CENTRAL										
Kasungu	4.50	1.56	1.43	2.55	3.64	3.04	1.28	3.46	3.47	4.36
Nkhotakota	1.60	1.45	8.62	1.35	1.76	3.73	0.89	1.26	1.68	1.97
Ntchisi	1.83	0.25	0.31	0.52	0.41	0.51	0.43	0.14	0.50	1.72
Dowa	4.96	1.53	0.91	1.61	1.12	2.07	2.09	1.65	2.61	4.71
Salima	2.54	2.46	2.42	1.34	3.19	4.64	2.86	1.95	3.51	2.61
Lilongwe	11.02	4.43	3.98	11.74	6.43	5.33	8.92	9.53	9.31	10.66
Mchinji	3.74	1.10	0.71	1.97	1.64	2.56	1.67	3.03	2.17	3.59
Dedza	5.36	14.02	4.70	2.41	5.20	2.65	3.26	2.21	4.13	5.30
Ntcheu	4.49	14.58	2.94	5.93	4.67	2.46	5.33	3.62	4.92	4.46
sum	40.25	41.32	25.87	29.42	28.42	27.18	26.93	26.83	32.59	39.38
SOUTHERN										
Mangochi	7.00	1.56	6.22	2.63	6.47	11.33	6.14	5.60	5.35	7.00
Machinga	7.71	3.97	6.10	2.35	6.73	7.61	6.47	3.47	5.24	7.59
Zomba	5.71	9.70	7.17	17.96	10.95	10.05	6.30	6.25	7.64	5.95
Chiradzulu	2.86	2.97	5.34	4.18	4.06	4.01	6.21	6.54	4.17	2.99
Blantyre	2.86	12.43	8.60	15.66	8.13	7.46	17.55	20.01	7.84	3.31
Mwanza	1.79	1.07	0.51	3.36	1.46	0.84	0.46	0.97	1.59	1.74
Thyolo	5.55	5.62	10.30	3.05	6.19	4.66	8.96	6.76	7.66	5.69
Mulanje	6.36	7.57	12.36	4.34	7.05	11.70	7.86	6.67	8.82	6.49
Chikawa	4.62	1.59	6.55	2.24	1.62	2.53	2.49	3.59	2.85	4.54
Neenja	2.33	1.01	1.49	1.12	1.27	2.49	3.53	0.97	2.57	2.31
sum	46.80	47.36	64.58	56.74	53.66	62.59	64.61	62.57	53.66	49.61
TOTAL	100	100	100	100	100	100	100	100	100	100

SOURCE : MALAWI POPULATION & HOUSING CENSUS, 1987, CORRECTED FOR ADJUSTMENTS TO SECTOR CLASSIFIED AS "OTHER".

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TABLE 42
URBAN DISTRIBUTION OF EMPLOYMENT IN DISTRICTS BY INDUSTRY, MALAWI, 1987

	AGRICULTURE	MINING	MANUFACTURING	ELECAWATER	CONSTRUCTION	TRADE	TRANSPORT	FINANCE	COMMUNITY	TOTAL
NORTH										
Chitipa	0.61	0.00	0.62	0.61	0.58	0.39	0.23	0.20	0.45	0.50
Karonga										
Rumphi	1.73	0.35	0.22	0.72	0.76	1.07	0.24	0.04	0.68	0.92
Nkhata-Bay	1.57	0.18	0.32	0.59	0.44	0.68	0.38	0.14	0.45	0.76
Mzimba	3.51	2.07	2.52	7.94	10.38	5.38	4.32	3.27	6.01	4.96
Mzuzu	4.76	0.17	0.76	3.25	3.15	1.04	0.79	0.68	0.95	2.11
sum	12.42	2.73	4.41	13.27	15.09	8.68	5.88	4.26	8.43	9.27
CENTRAL										
Kasungu	1.61	0.37	0.38	1.50	1.26	1.67	0.36	0.70	1.05	1.26
Ntchotaikota	3.41	0.18	0.46	1.23	1.42	0.41	0.27	0.22	0.69	1.36
Ntchisi	0.60	0.00	0.16	0.08	0.70	0.21	0.05	0.04	0.29	0.36
Dowa	2.72	0.54	0.33	0.96	0.69	1.34	0.38	0.14	0.59	1.22
Salima	2.45	3.36	1.08	0.56	1.15	2.31	1.67	0.43	1.37	1.74
Lilongwe	23.74	38.10	16.67	31.78	29.19	24.91	25.33	33.39	30.25	25.80
Mchinji	1.07	0.00	0.15	1.88	0.41	0.61	0.41	0.06	0.57	0.66
Dedza	5.96	5.23	1.66	0.60	0.89	0.98	0.14	0.28	1.03	2.32
Ntcheu	0.83	2.10	0.37	0.64	0.22	0.59	0.31	0.06	0.86	0.66
sum	42.74	44.95	21.18	39.54	35.79	38.20	29.07	35.13	38.63	35.35
SOUTHERN										
Mangochi	4.87	2.16	1.61	1.68	1.38	2.38	3.39	0.66	1.31	2.58
Machinga	4.44	2.69	1.10	2.67	1.56	2.45	2.05	0.58	1.65	2.51
Zomba	2.60	10.01	3.71	2.98	3.26	4.43	1.65	2.88	8.04	4.66
Chiradzulu	0.28	0.38	0.01	0.13	0.17	0.03	0.05	0.00	0.21	0.16
Blantyre	16.01	38.53	67.45	37.01	40.04	44.82	55.56	55.62	39.80	35.93
Mwanza	1.61	0.17	0.07	0.45	0.32	0.41	0.07	0.04	0.44	0.66
Thyolo	2.06	1.04	0.52	0.28	0.77	1.68	0.99	0.04	0.77	1.20
Mulanje	2.75	0.90	0.49	0.97	0.42	1.25	0.68	0.54	0.86	1.34
Chikawa	3.53	0.54	0.44	0.53	0.91	0.76	0.52	0.63	1.04	1.52
Nsanje	5.53	0.52	0.23	0.60	0.50	0.23	0.68	0.31	0.73	1.83
sum	44.64	52.27	74.76	47.03	48.99	58.19	65.22	60.71	54.93	55.36
TOTAL	100	100	100	100	100	100	100	100	100	100

SOURCE : MALAWI POPULATION & HOUSING CENSUS, 1987, CORRECTED FOR ADJUSTMENTS TO SECTOR CLASSIFIED AS "OTHER".

TABLE 43

DISTRIBUTION OF MANYEARS LOSS IN DISTRICTS BY INDUSTRY (RURAL & URBAN COMBINED), MALAWI, 1995

(LIFETIME MANYEARS IN THOUSANDS LOST TO AIDS)

	AGRICULTURE	MINING	MANUFACTURING	ELEC&WATER	CONSTRUCTION	TRADE	TRANSPORT	FINANCE	COMMUNITY	TOTAL
SHARE%	81.24	0.01	4.35	0.16	2.79	3.12	2.35	0.47	5.52	100.00
LEVEL	81.24	0.01	4.35	0.16	2.79	3.12	2.35	0.47	5.52	100.00
NORTH										
Chitipa	0.92	0.00	0.04	0.00	0.02	0.01	0.01	0.00	0.06	1.08
Karonga	1.35	0.00	0.03	0.00	0.03	0.09	0.01	0.00	0.06	1.57
Rumphi	0.91	0.00	0.03	0.00	0.07	0.04	0.01	0.00	0.07	1.13
Nkhata-Bay	1.36	0.00	0.11	0.00	0.09	0.05	0.02	0.00	0.07	1.71
Mzimba	4.21	0.00	0.13	0.01	0.23	0.16	0.09	0.02	0.32	5.16
Mzuzu	0.15	0.00	0.01	0.00	0.03	0.01	0.01	0.00	0.03	0.22
sum	8.90	0.00	0.35	0.02	0.47	0.30	0.16	0.02	0.61	10.89
CENTRAL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Kasungu	3.59	0.00	0.05	0.00	0.08	0.08	0.02	0.00	0.12	4.12
Nkhotakota	1.49	0.00	0.26	0.00	0.05	0.06	0.01	0.00	0.06	1.92
Ntchisi	1.46	0.00	0.01	0.00	0.01	0.01	0.00	0.00	0.03	1.62
Dowa	3.97	0.00	0.08	0.00	0.08	0.06	0.02	0.00	0.09	4.43
Salima	2.06	0.00	0.09	0.00	0.07	0.12	0.05	0.00	0.13	2.54
Lilongwe	9.23	0.00	0.35	0.04	0.39	0.40	0.46	0.14	1.11	11.84
Mchinji	2.96	0.00	0.02	0.00	0.04	0.06	0.02	0.00	0.07	3.36
Dedza	4.37	0.00	0.16	0.00	0.11	0.07	0.03	0.00	0.14	5.07
Ntcheu	3.56	0.00	0.09	0.01	0.09	0.05	0.05	0.00	0.16	4.16
sum	32.72	0.01	1.06	0.05	0.86	0.92	0.67	0.16	1.92	39.05
SOUTHERN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mangochi	5.63	0.00	0.21	0.00	0.13	0.25	0.10	0.01	0.16	6.66
Machinga	6.16	0.00	0.20	0.00	0.14	0.18	0.09	0.00	0.19	7.19
Zomba	4.57	0.00	0.27	0.02	0.24	0.25	0.06	0.02	0.44	5.85
Chiradzulu	2.27	0.00	0.16	0.00	0.06	0.08	0.06	0.00	0.12	2.77
Blantyre	2.64	0.00	1.21	0.04	0.53	0.70	1.00	0.24	1.37	6.09
Mwanza	1.45	0.00	0.02	0.00	0.03	0.02	0.01	0.00	0.06	1.65
Thyolo	4.42	0.00	0.31	0.00	0.12	0.11	0.09	0.01	0.23	5.34
Mulanje	6.66	0.00	0.37	0.00	0.14	0.24	0.06	0.01	0.26	7.94
Chikawa	3.73	0.00	0.20	0.00	0.04	0.06	0.03	0.00	0.11	4.31
Nsanje	1.95	0.00	0.05	0.00	0.03	0.05	0.04	0.00	0.09	2.27
sum	39.61	0.01	2.94	0.06	1.46	1.90	1.52	0.26	2.99	50.06
TOTAL	81.23	0.01	4.35	0.16	2.79	3.12	2.35	0.47	5.52	100.00

SOURCE : AUTHOR'S ESTMATES, FILENAME, EMPDIST5.WK3, SEPTEMBER 1995.

TABLE 44

RURAL DISTRIBUTION OF MANYEARS LOSS DUE TO AIDS BY DISTRICT & BY INDUSTRY , MALAWI, 1995
(MAN-YEARS IN THOSANDS)

	AGRICULTURE	MINING	MANUFACTURING	ELEC&WATER	CONSTRUCTION	TRADE	TRANSPORT	FINANCE	COMMUNITY	TOTAL
SHARE%	90.12	0.01	2.13	0.04	1.76	1.73	1.12	0.04	3.06	100.00
LEVEL	77.50	0.01	1.83	0.03	1.51	1.49	0.96	0.03	2.63	86.00
NORTH										
Chitipa	0.89	0.00	0.02	0.00	0.01	0.01	0.00	0.00	0.04	0.97
Karonga	1.32	0.00	0.02	0.00	0.03	0.02	0.02	0.00	0.06	1.46
Rumphi	0.86	0.00	0.02	0.00	0.05	0.02	0.01	0.00	0.05	0.99
Nkhata-Bay	1.32	0.00	0.06	0.00	0.07	0.03	0.02	0.00	0.06	1.54
Mzimba	4.04	0.00	0.06	0.00	0.11	0.07	0.04	0.00	0.15	4.47
Mzuzu	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05
sum	8.46	0.00	0.16	0.00	0.27	0.15	0.08	0.00	0.36	9.49
CENTRAL										
Kasungu	3.49	0.00	0.03	0.00	0.06	0.05	0.01	0.00	0.09	3.75
Nkhotakota	1.39	0.00	0.16	0.00	0.03	0.06	0.01	0.00	0.04	1.69
Ntchisi	1.42	0.00	0.01	0.00	0.01	0.01	0.00	0.00	0.02	1.46
Dowa	3.84	0.00	0.02	0.00	0.02	0.03	0.02	0.00	0.07	4.05
Salima	1.97	0.00	0.04	0.00	0.05	0.07	0.03	0.00	0.09	2.24
Lilongwe	8.54	0.00	0.07	0.00	0.10	0.06	0.09	0.00	0.25	9.17
Mchinji	2.90	0.00	0.01	0.00	0.03	0.04	0.02	0.00	0.06	3.09
Dedza	4.17	0.00	0.09	0.00	0.06	0.04	0.03	0.00	0.11	4.56
Ntcheu	3.46	0.00	0.05	0.00	0.07	0.04	0.05	0.00	0.13	3.83
sum	31.20	0.00	0.47	0.01	0.49	0.40	0.26	0.01	0.86	33.85
SOUTHERN										
Mangochi	5.43	0.00	0.11	0.00	0.10	0.17	0.05	0.00	0.14	6.02
Machinga	5.97	0.00	0.11	0.00	0.10	0.11	0.08	0.00	0.14	6.52
Zomba	4.43	0.00	0.13	0.01	0.17	0.15	0.06	0.00	0.20	5.11
Chiradzulu	2.22	0.00	0.10	0.00	0.06	0.06	0.06	0.00	0.11	2.57
Blantyre	2.22	0.00	0.16	0.01	0.12	0.11	0.17	0.01	0.21	2.85
Mwanza	1.39	0.00	0.01	0.00	0.02	0.01	0.00	0.00	0.04	1.49
Thyolo	4.30	0.00	0.19	0.00	0.09	0.07	0.09	0.00	0.20	4.90
Mulanje	6.46	0.00	0.23	0.00	0.11	0.17	0.06	0.00	0.23	7.31
Chikawa	3.56	0.00	0.12	0.00	0.02	0.04	0.02	0.00	0.07	3.91
Nsanje	1.80	0.00	0.03	0.00	0.02	0.04	0.03	0.00	0.07	1.96
sum	37.82	0.00	1.16	0.02	0.81	0.93	0.62	0.02	1.41	42.86
TOTAL	77.50	0.01	1.83	0.03	1.51	1.49	0.96	0.03	2.63	86.00

SOURCE : AUTHOR'S ESTIMATES, FILENAME, EMPDIST5.WK3, SEPTEMBER 1995.

TABLE 45 URBAN DISTRIBUTION OF MANYEARS LOSS IN DISTRICTS BY INDUSTRY , MALAWI, 1996

	AGRICULTURE	MINING	MANUFACTURING	ELEC&WATER	CONSTRUCTION	TRADE	TRANSPORT	FINANCE	COMMUNITY	TOTAL
SHARE%	19.11	0.07	19.89	0.99	10.00	12.88	10.98	3.47	22.71	100.00
LEVEL	2.67	0.01	2.78	0.14	1.40	1.80	1.53	0.49	3.18	14.00
NORTH										
Chitipa	0.02	0.00	0.02	0.00	0.01	0.01	0.00	0.00	0.01	0.07
Karonga	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rumphi	0.05	0.00	0.01	0.00	0.01	0.02	0.00	0.00	0.02	0.13
Nkhata--Bay	0.04	0.00	0.01	0.00	0.01	0.02	0.01	0.00	0.01	0.11
Mzimba	0.09	0.00	0.07	0.01	0.15	0.10	0.07	0.02	0.19	0.69
Mzuzu	0.13	0.00	0.02	0.00	0.04	0.02	0.01	0.00	0.03	0.30
sum	0.33	0.00	0.12	0.02	0.21	0.16	0.09	0.02	0.27	1.30
CENTRAL										
Kasungu	0.05	0.00	0.01	0.00	0.02	0.03	0.01	0.00	0.03	0.16
Nkhotakota	0.09	0.00	0.01	0.00	0.02	0.01	0.00	0.00	0.02	0.19
Ntchisi	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.05
Dowa	0.07	0.00	0.01	0.00	0.01	0.02	0.01	0.00	0.02	0.17
Salima	0.07	0.00	0.03	0.00	0.02	0.04	0.03	0.00	0.04	0.24
Lilongwe	0.63	0.00	0.46	0.04	0.41	0.45	0.39	0.16	0.86	3.61
Mchinji	0.03	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.02	0.09
Dedza	0.16	0.00	0.05	0.00	0.01	0.02	0.00	0.00	0.03	0.32
Ntcheu	0.02	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.03	0.09
sum	1.14	0.00	0.59	0.05	0.50	0.60	0.45	0.17	1.16	4.95
SOUTHERN										
Mangochi	0.13	0.00	0.04	0.00	0.02	0.04	0.05	0.00	0.04	0.38
Machinga	0.12	0.00	0.03	0.00	0.02	0.04	0.03	0.00	0.06	0.35
Zomba	0.07	0.00	0.10	0.00	0.05	0.08	0.03	0.01	0.26	0.65
Chiradzulu	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02
Blantyre	0.43	0.00	1.68	0.05	0.56	0.61	0.85	0.27	1.27	5.45
Mwanza	0.04	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.09
Thyolo	0.06	0.00	0.01	0.00	0.01	0.03	0.02	0.00	0.02	0.17
Mulanje	0.07	0.00	0.01	0.00	0.01	0.02	0.01	0.00	0.03	0.19
Chikawa	0.09	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.03	0.21
Neanje	0.15	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.02	0.26
sum	1.19	0.00	2.08	0.07	0.69	1.05	1.00	0.29	1.75	7.75
TOTAL	2.67	0.01	2.78	0.14	1.40	1.80	1.53	0.49	3.18	14.00

SOURCE : AUTHOR'S ESTMATES, FILENAME, EMPDIST5.WK3, SEPTEMBER 1995.

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TABLE 46

RURAL DISTRIBUTION OF MANYEARS LOSS DUE TO AIDS BY DISTRICT & BY INDUSTRY , MALAWI, 2000
(MAN-YEARS IN THOSANDS)

	AGRICULTURE	MINING	MANUFACTURING	ELEC&WATER	CONSTRUCTION	TRADE	TRANSPORT	FINANCE	COMMUNITY	TOTAL
SHARE%	90.12	0.01	2.13	0.04	1.76	1.73	1.12	0.04	3.06	100.00
LEVEL	432.56	0.03	10.21	0.18	8.44	8.30	5.37	0.19	14.69	480.00
NORTH										
Chitipa	4.98	0.00	0.11	0.00	0.07	0.04	0.02	0.00	0.24	5.44
Karonga	7.36	0.00	0.11	0.01	0.16	0.13	0.09	0.01	0.33	8.17
Rumphi	4.78	0.00	0.09	0.00	0.27	0.10	0.05	0.00	0.29	5.51
Nkhata-Bay	7.38	0.00	0.36	0.01	0.36	0.18	0.09	0.00	0.33	8.59
Mzimba	22.57	0.00	0.32	0.01	0.62	0.41	0.20	0.01	0.84	24.93
Mzuzu	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30
sum	47.32	0.00	0.98	0.03	1.50	0.86	0.45	0.02	2.02	52.94
CENTRAL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Kasungu	19.46	0.00	0.15	0.00	0.31	0.25	0.07	0.01	0.51	20.82
Nkhotakota	7.77	0.00	0.88	0.00	0.15	0.31	0.05	0.00	0.25	9.45
Ntchisi	7.90	0.00	0.03	0.00	0.03	0.04	0.02	0.00	0.12	8.27
Dowa	21.45	0.00	0.09	0.00	0.09	0.17	0.11	0.00	0.38	22.59
Salima	10.99	0.00	0.25	0.00	0.27	0.36	0.15	0.00	0.52	12.50
Lilongwe	47.66	0.00	0.40	0.02	0.54	0.44	0.46	0.02	1.37	51.16
Mchinji	16.20	0.00	0.07	0.00	0.16	0.21	0.10	0.01	0.32	17.23
Dedza	23.28	0.00	0.46	0.00	0.44	0.24	0.17	0.00	0.61	25.43
Ntcheu	19.41	0.00	0.30	0.01	0.41	0.21	0.29	0.01	0.72	21.39
sum	174.13	0.01	2.64	0.05	2.40	2.26	1.45	0.05	4.79	188.94
SOUTHERN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mangochi	30.29	0.00	0.63	0.00	0.55	0.94	0.26	0.01	0.79	33.60
Machinga	33.34	0.00	0.62	0.00	0.57	0.63	0.35	0.01	0.77	36.41
Zomba	24.72	0.00	0.73	0.03	0.92	0.63	0.34	0.01	1.12	28.55
Chiradzulu	12.37	0.00	0.54	0.01	0.34	0.33	0.33	0.01	0.61	14.34
Blantyre	12.37	0.00	0.86	0.03	0.69	0.62	0.94	0.04	1.15	15.91
Mwanza	7.76	0.00	0.05	0.01	0.12	0.07	0.03	0.00	0.23	8.34
Thyolo	23.99	0.00	1.05	0.01	0.52	0.39	0.46	0.02	1.12	27.33
Mulanje	36.16	0.00	1.26	0.01	0.60	0.97	0.42	0.01	1.30	40.77
Chikawa	20.01	0.00	0.67	0.00	0.14	0.21	0.13	0.01	0.42	21.60
Neenje	10.07	0.00	0.15	0.00	0.11	0.21	0.19	0.00	0.36	11.07
sum	211.11	0.02	6.59	0.10	4.55	5.20	3.46	0.12	7.86	238.12
TOTAL	432.56	0.03	10.21	0.18	8.44	8.30	5.37	0.19	14.69	480.00

SOURCE : AUTHOR'S ESTMATES, FILENAME, EMPDIST5.WK3, SEPTEMBER 1995.

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TABLE 47 URBAN DISTRIBUTION OF MANYEARS LOSS DUE TO AIDS BY DISTRICT & BY INDUSTRY , MALAWI, 2000

	AGRICULTURE	MINING	MANUFACTURING	ELEC&WATER	CONSTRUCTION	TRADE	TRANSPORT	FINANCE	COMMUNITY	TOTAL
SHARE%	19.11	0.07	19.89	0.99	10.00	12.89	10.98	3.47	22.71	100.00
LEVEL	19.67	0.07	20.68	1.03	10.40	13.35	11.37	3.61	23.62	104.00
NORTH										
Chitipa	0.12	0.00	0.13	0.01	0.05	0.05	0.03	0.01	0.11	0.52
Karonga	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rumphi	0.34	0.00	0.04	0.01	0.08	0.14	0.03	0.00	0.16	0.98
Nkhata-Bay	0.31	0.00	0.07	0.01	0.05	0.12	0.04	0.01	0.11	0.81
Mzimba	0.70	0.00	0.52	0.08	1.08	0.71	0.49	0.12	1.42	5.16
Mzuzu	0.95	0.00	0.16	0.03	0.39	0.14	0.09	0.02	0.23	2.20
sum	2.47	0.00	0.91	0.14	1.57	1.16	0.67	0.15	1.99	9.64
CENTRAL										
Kasungu	0.36	0.00	0.07	0.02	0.13	0.25	0.04	0.03	0.25	1.31
Nkhotakota	0.68	0.00	0.09	0.01	0.15	0.05	0.03	0.01	0.16	1.41
Ntchisi	0.12	0.00	0.03	0.00	0.07	0.03	0.01	0.00	0.07	0.39
Dowa	0.54	0.00	0.07	0.01	0.07	0.18	0.04	0.01	0.14	1.26
Salima	0.49	0.00	0.22	0.01	0.12	0.31	0.21	0.02	0.32	1.81
Lilongwe	4.72	0.02	3.45	0.33	3.04	3.32	2.85	1.20	7.15	26.63
Mchinji	0.21	0.00	0.03	0.02	0.04	0.05	0.05	0.00	0.13	0.68
Dedza	1.18	0.00	0.34	0.01	0.09	0.13	0.02	0.01	0.24	2.41
Ntcheu	0.17	0.00	0.08	0.01	0.02	0.05	0.04	0.00	0.20	0.69
sum	8.49	0.03	4.36	0.41	3.72	4.43	3.31	1.27	8.65	36.76
SOUTHERN										
Mangochi	0.97	0.00	0.33	0.02	0.14	0.32	0.39	0.03	0.31	2.68
Machinga	0.88	0.00	0.23	0.03	0.16	0.33	0.23	0.02	0.44	2.61
Zomba	0.82	0.01	0.77	0.03	0.34	0.59	0.19	0.10	1.90	4.84
Chiradzulu	0.05	0.00	0.00	0.00	0.02	0.00	0.01	0.00	0.05	0.17
Blantyre	3.18	0.02	13.95	0.36	4.17	5.96	6.32	2.01	9.40	40.49
Mwanza	0.32	0.00	0.01	0.00	0.03	0.05	0.01	0.00	0.10	0.66
Thyolo	0.41	0.00	0.11	0.00	0.08	0.22	0.11	0.00	0.18	1.25
Mulanje	0.55	0.00	0.10	0.01	0.04	0.17	0.10	0.02	0.20	1.39
Chikawa	0.70	0.00	0.09	0.01	0.09	0.10	0.08	0.02	0.24	1.58
Nsanje	1.10	0.00	0.05	0.01	0.05	0.03	0.07	0.01	0.17	1.90
sum	8.87	0.04	15.46	0.49	5.10	7.77	7.42	2.19	12.97	57.60
TOTAL	19.67	0.07	20.68	1.03	10.40	13.35	11.37	3.61	23.62	104.00

SOURCE : AUTHOR'S ESTIMATES, FILENAME, EMPDIST5.WK3, SEPTEMBER 1995.

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TABLE 46

RURAL DISTRIBUTION OF MANYEARS LOSS DUE TO AIDS BY DISTRICT & BY INDUSTRY , MALAWI, 2005
(MAN-YEARS IN THOSANDS)

	AGRICULTURE	MINING	MANUFACTURING	ELEC&WATER	CONSTRUCTION	TRADE	TRANSPORT	FINANCE	COMMUNITY	TOTAL
SHARE%	90.12	0.01	2.13	0.04	1.76	1.73	1.12	0.04	3.06	100.00
LEVEL	979.80	0.07	23.12	0.42	19.12	18.80	12.17	0.43	33.26	1087.20
NORTH										
Chitipa	11.22	0.00	0.25	0.00	0.16	0.09	0.05	0.00	0.54	12.33
Karonga	16.66	0.00	0.24	0.01	0.36	0.30	0.19	0.01	0.74	18.51
Rumphi	10.82	0.00	0.21	0.01	0.61	0.22	0.12	0.01	0.65	12.47
Nkhata-Bay	16.67	0.00	0.61	0.02	0.85	0.40	0.21	0.01	0.74	19.46
Mzimba	51.12	0.00	0.72	0.02	1.42	0.86	0.44	0.01	1.91	56.46
Nkhata	0.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.68
sum	107.19	0.01	2.23	0.06	3.39	1.94	1.01	0.05	4.66	119.91
CENTRAL										
Kasungu	44.09	0.00	0.33	0.01	0.70	0.57	0.16	0.01	1.16	47.57
Nkhotakota	17.89	0.00	1.99	0.01	0.34	0.70	0.11	0.01	0.56	21.41
Ntchisi	17.89	0.00	0.07	0.00	0.06	0.10	0.05	0.00	0.27	18.73
Dowa	48.57	0.00	0.21	0.01	0.21	0.39	0.25	0.01	0.67	51.17
Salima	24.90	0.00	0.56	0.01	0.61	0.67	0.35	0.01	1.17	28.32
Lilongwe	107.94	0.00	0.92	0.05	1.23	1.00	1.09	0.04	3.10	115.86
Mchinji	36.66	0.00	0.16	0.01	0.35	0.49	0.23	0.01	0.72	39.03
Dedza	52.73	0.01	1.09	0.01	0.99	0.54	0.40	0.01	1.37	57.59
Ntcheu	43.96	0.01	0.66	0.02	0.93	0.47	0.65	0.02	1.64	48.44
sum	394.42	0.03	5.96	0.12	5.44	5.11	3.26	0.11	10.84	427.95
SOUTHERN										
Mangochi	66.61	0.00	1.44	0.01	1.24	2.13	0.63	0.02	1.76	76.11
Machinga	75.52	0.00	1.41	0.01	1.29	1.49	0.79	0.01	1.74	82.46
Zomba	55.99	0.01	1.66	0.07	2.09	1.69	0.77	0.03	2.54	64.66
Chiradzulu	26.01	0.00	1.23	0.02	0.76	0.75	0.76	0.03	1.39	32.47
Blantyre	26.01	0.01	1.99	0.07	1.56	1.40	2.14	0.09	2.61	36.03
Mwanza	17.57	0.00	0.12	0.01	0.28	0.16	0.06	0.00	0.59	18.66
Thyolo	54.35	0.00	2.36	0.01	1.16	0.86	1.09	0.04	2.55	61.90
Mulanje	81.90	0.01	2.86	0.02	1.35	2.20	0.95	0.03	2.93	92.35
Chikawa	45.31	0.00	1.51	0.01	0.31	0.47	0.30	0.02	0.95	49.37
Nsanje	22.61	0.00	0.34	0.00	0.24	0.47	0.43	0.00	0.85	25.06
sum	476.16	0.04	14.93	0.24	10.30	11.77	7.69	0.27	17.85	539.34
TOTAL	979.80	0.07	23.12	0.42	19.12	18.80	12.17	0.43	33.26	1087.20

SOURCE : AUTHOR'S ESTIMATES, FILENAME, EMPDIST5.WK3, SEPTEMBER 1995.

TABLE 49

URBAN DISTRIBUTION OF MANYEARS LOSS DUE TO AIDS BY DISTRICT & BY INDUSTRY , MALAWI, 2005

	AGRICULTURE	MINING	MANUFACTURING	ELEC&WATER	CONSTRUCTION	TRADE	TRANSPORT	FINANCE	COMMUNITY	TOTAL
SHARE%	19.11	0.07	19.89	0.99	10.00	12.85	10.98	3.47	22.71	100.00
LEVEL	49.79	0.17	51.83	2.58	26.07	33.44	28.49	9.04	59.18	260.60
NORTH										
Chitipa	0.30	0.00	0.32	0.02	0.14	0.13	0.06	0.02	0.27	1.29
Karonga	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rumphi	0.58	0.00	0.11	0.02	0.19	0.38	0.07	0.00	0.40	2.40
Nkhata-Bay	0.76	0.00	0.17	0.02	0.11	0.29	0.11	0.01	0.26	2.03
Mzimba	1.75	0.00	1.91	0.21	2.70	1.79	1.23	0.30	3.56	12.94
Mzuzu	2.38	0.00	0.39	0.06	0.82	0.35	0.22	0.06	0.56	5.50
sum	6.16	0.00	2.29	0.34	3.93	2.90	1.68	0.39	4.99	24.15
CENTRAL										
Kasungu	0.90	0.00	0.19	0.04	0.33	0.63	0.11	0.06	0.62	3.27
Nkhotakota	1.70	0.00	0.23	0.03	0.37	0.14	0.06	0.02	0.41	3.53
Ntchisi	0.30	0.00	0.06	0.00	0.16	0.07	0.01	0.00	0.17	0.80
Dowa	1.36	0.00	0.17	0.02	0.16	0.45	0.11	0.01	0.35	3.17
Salima	1.22	0.01	0.55	0.01	0.30	0.77	0.53	0.04	0.61	4.54
Lilongwe	11.82	0.06	8.64	0.82	7.61	8.33	7.22	3.02	17.91	67.24
Mchinji	0.53	0.00	0.06	0.05	0.11	0.20	0.12	0.01	0.34	1.69
Dedza	2.97	0.01	0.66	0.02	0.23	0.32	0.04	0.03	0.61	6.05
Ntcheu	0.42	0.00	0.19	0.02	0.06	0.20	0.09	0.01	0.51	1.73
sum	21.26	0.08	10.96	1.02	9.33	11.10	8.26	3.16	21.66	92.12
SOUTHERN										
Mangochi	2.42	0.00	0.53	0.04	0.36	0.60	0.97	0.06	0.76	6.71
Machinga	2.21	0.00	0.57	0.07	0.41	0.82	0.56	0.05	1.09	6.55
Zomba	1.29	0.02	1.92	0.06	0.65	1.46	0.47	0.26	4.76	12.14
Chiradzulu	0.14	0.00	0.01	0.00	0.04	0.01	0.01	0.00	0.12	0.41
Blantyre	7.97	0.06	34.96	0.96	10.44	14.99	15.63	5.03	23.56	101.45
Mwanza	0.80	0.00	0.04	0.01	0.06	0.14	0.02	0.00	0.26	1.71
Thyolo	1.05	0.00	0.27	0.01	0.20	0.56	0.29	0.00	0.46	3.14
Mulanje	1.37	0.00	0.26	0.03	0.11	0.42	0.25	0.05	0.51	3.49
Chikawa	1.76	0.00	0.23	0.01	0.24	0.25	0.15	0.06	0.61	3.96
Nsanje	2.75	0.00	0.12	0.02	0.13	0.05	0.19	0.03	0.43	4.76
sum	22.22	0.09	38.75	1.22	12.77	19.46	18.55	5.49	32.51	144.33
TOTAL	49.79	0.17	51.83	2.58	26.07	33.44	28.49	9.04	59.18	260.60

SOURCE : AUTHOR'S ESTIMATES, FILENAME, EMPDIST5.WK3, SEPTEMBER 1995.

TABLE 50 RURAL DISTRIBUTION OF MANYEARS LOSS DUE TO AIDS BY DISTRICT & BY INDUSTRY , MALAWI, 2010
(MAN-YEARS IN THOSANDS)

	AGRICULTURE	MINING	MANUFACTURING	ELEC&WATER	CONSTRUCTION	TRADE	TRANSPORT	FINANCE	COMMUNITY	TOTAL
SHARE%	90.12	0.01	2.13	0.04	1.76	1.73	1.12	0.04	3.06	100.00
LEVEL	1181.49	0.09	27.86	0.50	23.06	22.67	14.67	0.51	40.11	1311.00
NORTH										
Chitipa	13.53	0.00	0.30	0.00	0.20	0.10	0.06	0.00	0.65	14.88
Karonga	20.11	0.00	0.29	0.02	0.43	0.36	0.23	0.02	0.90	22.32
Rumphi	13.04	0.00	0.25	0.01	0.74	0.27	0.14	0.01	0.78	15.04
Nkhata-Bay	20.11	0.00	0.96	0.02	1.03	0.48	0.25	0.01	0.89	23.47
Mzimba	61.65	0.00	0.57	0.02	1.71	1.12	0.54	0.02	2.30	68.09
Mzuzu	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.82
sum	129.25	0.01	2.66	0.07	4.09	2.34	1.22	0.05	5.53	144.59
CENTRAL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Kasungu	53.16	0.00	0.40	0.01	0.84	0.69	0.19	0.02	1.39	57.13
Nkhotakota	21.22	0.00	2.40	0.01	0.41	0.85	0.13	0.01	0.67	25.82
Ntchisi	21.56	0.00	0.09	0.00	0.10	0.12	0.06	0.00	0.32	22.59
Dowa	58.57	0.00	0.25	0.01	0.26	0.47	0.31	0.01	1.05	61.70
Salima	30.03	0.00	0.67	0.01	0.74	1.05	0.42	0.01	1.41	34.15
Lilongwe	130.16	0.00	1.10	0.06	1.48	1.21	1.31	0.05	3.74	139.73
Mchinji	44.24	0.00	0.20	0.01	0.42	0.59	0.27	0.02	0.87	47.07
Dedza	63.56	0.01	1.31	0.01	1.20	0.65	0.48	0.01	1.66	68.45
Ntcheu	53.01	0.01	0.82	0.03	1.12	0.56	0.78	0.02	1.97	58.42
sum	475.61	0.04	7.21	0.15	6.55	6.16	3.95	0.14	13.07	516.04
SOUTHERN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mangochi	82.74	0.00	1.73	0.01	1.49	2.57	0.75	0.03	2.15	91.78
Machinga	91.06	0.00	1.70	0.01	1.55	1.72	0.95	0.02	2.10	99.45
Zomba	67.51	0.01	2.00	0.09	2.82	2.28	0.92	0.03	3.06	77.97
Chiradzulu	33.78	0.00	1.49	0.02	0.94	0.91	0.91	0.03	1.67	39.16
Blantyre	33.78	0.01	2.40	0.08	1.88	1.69	2.57	0.10	3.14	43.45
Mwanza	21.16	0.00	0.14	0.02	0.34	0.19	0.07	0.00	0.64	22.77
Thyolo	65.54	0.01	2.67	0.02	1.43	1.06	1.31	0.04	3.07	74.64
Mulanje	98.76	0.01	3.45	0.02	1.63	2.65	1.16	0.03	3.54	111.36
Chikawa	54.64	0.00	1.63	0.01	0.37	0.57	0.36	0.02	1.14	59.53
Neanja	27.51	0.00	0.41	0.01	0.29	0.56	0.52	0.00	1.03	30.25
sum	576.59	0.04	15.01	0.29	12.42	14.19	9.51	0.32	21.52	650.36
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	1181.49	0.09	27.86	0.50	23.06	22.67	14.67	0.51	40.11	1311.00

SOURCE : AUTHOR'S ESTIMATES, FILENAME, EMPDIST5.WK3, SEPTEMBER 1995.

TABLE 51 URBAN DISTRIBUTION OF MANYEARS LOSS DUE TO AIDS BY DISTRICT & BY INDUSTRY , MALAWI, 2010

	AGRICULTURE	MINING	MANUFACTURING	ELEC&WATER	CONSTRUCTION	TRADE	TRANSPORT	FINANCE	COMMUNITY	TOTAL
SHARE%	19.11	0.07	19.89	0.99	10.00	12.83	10.93	3.47	22.71	100.00
LEVEL	65.82	0.23	68.52	3.42	34.46	44.21	37.67	11.95	78.24	344.50
NORTH										
Chitipa	0.40	0.00	0.42	0.03	0.18	0.17	0.09	0.02	0.35	1.71
Karonga	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rumphi	1.14	0.00	0.15	0.02	0.26	0.47	0.09	0.00	0.53	3.17
Nkhata-Bay	1.03	0.00	0.22	0.02	0.15	0.36	0.14	0.02	0.35	2.68
Mzimba	2.31	0.00	1.79	0.27	3.57	2.37	1.63	0.39	4.70	17.10
Mzuzu	3.15	0.00	0.51	0.11	1.09	0.46	0.30	0.08	0.75	7.27
sum	8.18	0.01	3.02	0.45	5.20	3.88	2.22	0.51	6.60	31.83
CENTRAL										
Kasungu	1.19	0.00	0.25	0.05	0.44	0.63	0.14	0.08	0.82	4.33
Nkhotakota	2.24	0.00	0.31	0.04	0.49	0.18	0.10	0.03	0.54	4.68
Ntchisi	0.40	0.00	0.11	0.00	0.24	0.09	0.02	0.00	0.23	1.19
Dowa	1.79	0.00	0.23	0.03	0.22	0.59	0.14	0.02	0.46	4.19
Salima	1.61	0.01	0.72	0.02	0.40	1.02	0.71	0.05	1.07	6.00
Lilongwe	15.82	0.08	11.42	1.09	10.08	11.01	9.54	3.99	23.67	86.69
Mchinji	0.71	0.00	0.11	0.08	0.14	0.27	0.16	0.01	0.46	2.24
Dedza	3.92	0.01	1.13	0.03	0.30	0.42	0.05	0.03	0.81	8.00
Ntcheu	0.55	0.00	0.25	0.03	0.08	0.26	0.12	0.01	0.67	2.29
sum	28.13	0.10	14.51	1.35	12.33	14.68	10.95	4.20	28.68	121.78
SOUTHERN										
Mangochi	3.21	0.00	1.10	0.08	0.47	1.05	1.28	0.10	1.03	8.87
Machinga	2.92	0.01	0.75	0.09	0.54	1.08	0.77	0.07	1.44	8.68
Zomba	1.71	0.02	2.54	0.10	1.13	1.96	0.82	0.34	6.29	16.05
Chiradzulu	0.18	0.00	0.01	0.00	0.08	0.01	0.02	0.00	0.16	0.55
Blantyre	10.54	0.08	46.22	1.26	13.80	19.81	20.93	6.65	31.14	134.11
Mwanza	1.08	0.00	0.05	0.02	0.11	0.18	0.02	0.00	0.34	2.26
Thyolo	1.36	0.00	0.38	0.01	0.28	0.74	0.37	0.00	0.80	4.15
Mulanje	1.81	0.00	0.34	0.03	0.15	0.55	0.33	0.08	0.67	4.61
Chikawa	2.32	0.00	0.30	0.02	0.31	0.33	0.20	0.07	0.81	5.23
Neenje	3.64	0.00	0.16	0.02	0.17	0.10	0.25	0.04	0.57	6.30
sum	29.36	0.12	51.22	1.61	16.86	25.72	24.57	7.25	42.96	190.79
TOTAL	65.82	0.23	68.52	3.42	34.46	44.21	37.67	11.95	78.24	344.50

SOURCE : AUTHOR'S ESTMATES, FILENAME, EMPDIST5.WK3, SEPTEMBER 1995.

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STATISTICAL APPENDIX

DEMOGRAPHIC SIMULATIONS

MALAWI

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TABLE A

DEMPROJ PROJECTIONS OF MALAWI, 1987-2022
REFERENCE SOLUTION: MALAWI 3
(Without HIV-AIDS)

lawi 3
GION = Total

	1987	1992	1997	2002	2007	2012	2017	2022
pulation								
housands)								
tal	7988	9418	10858	12362	13924	15565	17248	18923
le	3867	4588	5316	6081	6878	7718	8579	9439
male	4121	4830	5542	6281	7045	7847	8668	9484
ban	853	1162	1552	2052	2686	3487	4469	5642
ral	7135	8257	9305	10310	11238	12078	12779	13280
4	1398	1938	2032	2140	2228	2319	2388	2417
14	2287	2534	2999	3594	3813	4029	4233	4418
-64	3969	4585	5457	6264	7495	8790	10097	11477
+	334	362	370	365	388	427	530	610
males 15-49	1820	2088	2499	2829	3381	3913	4449	5007
le %	48.4	48.7	49.0	49.2	49.4	49.6	49.7	49.9
male %	51.6	51.3	51.0	50.8	50.6	50.4	50.3	50.1
ban %	10.7	12.3	14.3	16.6	19.3	22.4	25.9	29.8
ral %	89.3	87.7	85.7	83.4	80.7	77.6	74.1	70.2
4 %	17.5	20.6	18.7	17.3	16.0	14.9	13.8	12.8
9 %	28.6	26.9	27.6	29.1	27.4	25.9	24.5	23.3
-64 %	49.7	48.7	50.3	50.7	53.8	56.5	58.5	60.7
+ %	4.2	3.8	3.4	3.0	2.8	2.7	3.1	3.2
males 15-49%	22.8	22.2	23.0	22.9	24.3	25.1	25.8	26.5
x ratio	93.8	95.0	95.9	96.8	97.6	98.3	99.0	99.5
pend. ratio	0.929	0.975	0.922	0.915	0.806	0.722	0.656	0.596
dian age	17.0	16.2	16.6	16.9	17.7	19.0	20.3	21.6

	87-92	92-97	97-02	02-07	07-12	12-17	17-22
nual Rates of Change							
R / 1000	53.9	47.8	43.3	39.3	36.0	32.9	29.9
R / 1000	21.1	19.4	17.4	15.6	13.8	12.4	11.4
I percent	3.3	2.8	2.6	2.4	2.2	2.1	1.9
percent	3.3	2.8	2.6	2.4	2.2	2.1	1.9

Demographic Projection Model
1/25/1995 14:12:47

A: 2

Demographic Indicators

lawi
GION = Urban

	1987	1992	1997	2002	2007	2012	2017	2022
pulation (housands)								
tal	853	1162	1552	2052	2686	3487	4469	5642
le	446	610	817	1082	1418	1843	2362	2981
male	407	552	736	971	1268	1645	2107	2662
-4	143	231	280	341	[illegible]	497	593	696
-14	231	301	409	570	700	860	1048	1268
-64	466	624	856	1134	1562	2114	2800	3645
+	14	5	7	9	13	16	27	33
males 15-49	195	260	359	471	652	881	1165	1514
le %	5.6	6.5	7.5	8.8	10.2	11.8	13.7	15.8
male %	5.1	5.9	6.8	7.9	9.1	10.6	12.2	14.1
-4 %	16.7	19.9	18.1	16.6	15.3	14.2	13.3	12.3
-9 %	27.1	25.9	26.3	27.8	26.1	24.7	23.4	22.5
-64 %	54.6	53.7	55.1	55.2	58.1	60.6	62.7	64.6
+ %	1.6	0.5	0.5	0.4	0.5	0.5	0.6	0.6
males 15-49%	22.9	22.3	23.1	23.0	24.3	25.3	26.1	26.8
x ratio	109.5	110.3	111.0	111.5	111.8	112.0	112.1	112.0
pend. ratio	0.804	0.852	0.805	0.803	0.711	0.642	0.586	0.539
dian age	18.0	16.9	17.3	17.7	18.4	19.6	20.6	21.7

	87-92	92-97	97-02	02-07	07-12	12-17	17-22
nual Rates of Change							
percent	6.1	5.8	5.5	5.3	5.2	4.9	4.6

Demographic Projection Model
1/25/1995 14:12:50
Demographic Indicators

lawi
GION = Rural

	1987	1992	1997	2002	2007	2012	2017	2022
pulation (housands)								
tal	7135	8257	9305	10310	11238	12078	12779	13280
le	3421	3979	4499	4999	5460	5875	6218	6458
male	3714	4278	4806	5311	5777	6203	6561	6822
4	1256	1707	1751	1799	1817	1822	1795	1721
-14	2056	2232	2590	3025	3113	3169	3185	3150
-64	3503	3961	4600	5130	5933	6676	7297	7832
+	320	356	363	356	375	410	503	578
males 15-49	1625	1828	2139	2358	2728	3032	3284	3492
le %	42.8	42.2	41.4	40.4	39.2	37.7	36.0	34.1
male %	46.5	45.4	44.3	43.0	41.5	39.9	38.0	36.1

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4 %	17.6	20.7	18.8	17.4	16.2	15.1	14.0	13.0
9 %	28.8	27.0	27.8	29.3	27.7	26.2	24.9	23.7
-64 %	49.1	48.0	49.4	49.8	52.8	55.3	57.1	59.0
+ %	4.5	4.3	3.9	3.5	3.3	3.4	3.9	4.3
males 15-49%	22.8	22.1	23.0	22.9	24.3	25.1	25.7	26.3
x ratio	92.1	93.0	93.6	94.1	94.5	94.7	94.8	94.7
pend. ratio	0.945	0.995	0.944	0.940	0.831	0.748	0.682	0.622
dian age	16.9	16.1	16.5	16.7	17.6	18.8	20.1	21.6

	87-92	92-97	97-02	02-07	07-12	12-17	17-22
nual Rates of Change							
percent	2.9	2.4	2.0	1.7	1.4	1.1	0.8

Demographic Projection Model
1/25/1995 14:12:52
Demographic Indicators

lawi
GION = Total

	87-92	92-97	97-02	02-07	07-12	12-17	17-22
rtility							
R	7.39	6.50	5.72	5.04	4.43	3.90	3.43
R	3.60	3.17	2.79	2.46	2.16	1.90	1.67
R	2.39	2.17	1.97	1.79	1.61	1.46	1.32
an age of ild bearing	28.5	28.2	27.9	27.9	28.0	27.9	27.4
W ratio	0.77	0.93	0.81	0.76	0.66	0.59	0.54

e distribution of fertility table = UN Sub-Saharan Africa

rtality							
le LE	42.5	44.4	46.3	48.2	50.2	52.1	54.0
male LE	45.7	47.4	49.1	50.8	52.6	54.3	56.0
tal LE	44.2	46.0	47.8	49.6	51.4	53.2	55.0
R	137.1	127.6	118.1	109.4	101.1	92.9	85.2
MR	232.3	215.6	198.9	183.0	167.5	152.3	138.3

fe table = Coale-Demeny North

migration housands)							
le immigrati	0.0	0.0	0.0	0.0	0.0	0.0	0.0
male immigra	0.0	0.0	0.0	0.0	0.0	0.0	0.0
tal immigrat	0.0	0.0	0.0	0.0	0.0	0.0	0.0

itial urban growth rate % = 6.5
itial rural growth rate % = 2.8

	87-92	92-97	97-02	02-07	07-12	12-17	17-22
rths and Deaths housands)							
rths	469.4	484.9	503.2	516.9	531.2	540.3	540.7
aths	183.5	197.1	202.3	204.7	202.9	203.9	205.7

Demographic Projection Model
1/25/1995 14:12:59
Population by Age
(Thousands)

lawi
EGION = Total)

	1987			1992			1997		
	TOTAL	MALES	FEMALES	TOTAL	MALES	FEMALES	TOTAL	MALES	FEMALES
TAL	7988.5	3867.2	4121.3	9418.4	4588.1	4830.3	10857.6	5316.0	5541.6
-4	1398.5	691.2	707.3	1937.9	979.7	958.2	2031.6	1029.0	1002.6
-9	1310.5	647.3	663.2	1266.9	624.6	642.3	1770.9	893.7	877.2
-14	976.5	494.3	482.2	1266.8	625.6	641.2	1228.1	605.4	622.7
-19	770.6	368.1	402.5	950.9	481.1	469.7	1235.9	610.1	625.8
-24	670.9	300.8	370.1	746.4	355.5	390.9	922.7	465.7	457.0
-29	590.4	281.6	308.8	646.0	288.3	357.7	720.2	341.6	378.6
-34	437.0	207.8	229.2	566.1	269.2	296.8	621.1	276.4	344.7
-39	424.7	203.0	221.7	416.8	197.8	219.0	541.4	257.0	284.4
-44	293.4	141.8	151.6	402.2	191.6	210.6	396.0	187.3	208.6
-49	268.1	131.9	136.2	275.5	132.2	143.2	379.0	179.5	199.6
-54	198.2	91.7	106.5	248.4	120.9	127.4	256.3	121.9	134.4
-59	175.7	85.7	90.0	179.6	82.0	97.6	226.1	108.8	117.3
-64	140.0	62.4	77.6	153.2	73.6	79.6	157.9	71.0	86.8
-69	334.0	159.6	174.4	114.8	50.3	64.5	126.7	59.9	66.7
-74	0.0	0.0	0.0	247.1	115.6	131.5	86.2	36.9	49.2
-79	0.0	0.0	0.0	0.0	0.0	0.0	157.6	71.6	86.0
80+	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	2002			2007			2012		
	TOTAL	MALES	FEMALES	TOTAL	MALES	FEMALES	TOTAL	MALES	FEMALES
TAL	12362.4	6081.1	6281.4	13923.6	6878.3	7045.3	15565.2	7717.8	7847.4
-4	2139.5	1085.7	1053.9	2227.6	1132.1	1095.5	2318.7	1180.4	1138.3
-9	1872.8	947.6	925.2	1988.4	1008.4	980.0	2086.7	1060.4	1026.3
-14	1721.3	868.7	852.6	1825.1	923.5	901.6	1942.7	985.3	957.4
-19	1200.3	591.5	608.7	1685.3	850.3	835.0	1789.9	905.5	884.4
-24	1201.6	591.7	609.9	1169.2	574.9	594.4	1644.7	828.0	816.7
-29	892.1	448.6	443.5	1164.6	571.5	593.1	1135.7	556.6	579.1
-34	694.1	328.4	365.6	861.8	432.5	429.4	1127.8	552.3	575.5
-39	595.9	264.7	331.2	667.7	315.4	352.3	831.3	416.5	414.8
-44	516.2	244.4	271.8	570.0	252.5	317.4	640.5	301.9	338.6

5-49	374.6	176.3	198.4	490.0	230.8	259.2	543.0	239.4	303.5
0-54	354.2	166.3	188.0	351.5	164.0	187.4	461.3	215.7	245.6
5-59	234.7	110.4	124.3	325.8	151.3	174.5	324.6	150.0	174.5
0-64	200.0	95.0	105.0	208.8	97.0	111.8	291.5	133.8	157.7
5-69	131.8	58.4	73.4	168.2	78.8	89.4	176.9	81.1	95.9
0-74	96.2	44.7	51.5	101.3	44.0	57.2	130.4	60.1	70.3
5-79	56.1	23.4	32.7	63.5	28.7	34.7	67.8	28.8	39.1
80+	81.0	35.4	45.6	54.9	22.5	32.4	51.6	21.8	29.8

Demographic Projection Model
1/25/1995 14:13:13
Population by Age
(Thousands)

lawi
EGION = Total)

E	2017			2022		
	TOTAL	MALES	FEMALES	TOTAL	MALES	FEMALES
TAL	17247.6	8579.2	8668.4	18922.8	9438.9	9483.8
0-4	2388.0	1217.4	1170.7	2417.1	1233.6	1183.5
5-9	2188.8	1114.4	1074.3	2269.5	1157.4	1112.1
0-14	2043.8	1038.7	1005.0	2148.4	1094.1	1054.3
5-19	1908.5	967.7	940.8	2011.0	1021.8	989.2
0-24	1750.0	883.5	866.6	1869.3	946.0	923.3
5-29	1600.8	803.6	797.2	1706.9	859.4	847.5
0-34	1102.5	539.3	563.2	1557.5	780.5	777.0
5-39	1090.9	533.5	557.4	1069.1	522.3	546.8
0-44	799.7	400.0	399.8	1052.4	513.8	538.6
5-49	612.0	287.3	324.6	766.3	382.0	384.3
0-54	513.1	224.7	288.4	580.1	270.7	309.4
5-59	427.8	198.3	229.5	478.0	207.5	270.4
0-64	292.0	133.5	158.5	386.8	177.5	209.3
5-69	248.7	112.7	136.0	250.9	113.4	137.6
0-74	138.5	62.5	76.0	196.7	87.9	108.8
5-79	88.4	39.9	48.6	95.3	42.1	53.2
80+	54.0	22.2	31.9	67.4	28.8	38.6

A:6

Demographic Projection Model
1/25/1995 14:13:15
Population by Age
(Thousands)

lawi
EGION = Urban)

E	1987			1992			1997		
	TOTAL	MALES	FEMALES	TOTAL	MALES	FEMALES	TOTAL	MALES	FEMALES
TAL	853.3	445.9	407.4	1161.9	609.5	552.4	1552.5	816.6	735.9
0-4	142.9	71.5	71.4	230.7	118.2	112.5	280.3	143.3	136.9
5-9	125.7	61.7	64.0	141.7	69.5	72.2	229.8	115.1	114.7
0-14	105.6	48.6	57.0	159.7	71.8	87.9	179.2	80.3	98.9
5-19	88.3	43.7	44.6	126.9	66.5	60.4	190.4	97.0	93.5
0-24	90.5	43.8	46.7	117.1	59.9	57.1	167.1	89.9	77.3
5-29	86.4	48.2	38.2	108.2	56.9	51.3	139.6	76.8	62.8
0-34	60.3	35.6	24.7	90.3	53.2	37.2	112.3	62.2	50.1
5-39	50.2	29.8	20.4	57.1	33.6	23.5	85.5	50.0	35.5
0-44	31.7	19.9	11.8	50.3	31.2	19.1	57.1	34.9	22.2
5-49	24.7	15.8	8.9	29.4	18.4	11.0	46.7	28.8	17.9
0-54	15.3	9.5	5.8	22.8	14.6	8.1	27.1	17.0	10.1
5-59	10.9	6.8	4.1	12.8	7.6	5.2	19.1	11.7	7.4
0-64	7.2	3.9	3.3	9.4	5.4	4.0	11.2	6.1	5.1
5-69	13.6	7.1	6.5	5.5	2.6	2.8	7.1	3.7	3.5
0-74	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5-79	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
80+	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

E	2002			2007			2012		
	TOTAL	MALES	FEMALES	TOTAL	MALES	FEMALES	TOTAL	MALES	FEMALES
TAL	2052.3	1081.8	970.5	2685.9	1418.0	1267.9	3487.1	1842.6	1644.6
0-4	340.5	174.3	166.3	410.8	209.5	201.4	496.8	252.5	244.3
5-9	280.8	140.9	139.9	346.1	173.2	172.9	422.8	211.1	211.7
0-14	288.8	133.0	155.8	354.2	163.2	191.0	437.1	201.6	235.6
5-19	212.7	107.9	104.8	345.1	178.1	167.0	424.0	218.2	205.8
0-24	248.7	130.3	118.4	277.7	144.2	133.5	449.5	237.0	212.4
5-29	198.9	114.4	84.5	295.8	164.9	130.9	330.0	181.9	148.1
0-34	145.1	83.8	61.3	208.6	124.9	83.7	311.3	180.6	130.7
5-39	106.6	58.7	47.9	139.2	79.7	59.5	202.1	120.0	82.1
0-44	85.6	52.0	33.5	107.3	61.4	46.0	141.5	83.8	57.7
5-49	53.2	32.4	20.7	80.6	48.7	31.9	102.3	58.1	44.1
0-54	43.2	26.7	16.5	49.8	30.4	19.4	76.4	46.2	30.2
5-59	23.0	13.8	9.2	37.2	22.0	15.2	43.5	25.4	18.2
0-64	16.7	9.5	7.2	20.4	11.3	9.1	33.6	18.2	15.4
5-69	8.6	4.2	4.5	13.1	6.6	6.4	16.3	8.0	8.2
0-74	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

A:7

-79	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
80+	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Demographic Projection Model
1/25/1995 14:13:27
Population by Age
(Thousands)

awi
GION = Urban)

	2017			2022		
	TOTAL	MALES	FEMALES	TOTAL	MALES	FEMALES
AL	4468.7	2361.7	2107.0	5642.4	2980.7	2661.6
-4	593.4	300.2	293.1	696.1	350.5	345.6
-9	515.6	256.6	259.0	621.3	308.0	313.3
-14	532.2	245.5	286.7	646.9	298.5	348.3
-19	521.9	267.4	254.5	634.1	323.2	310.9
-24	548.0	287.4	260.6	669.3	348.7	320.6
-29	531.9	295.9	236.0	645.4	355.6	289.9
-34	347.6	198.7	148.9	562.0	323.1	238.9
-39	303.7	174.6	129.1	341.9	193.7	148.3
-44	206.5	126.4	80.2	311.6	184.4	127.2
-49	135.8	80.0	55.8	200.0	121.7	78.3
-54	97.6	55.5	42.1	130.8	77.0	53.8
-59	67.5	39.0	28.5	87.7	47.5	40.2
-64	39.7	21.3	18.5	62.4	33.2	29.2
-69	27.2	13.2	14.0	32.8	15.7	17.0
-74	0.0	0.0	0.0	0.0	0.0	0.0
-79	0.0	0.0	0.0	0.0	0.0	0.0
80+	0.0	0.0	0.0	0.0	0.0	0.0

Demographic Projection Model
1/25/1995 14:13:28
Population by Age
(Thousands)

alawi
REGION = Rural)

GE	1987 TOTAL	1987 MALES	1987 FEMALES	1992 TOTAL	1992 MALES	1992 FEMALES	1997 TOTAL	1997 MALES	1997 FEMALES
OTAL	7135.2	3421.3	3713.9	8256.5	3978.6	4277.9	9305.1	4499.4	4805.7
0-4	1255.6	619.7	635.9	1707.1	861.5	845.7	1751.4	885.7	865.7
5-9	1184.8	585.6	599.2	1125.2	555.1	570.1	1541.1	778.7	762.4
10-14	870.9	445.7	425.2	1107.1	553.8	553.3	1048.8	525.1	523.7
15-19	682.3	324.4	357.9	824.0	414.7	409.3	1045.4	513.1	532.3
20-24	580.4	257.0	323.4	629.3	295.6	333.8	755.5	375.8	379.7
25-29	504.0	233.4	270.6	537.8	231.4	306.4	580.6	264.9	315.7
30-34	376.7	172.2	204.5	475.7	216.1	259.7	508.8	214.2	294.5
35-39	374.5	173.2	201.3	359.7	164.2	195.5	455.9	207.1	248.9
40-44	261.7	121.9	139.8	351.9	160.4	191.4	338.9	152.4	186.5
45-49	243.4	116.1	127.3	246.1	113.8	132.3	332.4	150.7	181.7
50-54	182.9	82.2	100.7	225.6	106.3	119.3	229.2	104.9	124.4
55-59	164.8	78.9	85.9	166.8	74.4	92.4	207.0	97.1	109.9
60-64	132.8	58.5	74.3	143.9	68.2	75.6	146.7	65.0	81.7
65-69	320.4	152.5	167.9	109.3	47.6	61.7	119.6	56.3	63.3
70-74	0.0	0.0	0.0	247.1	115.6	131.5	86.2	36.9	49.2
75-79	0.0	0.0	0.0	0.0	0.0	0.0	157.6	71.6	86.0
80+	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

E	2002 TOTAL	2002 MALES	2002 FEMALES	2007 TOTAL	2007 MALES	2007 FEMALES	2012 TOTAL	2012 MALES	2012 FEMALES
TAL	10310.1	4999.3	5310.8	11237.7	5460.3	5777.4	12078.1	5875.2	6202.8
0-4	1799.0	911.4	887.6	1816.8	922.6	894.2	1822.0	927.9	894.0
5-9	1592.0	806.7	785.3	1642.3	835.2	807.1	1663.9	849.3	814.6
0-14	1432.5	735.8	696.8	1470.9	760.3	710.5	1505.5	783.8	721.8
15-19	987.5	483.6	504.0	1340.2	672.2	668.0	1365.9	687.3	678.6
0-24	952.9	461.4	491.5	891.5	430.6	460.9	1195.2	591.0	604.2
5-29	693.2	334.3	359.0	868.8	406.6	462.2	805.7	374.7	430.9
0-34	549.0	244.6	304.3	653.2	307.6	345.6	816.5	371.7	444.7
35-39	489.3	206.0	283.3	528.5	235.7	292.8	629.2	296.5	332.7
0-44	430.6	192.4	238.3	462.7	191.2	271.5	499.0	218.1	280.9
5-49	321.5	143.8	177.6	409.4	182.1	227.3	440.7	181.3	259.4
50-54	311.0	139.5	171.5	301.7	133.6	168.0	384.9	169.5	215.4
5-59	211.7	96.6	115.1	288.6	129.4	159.2	281.1	124.7	156.4
0-64	183.3	85.6	97.7	188.4	85.7	102.7	257.9	115.6	142.3
65-69	123.2	54.2	69.0	155.1	72.2	83.0	160.6	73.0	87.6
70-74	96.2	44.7	51.5	101.3	44.0	57.2	130.4	60.1	70.3
5-79	56.1	23.4	32.7	63.5	28.7	34.7	67.8	28.8	39.1
80+	81.0	35.4	45.6	54.9	22.5	32.4	51.6	21.8	29.8

A:9

Demographic Projection Model
1/25/1995 14:13:36
Population by Age
(Thousands)

lawi
EGION = Rural)

E	2017 TOTAL	2017 MALES	2017 FEMALES	2022 TOTAL	2022 MALES	2022 FEMALES
TAL	12778.9	6217.6	6561.3	13280.4	6458.2	6822.2
0-4	1794.7	917.1	877.5	1721.0	883.1	837.9
5-9	1673.1	857.8	815.3	1648.2	849.4	798.8
0-14	1511.6	793.2	718.3	1501.6	795.6	706.0
5-19	1386.6	700.4	686.2	1376.9	698.6	678.3
0-24	1202.1	596.1	605.9	1199.9	597.3	602.7
5-29	1069.0	507.7	561.2	1061.5	503.9	557.6
0-34	754.8	340.6	414.3	995.5	457.4	538.1
5-39	787.2	358.9	428.3	727.2	328.6	398.6
0-44	593.2	273.6	319.6	740.8	329.5	411.3
5-49	476.2	207.4	268.8	566.3	260.3	306.0
0-54	415.5	169.2	246.3	449.2	193.7	255.5
5-59	360.3	159.3	201.0	390.3	160.0	230.3
0-64	252.2	112.2	140.0	324.4	144.3	180.1
5-69	221.5	99.5	122.0	218.2	97.6	120.5
0-74	138.5	62.5	76.0	196.7	87.9	108.8
5-79	88.4	39.9	48.6	95.3	42.1	53.2
80+	54.0	22.2	31.9	67.4	28.8	38.6

TABLE B

DEMPROJ PROJECTIONS OF MALAWI, 1987-2022
IMPROVED SOLUTION: MALAWI4
(Without HIV-AIDS)

lawi4
GION = Total

	1987	1992	1997	2002	2007	2012	2017	2022
pulation								
housands)								
tal	7988	9418	10858	12361	13332	15330	16859	18448
le	3867	4588	5316	6081	6831	7598	8381	9199
male	4121	4830	5542	6281	7001	7732	8477	9250
ban	853	1220	1689	2282	2995	3844	4870	6103
ral	7135	8199	9169	10080	10837	11487	11988	12345
4	1398	1938	2032	2136	2123	2124	2145	2187
14	2287	2534	2999	3595	3818	3953	3997	4074
-64	3969	4585	5457	6265	7502	8820	10172	11546
+	334	362	370	365	389	433	544	641
males 15-49	1820	2088	2499	2829	3384	3925	4480	5025
le %	48.4	48.7	49.0	49.2	49.4	49.6	49.7	49.9
male %	51.6	51.3	51.0	50.8	50.6	50.4	50.3	50.1
ban %	10.7	13.0	15.6	18.5	21.7	25.1	28.9	33.1
ral %	89.3	87.0	84.4	81.5	78.3	74.9	71.1	66.9
4 %	17.5	20.6	18.7	17.3	15.3	13.9	12.7	11.9
9 %	28.6	26.9	27.6	29.1	27.6	25.8	23.7	22.1
-64 %	49.7	48.7	50.3	50.7	54.2	57.5	60.3	62.6
+ %	4.2	3.8	3.4	3.0	2.8	2.8	3.2	3.5
males 15-49%	22.8	22.2	23.0	22.9	24.5	25.6	26.6	27.2
x ratio	93.8	95.0	95.9	96.8	97.6	98.3	98.9	99.4
pend. ratio	0.929	0.975	0.922	0.915	0.792	0.689	0.604	0.542
dian age	17.0	16.2	16.6	16.9	17.9	19.4	21.0	22.7

	87-92	92-97	97-02	02-07	07-12	12-17	17-22
nual Rates of Change							
R / 1000	53.9	47.8	43.3	37.5	33.0	29.6	26.9
R / 1000	21.1	19.4	17.3	15.0	12.4	10.6	8.9
I percent	3.3	2.8	2.6	2.2	2.1	1.9	1.8
percent	3.3	2.8	2.6	2.2	2.1	1.9	1.8

Demographic Projection Model
1/25/1995 14:08:44

Demographic Indicators

lawi4
GION = Urban

	1987	1992	1997	2002	2007	2012	2017	2022
pulation								
housands)								
tal	853	1220	1689	2282	2995	3844	4870	6103
le	446	640	887	1201	1578	2026	2567	3215
male	407	580	801	1081	1417	1818	2304	2888
4	143	242	305	379	441	511	596	702
14	231	317	446	635	789	948	1109	1305
-64	466	655	930	1258	1750	2366	3134	4058
+	14	6	8	10	15	19	32	39
males 15-49	195	273	391	524	734	991	1312	1695
le %	5.6	6.8	8.2	9.7	11.4	13.2	15.2	17.4
male %	5.1	6.2	7.4	8.7	10.2	11.9	13.7	15.7
4 %	16.7	19.9	18.1	16.6	14.7	13.3	12.2	11.5
9 %	27.1	26.0	26.4	27.8	26.4	24.7	22.8	21.4
-64 %	54.6	53.7	55.1	55.1	58.4	61.6	64.3	66.5
+ %	1.6	0.5	0.5	0.4	0.5	0.5	0.7	0.6
males 15-49%	22.9	22.4	23.2	23.0	24.5	25.8	26.9	27.8
x ratio	109.5	110.2	110.7	111.1	111.3	111.5	111.4	111.3
pend. ratio	0.804	0.854	0.808	0.806	0.703	0.617	0.544	0.495
dian age	18.0	16.9	17.3	17.7	18.5	19.9	21.2	22.4

	87-92	92-97	97-02	02-07	07-12	12-17	17-22
nual Rates of Change							
percent	7.1	6.4	6.0	5.4	5.0	4.7	4.5

Demographic Projection Model
1/25/1995 14:08:47
Demographic Indicators

lawi4
GION = Rural

	1987	1992	1997	2002	2007	2012	2017	2022
pulation								
housands)								
tal	7135	8199	9169	10080	10837	11487	11988	12345
le	3421	3949	4429	4880	5253	5572	5814	5984
male	3714	4250	4740	5200	5584	5915	6174	6361
4	1256	1695	1726	1757	1682	1613	1549	1485
-14	2056	2217	2553	2960	3029	3005	2889	2769
-64	3503	3930	4527	5007	5752	6454	7038	7489
+	320	356	363	356	374	414	513	602
males 15-49	1625	1815	2108	2305	2650	2934	3168	3331
le %	42.8	41.9	40.8	39.5	38.0	36.3	34.5	32.4
male %	46.5	45.1	43.7	42.1	40.4	38.6	36.6	34.5

4 %	17.6	20.7	18.8	17.4	15.5	14.0	12.9	12.0
9 %	28.8	27.0	27.8	29.4	27.9	26.2	24.1	22.4
-64 %	49.1	47.9	49.4	49.7	53.1	56.2	58.7	60.7
+ %	4.5	4.3	4.0	3.5	3.5	3.6	4.3	4.9
males 15-49%	22.8	22.1	23.0	22.9	24.5	25.5	26.4	27.0
x ratio	92.1	92.9	93.4	93.8	94.1	94.2	94.2	94.1
pend. ratio	0.945	0.996	0.945	0.942	0.819	0.716	0.630	0.568
dian age	16.9	16.1	16.5	16.7	17.7	19.3	21.0	22.9

	87-92	92-97	97-02	02-07	07-12	12-17	17-22
nual Rates of Change							
percent	2.8	2.2	1.9	1.4	1.2	0.9	0.6

Demographic Projection Model
1/25/1995 14:08:49
Demographic Indicators

awi4
GION = Total

	87-92	92-97	97-02	02-07	07-12	12-17	17-22
rtility							
R	7.39	6.50	5.71	4.78	4.00	3.42	3.00
	3.60	3.17	2.79	2.33	1.95	1.67	1.46
	2.39	2.17	1.97	1.71	1.50	1.34	1.23
an age of							
ild bearing	28.5	28.2	27.9	27.9	28.0	27.9	27.4
ratio	0.77	0.93	0.81	0.76	0.63	0.54	0.48

e distribution of fertility table = UN Sub-Saharan Africa

tality							
le LE	42.5	44.4	46.4	48.8	52.0	55.2	59.0
ale LE	45.7	47.4	49.2	51.5	54.4	57.4	61.0
al LE	44.2	46.0	47.8	50.2	53.2	56.3	60.0
R	137.1	127.6	117.6	106.7	93.0	79.9	65.2
MR	232.3	215.6	198.1	177.9	152.4	128.7	102.3

e table = Coale-Demeny North

migration							
ousands)							
e immigrati	0.0	0.0	0.0	0.0	0.0	0.0	0.0
male immigra	0.0	0.0	0.0	0.0	0.0	0.0	0.0
al immigrat	0.0	0.0	0.0	0.0	0.0	0.0	0.0

itial urban growth rate % = 8.0
itial rural growth rate % = 2.7

	87-92	92-97	97-02	02-07	07-12	12-17	17-22
ths and Deaths							
ousands)							
rths	469.4	484.9	502.2	490.5	480.6	476.1	475.4
ths	183.5	197.1	201.4	196.4	180.9	170.5	157.4

Demographic Projection Model
1/25/1995 14:08:56
Population by Age
(Thousands)

lawi4
EGION = Total)

	1987			1992			1997		
E	TOTAL	MALES	FEMALES	TOTAL	MALES	FEMALES	TOTAL	MALES	FEMALES
TAL	7988.5	3867.2	4121.3	9418.4	4588.1	4830.3	10857.6	5316.0	5541.6
0-4	1398.5	691.2	707.3	1937.9	979.7	958.2	2031.6	1029.0	1002.6
5-9	1310.5	647.3	663.2	1266.9	624.6	642.3	1770.9	893.7	877.2
0-14	976.5	494.3	482.2	1266.8	625.6	641.2	1228.1	605.4	622.7
5-19	770.6	368.1	402.5	950.9	481.1	469.7	1235.9	610.1	625.8
0-24	670.9	300.8	370.1	746.4	355.5	390.9	922.7	465.7	457.0
5-29	590.4	281.6	308.8	646.0	288.3	357.7	720.2	341.6	378.6
0-34	437.0	207.8	229.2	566.1	269.2	296.8	621.1	276.4	344.7
5-39	424.7	203.0	221.7	416.8	197.8	219.0	541.4	257.0	284.4
0-44	293.4	141.8	151.6	402.2	191.6	210.6	396.0	187.3	208.6
5-49	268.1	131.9	136.2	275.5	132.2	143.2	379.0	179.5	199.6
0-54	198.2	91.7	106.5	248.4	120.9	127.4	256.3	121.9	134.4
5-59	175.7	85.7	90.0	179.6	82.0	97.6	226.1	108.8	117.3
0-64	140.0	62.4	77.6	153.2	73.6	79.6	157.9	71.0	86.8
5-69	334.0	159.6	174.4	114.8	50.3	64.5	126.7	59.9	66.7
0-74	0.0	0.0	0.0	247.1	115.6	131.5	86.2	36.9	49.2
5-79	0.0	0.0	0.0	0.0	0.0	0.0	157.6	71.6	86.0
80+	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	2002			2007			2012		
E	TOTAL	MALES	FEMALES	TOTAL	MALES	FEMALES	TOTAL	MALES	FEMALES
TAL	12361.3	6080.5	6280.8	13831.9	6831.0	7000.8	15330.4	7598.0	7732.4
0-4	2136.3	1084.1	1052.3	2122.7	1078.8	1043.9	2124.0	1082.1	1041.9
5-9	1873.5	948.0	925.6	1990.7	1009.4	981.3	2003.7	1018.1	985.6
0-14	1721.5	868.8	852.7	1827.3	924.6	902.8	1949.7	988.6	961.0
5-19	1200.4	591.6	608.8	1686.4	850.8	835.6	1795.2	908.0	887.2
0-24	1201.7	591.8	610.0	1170.1	575.3	594.8	1648.9	830.1	818.8
5-29	892.2	448.7	443.5	1165.5	572.0	593.6	1138.9	558.2	580.7
0-34	694.2	328.5	365.7	862.6	432.8	429.8	1131.4	554.1	577.3
5-39	596.0	264.8	331.2	668.4	315.7	352.7	834.3	418.0	416.3
0-44	516.3	244.4	271.8	570.6	252.8	317.8	643.1	303.1	340.0

45-49	374.7	176.3	198.4	490.6	231.1	259.5	545.3	240.5	304.8
50-54	354.3	166.3	188.0	351.9	164.3	187.6	463.4	216.8	246.6
55-59	234.7	110.4	124.3	326.3	151.6	174.7	326.3	151.0	175.4
60-64	200.1	95.1	105.0	209.2	97.2	112.0	293.5	134.8	158.7
65-69	131.9	58.4	73.5	168.6	79.0	89.7	178.5	81.8	96.7
70-74	96.2	44.7	51.5	101.7	44.2	57.5	132.0	60.9	71.1
75-79	56.1	23.4	32.7	63.8	28.9	34.9	69.0	29.3	39.7
80+	81.1	35.4	45.7	55.4	22.7	32.7	53.0	22.5	30.6

Demographic Projection Model
1/25/1995 14:09:10
Population by Age
(Thousands)

lawi4
EGION = Total)

	2017			2022		
E	TOTAL	MALES	FEMALES	TOTAL	MALES	FEMALES
TAL	16858.6	8381.3	8477.4	18448.4	9198.7	9249.7
0-4	2144.9	1094.6	1050.3	2187.3	1118.1	1069.2
5-9	2027.7	1033.2	994.5	2072.2	1057.8	1014.5
0-14	1969.8	1000.9	968.9	2001.3	1019.8	981.6
5-19	1920.5	973.4	947.0	1946.0	988.4	957.6
0-24	1760.4	888.6	871.8	1889.6	956.0	933.5
5-29	1610.5	808.6	801.9	1726.3	869.3	856.9
0-34	1109.9	543.0	566.9	1576.3	790.1	786.2
5-39	1099.2	537.5	561.7	1083.6	529.4	554.2
0-44	806.4	403.4	403.1	1069.7	523.2	546.5
5-49	617.7	290.2	327.5	779.1	388.7	390.4
0-54	518.3	227.2	291.0	590.8	276.2	314.6
5-59	432.8	200.9	231.9	488.1	212.5	275.6
0-64	296.2	135.7	160.6	397.0	182.7	214.3
5-69	253.5	115.0	138.5	259.5	117.5	142.0
0-74	142.1	64.2	77.9	205.9	92.2	113.7
5-79	91.7	41.4	50.2	101.5	45.1	56.4
80+	57.1	23.5	33.6	74.3	32.0	42.3

Demographic Projection Model
1/25/1995 14:10:57
Population by Age
(Thousands)

lawi4
EGION = Urban)

E	1987			1992			1997		
	TOTAL	MALES	FEMALES	TOTAL	MALES	FEMALES	TOTAL	MALES	FEMALES
TAL	853.3	445.9	407.4	1219.9	639.5	580.3	1688.7	887.3	801.5
0-4	142.9	71.5	71.4	242.4	124.2	118.3	305.3	156.1	149.2
5-9	125.7	61.7	64.0	149.0	73.1	75.9	250.6	125.5	125.1
0-14	105.6	48.6	57.0	167.8	75.5	92.3	195.1	87.5	107.6
5-19	88.3	43.7	44.6	133.2	69.7	63.5	207.1	105.4	101.7
0-24	90.5	43.8	46.7	122.7	62.8	59.9	181.3	97.4	83.9
5-29	86.4	48.2	38.2	113.3	59.5	53.8	151.2	82.9	68.2
0-34	60.3	35.6	24.7	94.7	55.6	39.0	121.7	67.1	54.6
5-39	50.2	29.8	20.4	59.9	35.2	24.7	92.9	54.2	38.8
0-44	31.7	19.9	11.8	52.8	32.7	20.1	62.1	37.9	24.2
5-49	24.7	15.8	8.9	30.9	19.3	11.5	50.9	31.3	19.6
0-54	15.3	9.5	5.8	23.9	15.4	8.6	29.6	18.5	11.1
5-59	10.9	6.8	4.1	13.5	8.0	5.5	20.9	12.8	8.1
0-64	7.2	3.9	3.3	9.9	5.7	4.2	12.3	6.7	5.6
5-69	13.6	7.1	6.5	5.8	2.8	3.0	7.8	4.0	3.8
0-74	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5-79	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
80+	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

E	2002			2007			2012		
	TOTAL	MALES	FEMALES	TOTAL	MALES	FEMALES	TOTAL	MALES	FEMALES
TAL	2281.6	1200.8	1080.8	2995.0	1577.8	1417.2	3843.8	2026.0	1817.8
-4	379.0	193.9	185.0	440.7	224.6	216.1	510.8	259.5	251.3
5-9	313.5	157.3	156.2	390.7	195.5	195.2	456.6	227.8	228.8
-14	321.5	148.3	173.1	398.6	184.1	214.5	491.6	227.1	264.5
-19	236.5	120.0	116.6	387.5	199.8	187.7	475.7	244.3	231.4
0-24	275.4	144.1	131.4	310.4	160.8	149.5	501.2	263.5	237.7
5-29	219.7	125.9	93.8	329.5	182.8	146.7	366.9	201.0	165.9
-34	160.5	92.2	68.3	232.7	138.5	94.2	346.8	199.6	147.1
-39	118.4	64.9	53.5	156.1	88.9	67.2	226.3	133.5	92.8
0-44	95.2	57.6	37.6	120.6	68.5	52.1	159.0	93.4	65.5
-49	59.3	36.0	23.3	91.0	54.7	36.3	115.5	65.2	50.3
-54	48.3	29.8	18.5	56.4	34.2	22.2	86.6	52.1	34.5
5-59	25.8	15.4	10.3	42.3	24.9	17.4	49.7	28.8	20.8
0-64	18.8	10.6	8.2	23.3	12.8	10.5	38.5	20.8	17.7
-69	9.8	4.7	5.0	15.0	7.6	7.4	18.8	9.3	9.5
0-74	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

5-79	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
80+	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Demographic Projection Model
1/25/1995 14:11:06
Population by Age
(Thousands)

lawi4
EGION = Urban)

	2017			2022		
E	TOTAL	MALES	FEMALES	TOTAL	MALES	FEMALES
TAL	4870.5	2566.9	2303.6	6103.4	3215.1	2888.3
0-4	596.4	301.4	295.0	702.5	353.2	349.3
5-9	535.6	266.3	269.3	634.1	313.9	320.2
0-14	572.9	264.6	308.3	670.6	309.9	360.6
5-19	585.4	298.9	286.5	681.3	345.8	335.5
0-24	610.5	318.8	291.8	746.2	386.6	359.5
5-29	590.5	326.2	264.3	717.2	391.8	325.4
0-34	386.9	219.2	167.7	626.1	356.3	269.8
5-39	340.3	194.0	146.3	383.9	215.3	168.6
0-44	232.1	140.8	91.4	351.9	206.2	145.7
5-49	153.7	89.7	63.9	227.1	136.9	90.2
0-54	111.1	62.6	48.4	149.7	87.3	62.3
5-59	77.4	44.5	32.9	101.4	54.6	46.8
0-64	45.9	24.5	21.4	72.9	38.6	34.3
5-69	31.7	15.4	16.4	38.7	18.5	20.2
0-74	0.0	0.0	0.0	0.0	0.0	0.0
5-79	0.0	0.0	0.0	0.0	0.0	0.0
80+	0.0	0.0	0.0	0.0	0.0	0.0

B.8

Demographic Projection Model
1/25/1995 14:11:08
Population by Age
(Thousands)

lawi4
EGION = Rural)

E	1987			1992			1997		
	TOTAL	MALES	FEMALES	TOTAL	MALES	FEMALES	TOTAL	MALES	FEMALES
TAL	7135.2	3421.3	3713.9	8198.6	3948.6	4250.0	9168.9	4428.8	4740.1
0-4	1255.6	619.7	635.9	1695.4	855.5	839.9	1726.3	872.9	853.4
5-9	1184.8	585.6	599.2	1118.0	551.5	566.4	1520.3	768.3	752.1
0-14	870.9	445.7	425.2	1099.1	550.1	549.0	1033.0	517.9	515.1
5-19	682.3	324.4	357.9	817.6	411.4	406.3	1028.7	504.7	524.1
0-24	580.4	257.0	323.4	623.6	292.7	330.9	741.4	368.3	373.1
5-29	504.0	233.4	270.6	532.7	228.8	303.9	569.0	258.7	310.3
0-34	376.7	172.2	204.5	471.4	213.6	257.8	499.4	209.3	290.1
5-39	374.5	173.2	201.3	356.9	162.6	194.3	448.5	202.9	245.6
0-44	261.7	121.9	139.8	349.3	158.9	190.4	333.9	149.5	184.4
5-49	243.4	116.1	127.3	244.6	112.9	131.7	328.2	148.2	180.0
0-54	182.9	82.2	100.7	224.4	105.6	118.8	226.7	103.4	123.4
5-59	164.8	78.9	85.9	166.1	74.0	92.1	205.2	96.0	109.2
0-64	132.8	58.5	74.3	143.3	68.0	75.4	145.6	64.4	81.2
5-69	320.4	152.5	167.9	109.0	47.5	61.6	118.9	55.9	63.0
0-74	0.0	0.0	0.0	247.1	115.6	131.5	86.2	36.9	49.2
5-79	0.0	0.0	0.0	0.0	0.0	0.0	157.6	71.6	86.0
80+	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	2002			2007			2012		
	TOTAL	MALES	FEMALES	TOTAL	MALES	FEMALES	TOTAL	MALES	FEMALES
TAL	10079.7	4879.8	5199.9	10836.9	5253.3	5583.7	11486.6	5572.0	5914.6
0-4	1757.4	890.2	867.2	1681.9	854.1	827.8	1613.2	822.5	790.6
5-9	1560.1	790.7	769.4	1600.0	813.9	786.1	1547.1	790.3	756.9
-14	1400.0	720.5	679.6	1428.7	740.5	688.2	1458.1	761.5	696.6
-19	963.8	471.6	492.2	1298.9	651.0	647.9	1319.5	663.7	655.8
0-24	926.3	447.7	478.6	859.7	414.4	445.3	1147.7	566.6	581.1
-29	672.5	322.8	349.7	836.0	389.1	446.9	772.1	357.3	414.8
-34	533.7	236.3	297.4	629.9	294.4	335.5	784.7	354.5	430.2
5-39	477.6	199.8	277.7	512.3	226.9	285.4	608.0	284.5	323.5
-44	421.1	186.8	234.3	450.0	184.3	265.7	484.1	209.7	274.4
-49	315.4	140.3	175.1	399.6	176.4	223.2	429.8	175.3	254.4
0-54	306.0	136.5	169.5	295.5	130.0	165.5	376.8	164.8	212.1
-59	208.9	94.9	114.0	284.0	126.7	157.3	276.7	122.1	154.5
-64	181.3	84.4	96.8	185.9	84.4	101.6	255.0	114.0	141.0
-69	122.1	53.7	68.4	153.7	71.4	82.3	159.7	72.6	87.1
0-74	96.2	44.7	51.5	101.7	44.2	57.5	132.0	60.9	71.1
-79	56.1	23.4	32.7	63.8	28.9	34.9	69.0	29.3	39.7
80+	81.1	35.4	45.7	55.4	22.7	32.7	53.0	22.5	30.6

Demographic Projection Model
1/25/1995 14:11:15
Population by Age
(Thousands)

Malawi4
(REGION = Rural)

AGE	2017 TOTAL	2017 MALES	2017 FEMALES	2022 TOTAL	2022 MALES	2022 FEMALES
TOTAL	11988.2	5814.4	6173.7	12345.0	5983.6	6361.3
0-4	1548.5	793.1	755.4	1484.8	764.9	719.9
5-9	1492.1	766.8	725.2	1438.1	743.8	694.3
10-14	1396.9	736.3	660.6	1330.8	709.8	621.0
15-19	1335.1	674.5	660.6	1264.6	642.5	622.1
20-24	1149.9	569.9	580.0	1143.4	569.4	574.0
25-29	1020.0	482.4	537.6	1009.1	477.6	531.6
30-34	723.0	323.8	399.2	950.3	433.8	516.4
35-39	758.9	343.5	415.4	699.7	314.1	385.6
40-44	574.3	262.6	311.7	717.8	316.9	400.9
45-49	464.0	200.4	263.6	552.0	251.8	300.2
50-54	407.2	164.6	242.6	441.1	188.9	252.2
55-59	355.4	156.4	199.0	386.7	157.9	228.8
60-64	250.3	111.2	139.2	324.1	144.1	180.1
65-69	221.8	99.7	122.1	220.7	99.0	121.8
70-74	142.1	64.2	77.9	205.9	92.2	113.7
75-79	91.7	41.4	50.2	101.5	45.1	56.4
80+	57.1	23.5	33.6	74.3	32.0	42.3

TABLE C

DEMPROJ PROJECTIONS OF MALAWI WITH HIV-AIDS, 1987-2022
SHOCKED SOLUTION ON MALAWI 3: MALAWI3AIDS

13aids
GION = Total

	1987	1992	1997	2002	2007	2012	2017	2022
pulation								
housands)								
tal	7988	9362	10483	11423	12491	13877	15483	17168
le	3867	4561	5133	5623	6182	6900	7726	8592
male	4121	4801	5350	5799	6309	6978	7758	8576
ban	853	1156	1506	1917	2446	3157	4067	5180
ral	7135	8206	8977	9506	10045	10721	11416	11988
4	1398	1926	1954	1945	1961	2079	2224	2311
14	2287	2534	2976	3513	3623	3686	3813	4065
-64	3969	4541	5188	5615	6550	7733	8981	10272
+	334	361	366	349	357	380	465	521
males 15-49	1820	2066	2368	2517	2935	3434	3978	4554
le %	48.4	48.7	49.0	49.2	49.5	49.7	49.9	50.0
male %	51.6	51.3	51.0	50.8	50.5	50.3	50.1	50.0
ban %	10.7	12.3	14.4	16.8	19.6	22.7	26.3	30.2
ral %	89.3	87.7	85.6	83.2	80.4	77.3	73.7	69.8
4 %	17.5	20.6	18.6	17.0	15.7	15.0	14.4	13.5
9 %	28.6	27.1	28.4	30.8	29.0	26.6	24.6	23.7
-64 %	49.7	48.5	49.5	49.2	52.4	55.7	58.0	59.8
+ %	4.2	3.9	3.5	3.1	2.9	2.7	3.0	3.0
males 15-49%	22.8	22.1	22.6	22.0	23.5	24.7	25.7	26.5
x ratio	93.8	95.0	96.0	97.0	98.0	98.9	99.6	100.2
pend. ratio	0.929	0.982	0.950	0.972	0.853	0.745	0.672	0.621
dian age	17.0	16.2	16.3	16.1	16.9	18.2	19.6	21.0

	87-92	92-97	97-02	02-07	07-12	12-17	17-22
nual Rates of Change							
/ 1000	53.8	47.0	41.8	38.1	36.1	34.3	31.7
/ 1000	23.0	26.6	26.7	21.4	15.7	12.9	11.2
percent	3.1	2.0	1.5	1.7	2.0	2.1	2.0
percent	3.2	2.3	1.7	1.8	2.1	2.2	2.1

aids
ON = Urban

	1987	1992	1997	2002	2007	2012	2017	2022
lation usands)								
l	853	1156	1506	1917	2446	3157	4067	5180
	446	606	792	1011	1293	1671	2154	2743
le	407	550	714	906	1153	1486	1913	2437
	143	230	272	315	368	450	554	664
	231	302	410	567	679	797	947	1164
4	466	619	818	1027	1386	1895	2542	3324
	14	5	7	8	12	14	24	27
les 15-49	195	257	342	424	576	790	1063	1394
%	5.6	6.5	7.6	8.9	10.3	12.0	13.9	16.0
le %	5.1	5.9	6.8	7.9	9.2	10.7	12.4	14.2
%	16.7	19.9	18.1	16.4	15.1	14.3	13.6	12.8
%	27.1	26.1	27.2	29.6	27.8	25.2	23.3	22.5
4 %	54.6	53.5	54.3	53.5	56.7	60.0	62.5	64.2
%	1.6	0.5	0.5	0.4	0.5	0.5	0.6	0.5
les 15-49%	22.9	22.2	22.7	22.1	23.6	25.0	26.1	26.9
ratio	109.5	110.3	111.0	111.6	112.1	112.5	112.6	112.6
nd. ratio	0.804	0.859	0.834	0.860	0.756	0.658	0.591	0.550
an age	18.0	16.8	16.9	16.8	17.5	18.8	20.2	21.4

	87-92	92-97	97-02	02-07	07-12	12-17	17-22
al Rates of Change							
ercent	6.0	5.3	4.8	4.8	5.1	5.0	4.8

Demographic Projection Model
3/20/1995 19:14:28
Demographic Indicators

aids
ON = Rural

	1987	1992	1997	2002	2007	2012	2017	2022
lation sands)								
	7135	8206	8977	9506	10045	10721	11416	11988
	3421	3954	4341	4612	4889	5228	5571	5849
le	3714	4252	4636	4893	5156	5492	5845	6139
	1256	1696	1682	1630	1593	1628	1670	1646
	2056	2232	2566	2946	2944	2889	2866	2900
	3503	3922	4370	4589	5164	5838	6440	6948
	320	356	359	341	345	365	441	494
les 15-49	1625	1809	2026	2093	2359	2644	2915	3160
%	42.8	42.2	41.4	40.4	39.1	37.7	36.0	34.1
le %	46.5	45.4	44.2	42.8	41.3	39.6	37.7	35.8
	17.6	20.7	18.7	17.1	15.9	15.2	14.6	13.7
	28.8	27.2	28.6	31.0	29.3	26.9	25.1	24.2
4 %	49.1	47.8	48.7	48.3	51.4	54.5	56.4	58.0

%	4.5	4.3	4.0	3.6	3.4	3.4	3.9	4.1
les 15-49%	22.8	22.0	22.6	22.0	23.5	24.7	25.5	26.4
ratio	92.1	93.0	93.6	94.3	94.8	95.2	95.3	95.3
nd. ratio	0.945	1.002	0.972	0.997	0.879	0.774	0.704	0.654
an age	16.9	16.1	16.2	15.9	16.8	18.1	19.4	20.8

	87-92	92-97	97-02	02-07	07-12	12-17	17-22
al Rates of Change							
ercent	2.8	1.8	1.1	1.1	1.3	1.3	1.0

Demographic Projection Model
3/20/1995 19:14:29
Demographic Indicators

aids
ON = Total

	87-92	92-97	97-02	02-07	07-12	12-17	17-22
ility							
	7.39	6.50	5.72	5.04	4.43	3.90	3.43
	3.60	3.17	2.79	2.46	2.16	1.90	1.67
	2.39	2.17	1.97	1.79	1.61	1.46	1.32
age of							
bearing	28.5	28.2	27.9	27.9	28.0	27.9	27.4
ratio	0.77	0.93	0.83	0.77	0.67	0.61	0.56

distribution of fertility table = UN Sub-Saharan Africa

ality							
LE	42.4	42.1	40.7	43.1	47.2	50.9	53.2
e LE	45.6	45.0	43.3	45.6	49.5	53.1	55.2
LE	44.1	43.6	42.0	44.4	48.4	52.0	54.2
	137.1	369.7	533.2	398.1	243.7	190.6	179.2
	232.3	255.9	268.0	231.1	191.2	168.6	153.9

table = Coale-Demeny North

ration							
sands)							
immigrati	0.0	0.0	0.0	0.0	0.0	0.0	0.0
e immigra	0.0	0.0	0.0	0.0	0.0	0.0	0.0
immigrat	0.0	0.0	0.0	0.0	0.0	0.0	0.0

al urban growth rate % = 6.5
al rural growth rate % = 2.8

	87-92	92-97	97-02	02-07	07-12	12-17	17-22
s and Deaths							
sands)							
s	466.6	466.3	457.5	455.1	476.2	503.3	516.9
s	199.8	263.7	292.9	255.8	207.0	189.0	183.5

Demographic Projection Model
3/20/1995 19:14:30
Population by Age
(Thousands)

ıids
:ON = Total)

	1987			1992			1997		
	TOTAL	MALES	FEMALES	TOTAL	MALES	FEMALES	TOTAL	MALES	FEMALES
.	7988.5	3867.2	4121.3	9361.9	4560.6	4801.3	10483.1	5133.4	5349.7
	1398.5	691.2	707.3	1926.0	973.7	952.3	1953.7	989.5	964.1
)	1310.5	647.3	663.2	1266.9	624.6	642.3	1747.9	882.0	865.8
.4	976.5	494.3	482.2	1266.8	625.6	641.2	1228.1	605.4	622.7
:9	770.6	368.1	402.5	941.9	478.0	463.9	1212.4	601.8	610.6
:4	670.9	300.8	370.1	735.2	350.8	384.4	861.3	442.1	419.3
:9	590.4	281.6	308.8	637.0	283.1	353.9	656.8	311.4	345.4
4	437.0	207.8	229.2	560.7	266.2	294.5	575.1	250.1	325.0
9	424.7	203.0	221.7	413.6	196.0	217.6	514.4	242.0	272.4
4	293.4	141.8	151.6	399.8	190.3	209.5	378.7	177.8	200.9
9	268.1	131.9	136.2	274.0	131.4	142.6	366.9	172.7	194.1
4	198.2	91.7	106.5	247.2	120.3	126.9	248.2	117.4	130.8
9	175.7	85.7	90.0	178.9	81.7	97.2	220.3	105.8	114.5
4	140.0	62.4	77.6	152.5	73.3	79.2	153.7	69.1	84.6
9	334.0	159.6	174.4	114.4	50.1	64.4	123.6	58.5	65.1
4	0.0	0.0	0.0	246.9	115.5	131.4	84.7	36.2	48.5
9	0.0	0.0	0.0	0.0	0.0	0.0	157.3	71.5	85.8
+	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	2002			2007			2012		
	TOTAL	MALES	FEMALES	TOTAL	MALES	FEMALES	TOTAL	MALES	FEMALES
	11422.8	5623.4	5799.5	12490.9	6182.1	6308.8	13877.5	6899.5	6978.0
	1945.0	986.9	958.0	1961.1	996.6	964.4	2078.6	1058.2	1020.4
	1767.3	894.0	873.3	1771.2	898.0	873.2	1814.6	922.0	892.6
4	1746.0	881.4	864.6	1852.2	937.8	914.3	1871.2	949.6	921.6
9	1185.6	586.3	599.2	1709.2	862.7	846.5	1816.5	919.5	897.0
4	1107.5	557.3	550.2	1115.9	556.1	559.9	1658.9	836.9	822.1
9	737.5	384.7	352.8	993.0	506.8	486.1	1047.9	525.0	522.9
4	552.9	256.2	296.7	628.6	330.1	298.5	912.4	468.5	443.9
9	500.8	210.8	290.0	470.8	212.3	258.5	564.6	295.9	268.7
4	459.7	213.1	246.6	441.9	180.3	261.5	424.7	188.0	236.7
9	337.1	155.7	181.4	412.4	188.1	224.3	404.8	162.0	242.8
4	328.8	152.3	176.5	300.3	136.1	164.2	377.5	169.8	207.6
9	217.3	101.0	116.3	291.5	132.6	158.9	270.2	120.5	149.7
4	188.2	89.2	99.0	186.1	85.0	101.1	256.1	114.7	141.3
9	123.2	54.5	68.8	153.1	71.5	81.5	154.6	69.6	85.0
	91.0	42.2	48.7	91.4	39.5	51.8	116.5	53.6	62.9
	54.3	22.5	31.8	58.7	26.5	32.1	60.2	25.4	34.8
+	80.7	35.2	45.5	53.6	21.9	31.7	48.3	20.4	28.0

Demographic Projection Model
3/20/1995 19:15:20
Population by Age
(Thousands)

ids
ON = Total)

	2017			2022		
	TOTAL	MALES	FEMALES	TOTAL	MALES	FEMALES
	15483.5	7725.6	7757.9	17168.2	8592.2	8576.0
	2224.1	1133.8	1090.3	2310.7	1179.3	1131.4
	1949.1	992.4	956.7	2106.0	1074.0	1032.0
4	1864.3	947.8	916.5	1958.5	997.6	961.0
9	1838.3	932.7	905.6	1834.4	932.3	902.1
4	1776.0	897.2	878.8	1800.5	911.7	888.8
9	1607.3	809.6	797.7	1732.3	872.8	859.5
4	999.8	502.0	497.8	1560.2	785.1	775.1
9	864.8	444.0	420.8	965.1	484.3	480.8
4	530.5	276.9	253.6	830.8	425.7	405.1
9	398.5	174.8	223.7	506.3	263.4	242.9
4	378.1	149.5	228.6	376.8	164.1	212.6
9	347.0	154.4	192.6	351.7	137.7	214.0
4	241.1	106.1	135.0	313.5	138.0	175.5
9	217.2	96.0	121.3	207.0	90.0	117.0
4	120.2	53.2	67.0	171.7	74.7	97.0
9	78.5	35.3	43.2	82.7	35.9	46.8
+	48.6	19.8	28.8	60.1	25.6	34.5

Demographic Projection Model
3/20/1995 19:16:05
Population by Age
(Thousands)

3aids
GION = Urban)

	1987			1992			1997		
	TOTAL	MALES	FEMALES	TOTAL	MALES	FEMALES	TOTAL	MALES	FEMALES
AL	853.3	445.9	407.4	1155.9	606.3	549.5	1506.2	792.3	713.9
-4	142.9	71.5	71.4	229.7	117.7	112.0	272.0	139.3	132.7
-9	125.7	61.7	64.0	141.9	69.7	72.3	228.9	114.8	114.1
-14	105.6	48.6	57.0	160.0	71.9	88.0	180.8	81.2	99.7
-19	88.3	43.7	44.6	125.9	66.1	59.8	188.5	96.7	91.9
-24	90.5	43.8	46.7	115.5	59.3	56.3	157.6	86.2	71.4
-29	86.4	48.2	38.2	106.8	56.0	50.8	128.4	70.7	57.7
-34	60.3	35.6	24.7	89.6	52.7	36.9	104.4	56.8	47.6
-39	50.2	29.8	20.4	56.7	33.4	23.4	81.8	47.5	34.3
-44	31.7	19.9	11.8	50.1	31.0	19.1	55.0	33.5	21.5
-49	24.7	15.8	8.9	29.3	18.3	10.9	45.5	28.0	17.5
-54	15.3	9.5	5.8	22.7	14.6	8.1	26.4	16.5	9.9
-59	10.9	6.8	4.1	12.8	7.6	5.2	18.8	11.5	7.3
-64	7.2	3.9	3.3	9.4	5.4	4.0	11.0	6.0	5.0
-69	13.6	7.1	6.5	5.5	2.6	2.8	7.0	3.6	3.4
-74	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
-79	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30+	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	2002			2007			2012		
	TOTAL	MALES	FEMALES	TOTAL	MALES	FEMALES	TOTAL	MALES	FEMALES
L	1917.2	1011.1	906.1	2445.6	1292.8	1152.8	3156.9	1671.3	1485.6
4	315.0	161.8	153.1	368.1	188.8	179.3	450.1	230.0	220.2
9	269.6	135.8	133.8	313.8	157.9	155.9	371.7	186.6	185.2
-14	297.9	137.8	160.0	365.5	169.6	195.9	425.3	197.4	227.8
19	213.7	109.3	104.5	356.1	184.9	171.2	434.8	225.0	209.8
24	233.4	125.3	108.2	269.8	142.7	127.1	457.9	243.1	214.8
29	168.2	100.1	68.1	257.9	149.4	108.5	308.3	173.9	134.3
-34	117.1	66.7	50.4	156.3	97.4	58.9	256.7	155.3	101.4
39	90.2	47.7	42.5	99.0	54.8	44.2	140.0	86.5	53.5
44	77.2	46.3	30.8	83.1	44.8	38.3	93.5	52.9	40.6
-49	48.5	29.3	19.2	68.6	40.6	27.9	75.5	40.0	35.5
54	40.7	25.0	15.7	43.0	25.8	17.2	62.7	37.0	25.7
59	21.6	12.9	8.7	33.8	19.7	14.1	36.4	20.7	15.7
-64	16.0	9.1	6.9	18.5	10.1	8.4	29.8	15.9	13.9
69	8.2	4.0	4.2	12.1	6.2	6.0	14.4	7.0	7.4
74	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
79	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0+	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Demographic Projection Model
3/20/1995 19:17:37
Population by Age
(Thousands)

ds
N = Urban)

2017			2022		
TOTAL	MALES	FEMALES	TOTAL	MALES	FEMALES
4067.3	2154.3	1912.9	5179.8	2743.1	2436.7
554.4	281.5	272.9	664.5	335.3	329.1
460.7	230.1	230.6	575.9	286.2	289.7
486.7	225.6	261.1	588.6	272.5	316.1
504.1	259.3	244.8	577.3	295.0	282.3
557.3	293.4	263.9	643.1	335.9	307.1
535.2	299.5	235.8	653.3	360.7	292.6
317.3	185.8	131.5	562.0	324.6	237.4
243.5	146.1	97.4	309.4	179.5	129.9
138.9	88.0	50.9	248.1	152.7	95.4
87.5	49.0	38.5	133.3	83.9	49.4
70.6	37.2	33.4	83.7	46.7	36.9
54.6	30.6	23.9	63.3	31.6	31.7
32.8	17.1	15.7	50.3	25.9	24.5
23.9	11.3	12.5	27.0	12.5	14.5
0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0

Demographic Projection Model
3/20/1995 19:18:33
Population by Age
(Thousands)

ds
= Rural)

C:8

E	1987 TOTAL	1987 MALES	1987 FEMALES	1992 TOTAL	1992 MALES	1992 FEMALES	1997 TOTAL	1997 MALES	1997 FEMALES
TAL	7135.2	3421.3	3713.9	8206.0	3954.3	4251.8	8976.9	4341.1	4635.7
0-4	1255.6	619.7	635.9	1696.3	856.0	840.3	1681.7	850.2	831.5
5-9	1184.8	585.6	599.2	1125.0	555.0	570.0	1519.0	767.3	751.8
0-14	870.9	445.7	425.2	1106.8	553.6	553.2	1047.3	524.2	523.0
5-19	682.3	324.4	357.9	816.0	411.8	404.1	1023.9	505.1	518.8
0-24	580.4	257.0	323.4	619.7	291.5	328.2	703.7	355.9	347.8
5-29	504.0	233.4	270.6	530.2	227.1	303.1	528.4	240.7	287.7
0-34	376.7	172.2	204.5	471.1	213.6	257.6	470.6	193.3	277.4
5-39	374.5	173.2	201.3	356.9	162.7	194.2	432.6	194.4	238.2
0-44	261.7	121.9	139.8	349.7	159.3	190.4	323.7	144.4	179.4
5-49	243.4	116.1	127.3	244.7	113.1	131.6	321.3	144.7	176.6
0-54	182.9	82.2	100.7	224.5	105.7	118.8	221.7	100.8	120.9
5-59	164.8	78.9	85.9	166.1	74.1	92.0	201.5	94.3	107.3
0-64	132.8	58.5	74.3	143.2	67.9	75.3	142.7	63.1	79.6
5-69	320.4	152.5	167.9	109.0	47.4	61.5	116.5	54.8	61.7
0-74	0.0	0.0	0.0	246.9	115.5	131.4	84.7	36.2	48.5
5-79	0.0	0.0	0.0	0.0	0.0	0.0	157.3	71.5	85.8
80+	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

E	2002 TOTAL	2002 MALES	2002 FEMALES	2007 TOTAL	2007 MALES	2007 FEMALES	2012 TOTAL	2012 MALES	2012 FEMALES
TAL	9505.6	4612.3	4893.3	10045.2	4889.3	5156.0	10720.6	5228.2	5492.4
0-4	1630.0	825.1	804.9	1593.0	807.9	785.1	1628.4	828.2	800.3
-9	1497.7	758.2	739.5	1457.4	740.1	717.3	1442.9	735.5	707.5
0-14	1448.1	743.6	704.5	1486.6	768.2	718.4	1446.0	752.2	693.8
-19	971.8	477.0	494.8	1353.1	677.8	675.3	1381.7	694.5	687.2
-24	874.0	432.0	442.0	846.2	413.4	432.7	1201.1	593.8	607.3
-29	569.4	284.7	284.7	735.1	357.4	377.7	739.6	351.1	388.5
-34	435.8	189.5	246.3	472.3	232.7	239.6	655.7	313.2	342.5
-39	410.6	163.1	247.6	371.8	157.4	214.3	424.6	209.4	215.2
-44	382.5	166.8	215.7	358.7	135.5	223.2	331.1	135.0	196.1
-49	288.6	126.4	162.2	343.9	147.5	196.4	329.3	122.1	207.2
-54	288.1	127.3	160.8	257.2	110.3	147.0	314.8	132.9	181.9
-59	195.7	88.1	107.6	257.7	112.9	144.8	233.8	99.8	134.0
-64	172.2	80.1	92.1	167.6	74.9	92.7	226.3	98.8	127.4
-69	115.0	50.5	64.5	140.9	65.4	75.6	140.2	62.5	77.6
-74	91.0	42.2	48.7	91.4	39.5	51.8	116.5	53.6	62.9
-79	54.3	22.5	31.8	58.7	26.5	32.1	60.2	25.4	34.8
80+	80.7	35.2	45.5	53.6	21.9	31.7	48.3	20.4	28.0

Demographic Projection Model
3/20/1995 19:19:51
Population by Age
(Thousands)

aids
GION = Rural)

	2017 TOTAL	2017 MALES	2017 FEMALES	2022 TOTAL	2022 MALES	2022 FEMALES
L	11416.2	5571.3	5845.0	11988.4	5849.1	6139.3

	1987			1992			1997		
	TOTAL	MALES	FEMALES	TOTAL	MALES	FEMALES	TOTAL	MALES	FEMALES
AL	7135.2	3421.3	3713.9	8206.0	3954.3	4251.8	8976.9	4341.1	4635.7
-4	1255.6	619.7	635.9	1696.3	856.0	840.3	1681.7	850.2	831.5
-9	1184.8	585.6	599.2	1125.0	555.0	570.0	1519.0	767.3	751.8
-14	870.9	445.7	425.2	1106.8	553.6	553.2	1047.3	524.2	523.0
-19	682.3	324.4	357.9	816.0	411.8	404.1	1023.9	505.1	518.8
-24	580.4	257.0	323.4	619.7	291.5	328.2	703.7	355.9	347.8
-29	504.0	233.4	270.6	530.2	227.1	303.1	528.4	240.7	287.7
-34	376.7	172.2	204.5	471.1	213.6	257.6	470.6	193.3	277.4
-39	374.5	173.2	201.3	356.9	162.7	194.2	432.6	194.4	238.2
-44	261.7	121.9	139.8	349.7	159.3	190.4	323.7	144.4	179.4
-49	243.4	116.1	127.3	244.7	113.1	131.6	321.3	144.7	176.6
-54	182.9	82.2	100.7	224.5	105.7	118.8	221.7	100.8	120.9
-59	164.8	78.9	85.9	166.1	74.1	92.0	201.5	94.3	107.3
-64	132.8	58.5	74.3	143.2	67.9	75.3	142.7	63.1	79.6
-69	320.4	152.5	167.9	109.0	47.4	61.5	116.5	54.8	61.7
-74	0.0	0.0	0.0	246.9	115.5	131.4	84.7	36.2	48.5
-79	0.0	0.0	0.0	0.0	0.0	0.0	157.3	71.5	85.8
80+	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	2002			2007			2012		
	TOTAL	MALES	FEMALES	TOTAL	MALES	FEMALES	TOTAL	MALES	FEMALES
AL	9505.6	4612.3	4893.3	10045.2	4889.3	5156.0	10720.6	5228.2	5492.4
-4	1630.0	825.1	804.9	1593.0	807.9	785.1	1628.4	828.2	800.2
-9	1497.7	758.2	739.5	1457.4	740.1	717.3	1442.9	735.5	707.5
-14	1448.1	743.6	704.5	1486.6	768.2	718.4	1446.0	752.2	693.8
-19	971.8	477.0	494.8	1353.1	677.8	675.3	1381.7	694.5	687.2
-24	874.0	432.0	442.0	846.2	413.4	432.7	1201.1	593.8	607.3
-29	569.4	284.7	284.7	735.1	357.4	377.7	739.6	351.1	388.5
-34	435.8	189.5	246.3	472.3	232.7	239.6	655.7	313.2	342.5
-39	410.6	163.1	247.6	371.8	157.4	214.3	424.6	209.4	215.2
-44	382.5	166.8	215.7	358.7	135.5	223.2	331.1	135.0	196.1
-49	288.6	126.4	162.2	343.9	147.5	196.4	329.3	122.1	207.2
-54	288.1	127.3	160.8	257.2	110.3	147.0	314.8	132.9	181.9
-59	195.7	88.1	107.6	257.7	112.9	144.8	233.8	99.8	134.0
-64	172.2	80.1	92.1	167.6	74.9	92.7	226.3	98.8	127.4
-69	115.0	50.5	64.5	140.9	65.4	75.6	140.2	62.5	77.6
-74	91.0	42.2	48.7	91.4	39.5	51.8	116.5	53.6	62.9
-79	54.3	22.5	31.8	58.7	26.5	32.1	60.2	25.4	34.8
80+	80.7	35.2	45.5	53.6	21.9	31.7	48.3	20.4	28.0

Demographic Projection Model
3/20/1995 19:19:51
Population by Age
(Thousands)

Gaids
GION = Rural)

	2017			2022		
	TOTAL	MALES	FEMALES	TOTAL	MALES	FEMALES
AL	11416.2	5571.3	5845.0	11988.4	5849.1	6139.3

-4	1669.8	852.3	817.5	1646.2	843.9	802.3
-9	1488.4	762.3	726.2	1530.2	787.8	742.3
-14	1377.6	722.2	655.4	1370.0	725.1	644.9
-19	1334.2	673.4	660.8	1257.0	637.3	619.8
-24	1218.8	603.8	614.9	1157.4	575.8	581.6
-29	1072.1	510.1	561.9	1079.0	512.1	566.9
-34	682.5	316.2	366.3	998.2	460.5	537.8
-39	621.3	297.9	323.4	655.7	304.8	350.9
44	391.7	189.0	202.7	582.7	273.0	309.7
49	311.1	125.9	185.2	373.0	179.5	193.5
54	307.5	112.3	195.1	293.1	117.4	175.7
59	292.5	123.8	168.7	288.3	106.1	182.2
64	208.3	89.1	119.2	263.1	112.1	151.0
69	193.4	84.6	108.7	180.0	77.4	102.5
74	120.2	53.2	67.0	171.7	74.7	97.0
79	78.5	35.3	43.2	82.7	35.9	46.8
0+	48.6	19.8	28.8	60.1	25.6	34.5

ANNEX (2)

District-Level HIV Prevalence Rate, Malawi

1987-2022

AGGREGATE ADULT PREVALENCE RATE, 1987–2022 BLANTYRE

BLANTYRE	PREVRATE URBAN	PREVRATE RURAL	% ADULTS URBAN	% ADULTS RURAL	PREVRATE AGGREGATE
1987	6.2	4.5	56.46	43.54	6.59
1988	18.6	7.5	56.65	43.35	13.79
1989	18.6	7.5	56.83	43.17	13.81
1990	21.9	10.5	57.02	42.98	17.00
1991	26	10.5	57.21	42.79	19.37
1992	27.1	13	57.40	42.60	21.09
1993	30.2	16	57.81	42.19	25.05
1994	33	16	58.23	41.77	26.73
1995	35	16	58.64	41.36	27.97
1996	36	17	59.05	40.95	28.22
1997	32	15	59.46	40.54	25.11
1998	28	15	59.94	40.06	22.79
1999	25	12	60.41	39.59	19.85
2000	20	10	60.89	39.11	16.09
2001	17	8	61.37	38.63	13.52
2002	16	7	61.85	38.15	12.57
2003	14	6	62.42	37.58	10.99
2004	12	5	62.98	37.02	9.41
2005	9	5	63.55	36.45	7.54
2006	7	3	64.12	35.88	5.56
2007	7	3	64.69	35.31	5.59
2008	6	0	65.32	34.68	3.92
2009	4	0	65.95	34.05	2.64
2010	2	0	66.58	33.42	1.33
2011	0.5		67.21	32.79	0.34
2012			67.84	32.16	0.00
2013			68.41	31.59	0.00
2014			68.98	31.02	0.00
2015			69.55	30.45	0.00
2016			70.12	29.88	0.00
2017			70.69	29.31	0.00
2018			71.22	28.78	0.00
2019			71.75	28.25	0.00
2020			72.28	27.72	0.00
2021			72.81	27.19	0.00
2022			73.33	26.67	0.00

ADULT PREVALENCE RATE, 1987–2022

CHITIPA

DISTRICT : CHITIPA	PREVRATE URBAN	PREVRATE RURAL	% ADULTS URBAN	% ADULTS RURAL	PREVRATE AGGREGATE
1987	8.20	3.00	4.00	96.00	3.21
1988	10.00	3.76	4.22	95.78	4.02
1989	13.40	4.52	4.43	95.57	4.91
1990	16.80	5.28	4.65	95.35	5.82
1991	18.60	6.04	4.87	95.13	6.85
1992	18.60	6.80	5.08	94.92	7.40
1993	18.60	7.56	5.19	94.81	8.13
1994	21.40	11.40	5.30	94.70	11.93
1995	23.40	13.40	5.41	94.59	13.94
1996	24.40	14.40	5.52	94.48	14.95
1997	20.40	10.40	5.63	94.37	10.96
1998	18.40	8.40	5.74	94.26	8.97
1999	15.40	5.40	5.85	94.15	5.98
2000	10.40	0.40	5.96	94.04	1.00
2001	7.40		6.07	93.93	0.45
2002	6.40		6.17	93.83	0.40
2003	4.40		6.38	93.62	0.26
2004	3.40		6.59	93.41	0.22
2005	1.40		6.80	93.20	0.10
2006	1.00		7.01	92.99	0.07
2007			7.22	92.78	0.00
2008			7.34	92.66	0.00
2009			7.46	92.54	0.00
2010			7.58	92.42	0.00
2011			7.70	92.30	0.00
2012			7.83	92.17	0.00
2013			8.17	91.83	0.00
2014			8.52	91.48	0.00
2015			8.87	91.13	0.00
2016			9.21	90.79	0.00
2017			9.56	90.44	0.00
2018			9.95	90.05	0.00
2019			10.35	89.65	0.00
2020			10.75	89.25	0.00
2021			11.14	88.86	0.00
2022			11.54	88.46	0.00

AGGREGATE ADULT PREVALENCE RATE, 1967-2022 CHIKAWAWA

DISTRICT : CHIKWAWA	PREVRATE URBAN	PREVRATE RURAL	% ADULTS URBAN	% ADULTS RURAL	PREVRATE AGGREGATE
1967	8.20	3.00	3.55	96.45	3.18
1968	15.00	4.50	3.56	96.44	4.87
1969	15.10	6.00	3.57	96.43	6.32
1990	13.60	7.50	3.57	96.43	7.72
1991	14.80	9.00	3.58	96.42	9.21
1992	14.60	10.50	3.59	96.41	10.65
1993	15.20	12.00	3.65	96.35	12.12
1994	18.00	14.80	3.71	96.29	14.92
1995	20.00	16.80	3.76	96.24	16.92
1996	21.00	17.80	3.82	96.18	17.92
1997	17.00	13.80	3.88	96.12	13.92
1998	15.00	11.80	4.02	95.98	11.93
1999	12.00	8.80	4.15	95.85	8.93
2000	7.00	3.80	4.29	95.71	3.94
2001	4.00	0.80	4.43	95.57	0.94
2002	3.00		4.56	95.44	0.14
2003	1.00		4.68	95.32	0.05
2004			4.79	95.21	0.00
2005			4.90	95.10	0.00
2006			5.02	94.98	0.00
2007			5.13	94.87	0.00
2008			5.31	94.69	0.00
2009			5.49	94.51	0.00
2010			5.67	94.33	0.00
2011			5.85	94.15	0.00
2012			6.03	93.97	0.00
2013			6.28	93.72	0.00
2014			6.54	93.46	0.00
2015			6.80	93.20	0.00
2016			7.05	92.95	0.00
2017			7.31	92.69	0.00
2018			7.59	92.41	0.00
2019			7.87	92.13	0.00
2020			8.14	91.86	0.00
2021			8.42	91.58	0.00
2022			8.70	91.30	0.00

AGGREGATE ADULT PREVALENCE RATE, 1967–2022 CHIRADZULU

DISTRICT : CHIRADZULU	PREVRATE URBAN	PREVRATE RURAL	% ADULTS URBAN	% ADULTS RURAL	PREVRATE AGGREGATE
1987	8.20	3.00	0.87	99.13	3.05
1988	10.00	5.92	0.85	99.15	5.95
1989	13.90	8.83	0.82	99.18	8.88
1990	16.20	11.75	0.80	99.20	11.79
1991	21.50	14.67	0.78	99.22	14.72
1992	20.80	17.58	0.75	99.25	17.61
1993	20.80	20.50	0.73	99.27	20.50
1994	23.80	22.60	0.71	99.29	22.61
1995	25.60	24.60	0.69	99.31	24.61
1996	26.60	25.60	0.67	99.33	25.61
1997	22.60	21.60	0.65	99.35	21.61
1998	20.60	19.60	0.75	99.25	19.61
1999	17.60	16.60	0.85	99.15	16.61
2000	12.60	11.60	0.95	99.05	11.61
2001	9.60	8.60	1.05	98.95	8.61
2002	8.60	7.60	1.15	98.85	7.61
2003	6.60	5.60	1.21	98.79	5.61
2004	5.60	4.60	1.27	98.73	4.61
2005	4.60	3.60	1.33	98.67	3.61
2006	3.60	2.60	1.39	98.61	2.61
2007	2.60	1.60	1.46	98.54	1.61
2008	1.60	0.60	1.50	98.50	0.61
2009	0.60	0.00	1.54	98.46	0.01
2010	0.00	0.00	1.59	98.41	0.00
2011			1.63	98.37	0.00
2012			1.67	98.33	0.00
2013			1.72	98.28	0.00
2014			1.76	98.24	0.00
2015			1.80	98.20	0.00
2016			1.84	98.16	0.00
2017			1.89	98.11	0.00
2018			1.96	98.04	0.00
2019			2.04	97.96	0.00
2020			2.12	97.88	0.00
2021			2.20	97.80	0.00
2022			2.27	97.73	0.00

ADULT PREVALENCE RATE, 1987–2022 DISTRICT : DEDZA

DISTRICT : DEDZA	PREVRATE URBAN	PREVRATE RURAL	% ADULTS URBAN	% ADULTS RURAL	DEDZA PREVRATE AGGREGATE
1987	8.20	3.00	4.23	95.77	3.22
1988	8.60	3.64	4.20	95.80	3.85
1989	9.00	4.29	4.17	95.83	4.48
1990	9.00	4.93	4.15	95.85	5.10
1991	9.40	5.57	4.12	95.88	5.73
1992	9.40	6.22	4.10	95.90	6.35
1993	9.40	6.86	4.23	95.77	6.97
1994	12.20	9.20	4.36	95.64	9.33
1995	14.20	11.20	4.50	95.50	11.33
1996	15.20	12.20	4.63	95.37	12.34
1997	11.20	8.20	4.76	95.24	8.34
1998	9.20	6.20	4.87	95.13	6.35
1999	6.20	3.20	4.98	95.02	3.35
2000	1.20	1.00	5.09	94.91	1.01
2001	0.50		5.20	94.80	0.03
2002			5.31	94.69	0.00
2003			5.53	94.47	0.00
2004			5.76	94.24	0.00
2005			5.99	94.01	0.00
2006			6.21	93.79	0.00
2007			6.44	93.56	0.00
2008			6.67	93.33	0.00
2009			6.91	93.09	0.00
2010			7.14	92.86	0.00
2011			7.38	92.62	0.00
2012			7.61	92.39	0.00
2013			7.91	92.09	0.00
2014			8.21	91.79	0.00
2015			8.51	91.49	0.00
2016			8.81	91.19	0.00
2017			9.11	90.89	0.00
2018			9.22	90.78	0.00
2019			9.32	90.68	0.00
2020			9.43	90.57	0.00
2021			9.54	90.46	0.00
2022			9.65	90.35	0.00

URBAN = BLOOD DONORS ADJUSTED, 1989–1993,
RURAL = ANTENATAL ,1993, THEN ADJUSTED

ADULT PREVALENCE RATE, 1987–2022 DISTRICT : DOWA DOWA

	PREVRATE URBAN	PREVRATE RURAL	% ADULTS URBAN	% ADULTS RURAL	PREVRATE AGGREGATE
1987	8.20	1.00	2.91	97.09	1.21
1988	8.60	1.29	2.93	97.07	1.51
1989	9.00	1.58	2.96	97.04	1.80
1990	10.00	1.88	2.99	97.01	2.12
1991	10.00	2.17	3.02	96.98	2.40
1992	10.00	2.46	3.05	96.95	2.69
1993	10.30	2.75	3.21	96.79	2.99
1994	13.10	6.10	3.37	96.63	6.34
1995	15.10	8.10	3.54	96.46	8.35
1996	16.10	9.10	3.70	96.30	9.36
1997	12.10	5.10	3.86	96.14	5.37
1998	10.10	3.10	3.91	96.09	3.37
1999	7.10	0.10	3.97	96.03	0.38
2000	2.10		4.02	95.98	0.08
2001	1.40		4.07	95.93	0.06
2002	1.00		4.12	95.88	0.04
2003			4.29	95.71	0.00
2004			4.46	95.54	0.00
2005			4.63	95.37	0.00
2006			4.80	95.20	0.00
2007			4.97	95.03	0.00
2008			5.19	94.81	0.00
2009			5.40	94.60	0.00
2010			5.62	94.38	0.00
2011			5.84	94.16	0.00
2012			6.05	93.95	0.00
2013			6.29	93.71	0.00
2014			6.52	93.48	0.00
2015			6.76	93.24	0.00
2016			6.99	93.01	0.00
2017			7.22	92.78	0.00
2018			7.50	92.50	0.00
2019			7.78	92.22	0.00
2020			8.06	91.94	0.00
2021			8.33	91.67	0.00
2022			8.61	91.39	0.00

URBAN = BLOOD DONORS ADJUSTED, 1989–1993,
RURAL = ANTENATAL ,1993, THEN ADJUSTED

ADULT PREVALENCE RATE, 1987–2022, DISTRICT : KARONGA KARONGA

	PREVRATE URBAN	PREVRATE RURAL	% ADULTS URBAN	% ADULTS RURAL	PREVRATE AGGREGATE
1987	8.20	3.00	13.92	86.08	3.72
1988	10.10	4.50	14.15	85.85	5.29
1989	12.00	6.00	14.38	85.62	6.86
1990	12.95	7.50	14.60	85.40	8.30
1991	13.90	9.00	14.83	85.17	9.73
1992	14.19	10.50	15.05	84.95	11.06
1993	14.48	12.00	15.35	84.65	12.38
1994	17.83	15.83	15.64	84.36	16.15
1995	19.83	17.83	15.93	84.07	18.15
1996	20.83	18.83	16.22	83.78	19.16
1997	16.83	14.83	16.51	83.49	15.16
1998	14.83	12.83	16.95	83.05	13.17
1999	11.83	9.83	17.39	82.61	10.18
2000	6.83	4.83	17.83	82.17	5.19
2001	6.13	4.13	18.26	81.74	4.50
2002	5.73	3.73	18.70	81.30	4.11
2003	4.73	2.73	19.26	80.74	3.12
2004	4.73	2.73	19.83	80.17	3.13
2005	4.73	2.73	20.40	79.60	3.14
2006	3.73	1.73	20.96	79.04	2.15
2007	2.73	1.00	21.53	78.47	1.37
2008	1.73		22.13	77.87	0.38
2009	0.73		22.74	77.26	0.17
2010			23.34	76.66	0.00
2011			23.95	76.05	0.00
2012			24.55	75.45	0.00
2013			25.30	74.70	0.00
2014			26.04	73.96	0.00
2015			26.78	73.22	0.00
2016			27.53	72.47	0.00
2017			28.27	71.73	0.00
2018			29.10	70.90	0.00
2019			29.93	70.07	0.00
2020			30.75	69.25	0.00
2021			31.58	68.42	0.00
2022			32.41	67.59	0.00

ADULT PREVALENCE RATE, 1967–2022, DISTRICT : KASUNGU KASUNGU

	PREVRATE URBAN	PREVRATE RURAL	% ADULTS URBAN	% ADULTS RURAL	PREVRATE AGGREGATE
1967	8.20	3.00	3.91	96.09	3.20
1968	10.10	3.17	4.01	95.99	3.44
1969	12.00	3.33	4.11	95.89	3.69
1990	15.90	3.50	4.21	95.79	4.02
1991	19.80	3.67	4.31	95.69	4.36
1992	21.30	3.83	4.41	95.59	4.60
1993	22.80	4.00	4.46	95.54	4.84
1994	26.63	8.63	4.50	95.50	9.44
1995	28.63	10.63	4.55	95.45	11.45
1996	29.63	11.63	4.60	95.40	12.46
1997	25.63	7.63	4.64	95.36	8.47
1998	23.63	5.63	4.77	95.23	6.49
1999	20.63	2.63	4.91	95.09	3.52
2000	15.63	2.00	5.04	94.96	2.69
2001	14.93	2.00	5.17	94.83	2.67
2002	14.53	2.00	5.30	94.70	2.66
2003	13.53	1.00	5.46	94.54	1.68
2004	13.53	1.00	5.61	94.39	1.70
2005	13.53	1.00	5.77	94.23	1.72
2006	11.53		5.92	94.08	0.68
2007	9.53		6.08	93.92	0.58
2008	7.53		6.31	93.69	0.48
2009	5.53		6.53	93.47	0.36
2010	3.80		6.76	93.24	0.26
2011	2.80		6.99	93.01	0.20
2012	1.80		7.22	92.78	0.13
2013	0.80		7.47	92.53	0.06
2014			7.72	92.28	0.00
2015			7.98	92.02	0.00
2016			8.23	91.77	0.00
2017			8.48	91.52	0.00
2018			8.81	91.19	0.00
2019			9.14	90.86	0.00
2020			9.47	90.53	0.00
2021			9.81	90.19	0.00
2022			10.14	89.86	0.00

ADULT PREVALENCE RATE, 1967–2022, DISTRICT : LILONGWE LILONGWWE

	PREVRATE URBAN	PREVRATE RURAL	% ADULTS URBAN	% ADULTS RURAL	PREVRATE AGGREGATE
1967	8.20	3.00	23.66	76.34	4.23
1968	16.40	4.00	24.58	75.42	7.05
1969	16.40	6.40	25.50	74.50	8.95
1990	17.90	7.80	26.42	73.58	10.47
1991	22.70	8.00	27.34	72.66	12.02
1992	24.20	9.50	28.26	71.74	13.65
1993	25.70	11.00	29.17	70.83	15.29
1994	29.53	14.83	30.07	69.93	19.25
1995	31.53	16.83	30.97	69.03	21.39
1996	32.53	17.83	31.87	68.13	22.52
1997	28.53	19.83	32.77	67.23	22.68
1998	26.53	17.83	33.69	66.31	20.76
1999	24.53	15.83	34.61	65.39	18.84
2000	22.53	13.83	35.52	64.48	16.92
2001	20.53	11.83	36.44	63.56	15.00
2002	18.53	9.83	37.36	62.64	13.08
2003	16.53	7.83	38.36	61.64	11.17
2004	14.53	5.83	39.35	60.65	9.26
2005	12.53	3.83	40.35	59.65	7.34
2006	10.53	1.83	41.34	58.66	5.43
2007	8.53	1.00	42.34	57.66	4.19
2008	6.53		43.14	56.86	2.82
2009	4.53		43.94	56.06	1.99
2010	2.53		44.75	55.25	1.13
2011	0.53		45.55	54.45	0.24
2012			46.36	53.64	0.00
2013			47.24	52.76	0.00
2014			48.12	51.88	0.00
2015			49.00	51.00	0.00
2016			49.89	50.11	0.00
2017			50.77	49.23	0.00
2018			51.63	48.37	0.00
2019			52.50	47.50	0.00
2020			53.36	46.64	0.00
2021			54.22	45.78	0.00
2022			55.09	44.91	0.00

ADULT PREVALENCE RATE, 1987-2022, DISTRICT: MANGOCHI MANGOCHI

	PREVRATE URBAN	PREVRATE RURAL	% ADULTS URBAN	% ADULTS RURAL	PREVRATE AGGREGATE
1987	8.20	3.00	4.03	95.97	3.21
1988	10.26	5.33	4.14	95.86	5.54
1989	12.32	7.67	4.25	95.75	7.86
1990	14.38	10.00	4.36	95.64	10.19
1991	16.44	12.33	4.47	95.53	12.52
1992	18.50	14.67	4.58	95.42	14.84
1993	20.00	17.00	4.66	95.34	17.14
1994	23.83	20.83	4.74	95.26	20.98
1995	25.83	22.83	4.82	95.18	22.98
1996	26.83	23.83	4.90	95.10	23.98
1997	22.83	19.83	4.99	95.01	19.98
1998	20.83	17.83	5.16	94.84	17.99
1999	18.83	15.83	5.34	94.66	15.99
2000	16.83	13.83	5.52	94.48	14.00
2001	14.83	11.83	5.69	94.31	12.00
2002	12.83	9.83	5.87	94.13	10.01
2003	10.83	7.83	6.06	93.94	8.02
2004	8.83	5.83	6.26	93.74	6.02
2005	6.83	3.83	6.46	93.54	4.03
2006	4.83	1.83	6.65	93.35	2.03
2007	2.83	1.00	6.85	93.15	1.13
2008	0.83		7.09	92.91	0.06
2009			7.33	92.67	0.00
2010			7.58	92.42	0.00
2011			7.82	92.18	0.00
2012			8.06	91.94	0.00
2013			8.40	91.60	0.00
2014			8.73	91.27	0.00
2015			9.06	90.94	0.00
2016			9.39	90.61	0.00
2017			9.72	90.28	0.00
2018			10.08	89.92	0.00
2019			10.44	89.56	0.00
2020			10.79	89.21	0.00
2021			11.15	88.85	0.00
2022			11.51	88.49	0.00

ADULT PREVALENCE RATE, 1987–2022, NKHATABAY

	PREVRATE URBAN	PREVRATE RURAL	% ADULTS URBAN	% ADULTS RURAL	NKHATABAY PREVRATE AGGREGATE
1987	8.20	3.00	3.95	96.05	3.21
1988	10.68	4.00	4.29	95.71	4.29
1989	13.15	5.00	4.64	95.36	5.38
1990	15.63	6.00	4.99	95.01	6.48
1991	18.10	7.00	5.33	94.67	7.59
1992	20.06	8.00	5.68	94.32	8.69
1993	21.56	9.00	5.73	94.27	9.72
1994	25.39	13.39	5.79	94.21	14.09
1995	27.39	15.39	5.84	94.16	16.09
1996	28.39	16.39	5.89	94.11	17.10
1997	24.39	12.39	5.94	94.06	13.11
1998	22.39	10.39	6.16	93.84	11.13
1999	20.39	8.39	6.37	93.63	9.16
2000	18.39	6.39	6.59	93.41	7.18
2001	16.39	4.39	6.80	93.20	5.21
2002	14.39	2.39	7.02	92.98	3.24
2003	12.39	0.39	7.27	92.73	1.27
2004	10.39		7.52	92.48	0.78
2005	8.39		7.77	92.23	0.65
2006	6.39		8.02	91.98	0.51
2007	4.39		8.27	91.73	0.36
2008	2.39		8.56	91.44	0.20
2009	0.39		8.86	91.14	0.03
2010			9.15	90.85	0.00
2011			9.45	90.55	0.00
2012			9.74	90.26	0.00
2013			10.08	89.92	0.00
2014			10.42	89.58	0.00
2015			10.75	89.25	0.00
2016			11.09	88.91	0.00
2017			11.43	88.57	0.00
2018			11.88	88.12	0.00
2019			12.34	87.66	0.00
2020			12.79	87.21	0.00
2021			13.25	86.75	0.00
2022			13.71	86.29	0.00

URBAN: AVERAGE BLOOD–DONORS FOR 1991, OTHER YEARS ADJUSTED

RURAL: ANTE–NATAL RATE IN 1993 ASSUMED TO BE 9%, OTHER YEARS ADJUSTED

ADULT PREVALENCE RATE, 1987–2022, DISTRICT : MACHINGA MACHINGA

	PREVRATE URBAN	PREVRATE RURAL	% ADULTS URBAN	% ADULTS RURAL	PREVRATE AGGREGATE
1987	8.20	3.00	3.61	96.39	3.19
1988	10.20	4.08	3.66	96.34	4.30
1989	12.20	5.16	3.71	96.29	5.42
1990	14.20	6.24	3.76	96.24	6.53
1991	16.20	7.31	3.81	96.19	7.65
1992	18.20	8.39	3.86	96.14	8.77
1993	19.70	9.47	4.01	95.99	9.88
1994	23.53	13.53	4.16	95.84	13.95
1995	25.53	15.53	4.31	95.69	15.96
1996	26.53	16.53	4.46	95.54	16.98
1997	22.53	12.53	4.61	95.39	12.99
1998	20.53	10.53	4.75	95.25	11.01
1999	18.53	8.53	4.88	95.12	9.02
2000	16.53	6.53	5.02	94.98	7.04
2001	14.53	4.53	5.16	94.84	5.05
2002	12.53	2.53	5.30	94.70	3.06
2003	10.53	0.53	5.48	94.52	1.08
2004	8.53		5.65	94.35	0.48
2005	6.53		5.83	94.17	0.38
2006	4.53		6.01	93.99	0.27
2007	2.53		6.19	93.81	0.16
2008	0.53		6.41	93.59	0.05
2009			6.64	93.36	0.00
2010			6.87	93.13	0.00
2011			7.09	92.91	0.00
2012			7.32	92.68	0.00
2013			7.60	92.40	0.00
2014			7.88	92.12	0.00
2015			8.16	91.84	0.00
2016			8.44	91.56	0.00
2017			8.72	91.28	0.00
2018			9.07	90.93	0.00
2019			9.41	90.59	0.00
2020			9.75	90.25	0.00
2021			10.10	89.90	0.00
2022			10.44	89.56	0.00

ADULT PREVALENCE RATE, 1987-2022, DISTRICT : MICHINJI MICHINJI

	PREVRATE URBAN	PREVRATE RURAL	% ADULTS URBAN	% ADULTS RURAL	PREVRATE AGGREGATE
1987	8.20	3.00	2.22	97.78	3.12
1988	12.75	5.60	2.29	97.71	5.76
1989	17.30	8.20	2.37	97.63	8.42
1990	21.85	10.80	2.44	97.56	11.07
1991	26.40	13.40	2.51	97.49	13.73
1992	28.46	16.00	2.58	97.42	16.32
1993	29.96	18.60	2.62	97.38	18.90
1994	33.79	23.79	2.65	97.35	24.06
1995	35.79	25.79	2.69	97.31	26.06
1996	36.79	26.79	2.73	97.27	27.07
1997	32.79	22.79	2.76	97.24	23.07
1998	30.79	20.79	2.79	97.21	21.07
1999	28.79	18.79	2.81	97.19	19.07
2000	26.79	16.79	2.84	97.16	17.08
2001	24.79	14.79	2.86	97.14	15.08
2002	22.79	12.79	2.88	97.12	13.08
2003	20.79	10.79	3.01	96.99	11.09
2004	18.79	8.79	3.14	96.86	9.11
2005	16.79	6.79	3.27	96.73	7.12
2006	14.79	4.79	3.40	96.60	5.13
2007	12.79	2.79	3.53	96.47	3.15
2008	10.79	0.79	3.68	96.32	1.16
2009	8.79		3.83	96.17	0.34
2010	6.79		3.99	96.01	0.27
2011	4.79		4.14	95.86	0.20
2012	2.79		4.29	95.71	0.12
2013	0.79		4.45	95.55	0.04
2014			4.61	95.39	0.00
2015			4.78	95.22	0.00
2016			4.94	95.06	0.00
2017			5.10	94.90	0.00
2018			5.30	94.70	0.00
2019			5.50	94.50	0.00
2020			5.71	94.29	0.00
2021			5.91	94.09	0.00
2022			6.11	93.89	0.00

ADULT PREVALENCE RATE, 1987–2022, DISTRICT : MULANJE MULANJE

	PREVRATE URBAN	PREVRATE RURAL	% ADULTS URBAN	% ADULTS RURAL	PREVRATE AGGREGATE
1987	8.20	3.00	1.78	98.22	3.09
1988	12.56	7.29	1.83	98.17	7.39
1989	16.92	11.58	1.88	98.12	11.68
1990	21.28	15.87	1.93	98.07	15.97
1991	25.64	20.16	1.98	98.02	20.27
1992	30.00	24.45	2.03	97.97	24.56
1993	31.50	28.74	2.09	97.91	28.80
1994	35.33	32.33	2.16	97.84	32.40
1995	37.33	34.33	2.22	97.78	34.40
1996	38.33	35.33	2.28	97.72	35.40
1997	34.33	31.33	2.35	97.65	31.40
1998	32.33	29.33	2.41	97.59	29.41
1999	30.33	27.33	2.47	97.53	27.41
2000	28.33	25.33	2.53	97.47	25.41
2001	26.33	23.33	2.59	97.41	23.41
2002	24.33	21.33	2.66	97.34	21.41
2003	22.33	19.33	2.74	97.26	19.42
2004	20.33	17.33	2.82	97.18	17.42
2005	18.33	15.33	2.90	97.10	15.42
2006	16.33	13.33	2.98	97.02	13.42
2007	14.33	11.33	3.06	96.94	11.43
2008	12.33	9.33	3.19	96.81	9.43
2009	10.33	7.33	3.33	96.67	7.43
2010	8.33	5.33	3.46	96.54	5.44
2011	6.33	3.33	3.60	96.40	3.44
2012	4.33	1.33	3.73	96.27	1.45
2013	2.33	1.00	3.88	96.12	1.05
2014	1.00		4.03	95.97	0.04
2015			4.17	95.83	0.00
2016			4.32	95.68	0.00
2017			4.46	95.54	0.00
2018			4.66	95.34	0.00
2019			4.86	95.14	0.00
2020			5.05	94.95	0.00
2021			5.25	94.75	0.00
2022			5.44	94.56	0.00

ADULT PREVALENCE RATE, 1987–2022, DISTRICT : MWANZA MWANZA

	PREVRATE URBAN	PREVRATE RURAL	% ADULTS URBAN	% ADULTS RURAL	PREVRATE AGGREGATE
1987	8.20	3.00	3.23	96.77	3.17
1988	10.16	5.00	3.40	96.60	5.18
1989	12.12	7.00	3.58	96.42	7.18
1990	14.08	9.00	3.76	96.24	9.19
1991	16.04	11.00	3.93	96.07	11.20
1992	18.00	13.00	4.11	95.89	13.21
1993	19.50	15.00	4.21	95.79	15.19
1994	23.33	19.33	4.30	95.70	19.51
1995	25.33	21.33	4.40	95.60	21.51
1996	26.33	22.33	4.50	95.50	22.51
1997	22.33	18.33	4.60	95.40	18.52
1998	20.33	16.33	4.85	95.15	16.53
1999	18.33	14.33	5.11	94.89	14.54
2000	16.33	12.33	5.37	94.63	12.55
2001	14.33	10.33	5.63	94.37	10.56
2002	12.33	8.33	5.88	94.12	8.57
2003	10.33	6.33	6.02	93.98	6.57
2004	8.33	4.33	6.15	93.85	4.58
2005	6.33	2.33	6.29	93.71	2.58
2006	4.33	0.33	6.42	93.58	0.59
2007	2.33		6.56	93.44	0.15
2008	0.33		6.77	93.23	0.02
2009			6.99	93.01	0.00
2010			7.21	92.79	0.00
2011			7.42	92.58	0.00
2012			7.64	92.36	0.00
2013			7.91	92.09	0.00
2014			8.18	91.82	0.00
2015			8.44	91.56	0.00
2016			8.71	91.29	0.00
2017			8.98	91.02	0.00
2018			9.37	90.63	0.00
2019			9.76	90.24	0.00
2020			10.16	89.84	0.00
2021			10.55	89.45	0.00
2022			10.94	89.06	0.00

URBAN: AVERAGE BLOOD–DONORS FOR 1992, OTHER YEARS ADJUSTED

RURAL: ANTE–NATAL RATE ASSUMED TO BE 15% IN 1993, OTHER YEARS ADJUSTED

ADULT PREVALENCE RATE, 1987–2022, DISTRICT : MZIMBA MZIMBA

	PREVRATE URBAN	PREVRATE RURAL	% ADULTS URBAN	% ADULTS RURAL	PREVRATE AGGREGATE
1987	8.20	3.00	8.81	91.19	3.46
1988	11.15	3.80	9.86	90.14	4.52
1989	14.10	4.60	10.92	89.08	5.64
1990	17.05	5.40	11.97	88.03	6.79
1991	20.00	6.20	13.02	86.98	8.00
1992	21.96	7.00	14.07	85.93	9.11
1993	23.46	7.80	14.52	85.48	10.07
1994	27.29	11.29	14.96	85.04	13.69
1995	29.29	13.29	15.41	84.59	15.76
1996	30.29	14.29	15.85	84.15	16.83
1997	26.29	10.29	16.29	83.71	12.90
1998	24.29	8.29	16.88	83.12	10.99
1999	22.29	6.29	17.46	82.54	9.09
2000	20.29	4.29	18.05	81.95	7.18
2001	18.29	2.29	18.63	81.37	5.27
2002	16.29	0.29	19.22	80.78	3.37
2003	14.29		19.84	80.16	2.84
2004	12.29		20.46	79.54	2.52
2005	10.29		21.08	78.92	2.17
2006	8.29		21.70	78.30	1.80
2007	6.29		22.33	77.67	1.41
2008	4.29		22.99	77.01	0.99
2009	2.29		23.65	76.35	0.54
2010	0.29		24.32	75.68	0.07
2011			24.98	75.02	0.00
2012			25.65	74.35	0.00
2013			26.43	73.57	0.00
2014			27.21	72.79	0.00
2015			27.99	72.01	0.00
2016			28.77	71.23	0.00
2017			29.55	70.45	0.00
2018			30.36	69.64	0.00
2019			31.17	68.83	0.00
2020			31.97	68.03	0.00
2021			32.78	67.22	0.00
2022			33.58	66.42	0.00

URBAN: AVERAGE BLOOD–DONORS FOR 1991, OTHER YEARS ADJUSTED

RURAL: ANTE–NATAL RATE IN 1993, OTHER YEARS ADJUSTED

ADULT PREVALENCE RATE, 1987–2022, DISTRICT : NKHOTAKOTA NKHOTAKOTA

	PREVRATE URBAN	PREVRATE RURAL	% ADULTS URBAN	% ADULTS RURAL	PREVRATE AGGREGATE
1987	8.20	3.00	8.05	91.95	3.42
1988	11.58	4.00	7.87	92.13	4.60
1989	14.95	5.00	7.68	92.32	5.76
1990	18.33	6.00	7.50	92.50	6.92
1991	21.70	7.00	7.32	92.68	8.08
1992	23.65	8.00	7.14	92.86	9.12
1993	25.16	9.00	7.28	92.72	10.18
1994	28.99	12.99	7.42	92.58	14.18
1995	30.99	14.99	7.55	92.45	16.20
1996	31.99	15.99	7.69	92.31	17.22
1997	27.99	11.99	7.83	92.17	13.25
1998	25.99	9.99	7.94	92.06	11.26
1999	23.99	7.99	8.05	91.95	9.28
2000	21.99	5.99	8.17	91.83	7.30
2001	19.99	3.99	8.28	91.72	5.32
2002	17.99	1.99	8.40	91.60	3.34
2003	15.99	1.00	8.76	91.24	2.31
2004	13.99		9.11	90.89	1.28
2005	11.99		9.47	90.53	1.14
2006	9.99		9.83	90.17	0.98
2007	7.99		10.19	89.81	0.81
2008	5.99		10.46	89.54	0.63
2009	3.99		10.73	89.27	0.43
2010	1.99		11.00	89.00	0.22
2011			11.27	88.73	0.00
2012			11.54	88.46	0.00
2013			11.98	88.02	0.00
2014			12.42	87.58	0.00
2015			12.86	87.14	0.00
2016			13.30	86.70	0.00
2017			13.74	86.26	0.00
2018			14.25	85.75	0.00
2019			14.75	85.25	0.00
2020			15.25	84.75	0.00
2021			15.75	84.25	0.00
2022			16.25	83.75	0.00

URBAN: BLOOD–DONORS FOR 1991, OTHER YEARS ADJUSTED

RURAL: ANTE–NATAL RATE IN 1993 ASSUMED TO BE 9%, OTHER YEARS ADJUSTED

ADULT PREVALENCE RATE, 1987–2022, DISTRICT : NSANJE NSANJE

	PREVRATE URBAN	PREVRATE RURAL	% ADULTS URBAN	% ADULTS RURAL	PREVRATE AGGREGATE
1987	8.20	3.00	6.42	93.58	5.33
1988	9.58	4.50	6.43	93.57	6.89
1989	10.95	6.00	6.43	93.57	8.32
1990	12.33	7.50	6.44	93.56	7.81
1991	13.70	9.00	6.45	93.55	9.30
1992	15.66	10.50	6.45	93.55	10.89
1993	17.16	12.00	6.65	93.35	12.34
1994	20.99	15.99	6.84	93.16	16.34
1995	22.99	17.99	7.04	92.96	18.35
1996	23.99	18.99	7.24	92.76	19.36
1997	19.99	14.99	7.43	92.57	15.36
1998	17.99	12.99	7.62	92.38	13.37
1999	15.99	10.99	7.81	92.19	11.38
2000	13.99	8.99	8.00	92.00	9.39
2001	11.99	6.99	8.19	91.81	7.40
2002	9.99	4.99	8.38	91.62	5.41
2003	7.99	2.99	8.63	91.37	3.42
2004	5.99	0.99	8.87	91.13	1.44
2005	3.99		9.11	90.89	0.36
2006	1.99		9.35	90.65	0.19
2007	1.00		9.60	90.40	0.10
2008			9.93	90.07	0.00
2009			10.26	89.74	0.00
2010			10.59	89.41	0.00
2011			10.92	89.08	0.00
2012			11.26	88.74	0.00
2013			11.69	88.31	0.00
2014			12.13	87.87	0.00
2015			12.56	87.44	0.00
2016			13.00	87.00	0.00
2017			13.43	86.57	0.00
2018			13.87	86.13	0.00
2019			14.31	85.69	0.00
2020			14.75	85.25	0.00
2021			15.19	84.81	0.00
2022			15.64	84.36	0.00

URBAN: BLOOD–DONORS FOR 1991, OTHER YEARS ADJUSTED

RURAL: ANTE–NATAL RATE IN 1993 ASSUMED TO BE 12%, OTHER YEARS ADJUSTED

ADULT PREVALENCE RATE, 1987–2022, DISTRICT : NTCHEU NTCHEU

	PREVRATE URBAN	PREVRATE RURAL	% ADULTS URBAN	% ADULTS RURAL	PREVRATE AGGREGATE
1987	5.00	2.00	1.60	98.40	2.05
1988	7.47	2.93	1.65	98.35	3.01
1989	9.93	3.87	1.70	98.30	3.97
1990	12.40	4.80	1.74	98.26	4.93
1991	14.90	5.73	1.79	98.21	5.90
1992	14.90	6.67	1.83	98.17	6.82
1993	15.70	7.60	1.85	98.15	7.75
1994	18.40	10.40	1.87	98.13	10.55
1995	20.40	12.40	1.89	98.11	12.55
1996	21.40	13.40	1.91	98.09	13.55
1997	17.40	9.40	1.93	98.07	9.55
1998	15.40	7.40	2.02	97.98	7.56
1999	13.40	5.40	2.10	97.90	5.57
2000	11.40	3.40	2.19	97.81	3.58
2001	9.40	1.40	2.28	97.72	1.58
2002	7.40	1.00	2.36	97.64	1.15
2003	5.40		2.40	97.60	0.13
2004	3.40		2.44	97.56	0.08
2005	1.40		2.48	97.52	0.03
2006	1.00		2.52	97.48	0.03
2007			2.56	97.44	0.00
2008			2.67	97.33	0.00
2009			2.79	97.21	0.00
2010			2.91	97.09	0.00
2011			3.02	96.98	0.00
2012			3.14	96.86	0.00
2013			3.26	96.74	0.00
2014			3.38	96.62	0.00
2015			3.50	96.50	0.00
2016			3.62	96.38	0.00
2017			3.74	96.26	0.00
2018			3.86	96.14	0.00
2019			3.99	96.01	0.00
2020			4.11	95.89	0.00
2021			4.23	95.77	0.00
2022			4.36	95.64	0.00

URBAN: BLOOD–DONORS FOR 1990–94, OTHER YEARS ADJUSTED

RURAL: ANTE–NATAL RATE IN 1993 ASSUMED TO BE 7.6%, OTHER YEARS ADJUSTED

ADULT PREVALENCE RATE, 1987–2022, DISTRICT : NTCHISI NTCHISI

	PREVRATE URBAN	PREVRATE RURAL	% ADULTS URBAN	% ADULTS RURAL	PREVRATE AGGREGATE
1987	5.00	2.00	1.59	98.41	2.05
1988	6.18	2.93	1.82	98.18	2.99
1989	7.37	3.87	2.05	97.95	3.94
1990	8.55	4.80	2.28	97.72	4.89
1991	9.73	5.73	2.51	97.49	5.83
1992	12.10	6.67	2.74	97.26	6.82
1993	12.90	7.60	2.88	97.12	7.75
1994	15.60	10.60	3.02	96.98	10.75
1995	17.60	12.60	3.16	96.84	12.76
1996	18.60	13.60	3.31	96.69	13.77
1997	14.60	9.60	3.45	96.55	9.77
1998	12.60	7.60	3.36	96.64	7.77
1999	10.60	5.60	3.27	96.73	5.78
2000	8.60	3.60	3.18	96.82	3.76
2001	6.60	1.60	3.09	96.91	1.75
2002	4.60	1.00	3.00	97.00	1.11
2003	2.60		3.07	96.93	0.08
2004	0.60		3.14	96.86	0.02
2005			3.22	96.78	0.00
2006			3.29	96.71	0.00
2007			3.36	96.64	0.00
2008			3.54	96.46	0.00
2009			3.72	96.28	0.00
2010			3.90	96.10	0.00
2011			4.08	95.92	0.00
2012			4.26	95.74	0.00
2013			4.50	95.50	0.00
2014			4.74	95.26	0.00
2015			4.97	95.03	0.00
2016			5.21	94.79	0.00
2017			5.45	94.55	0.00
2018			5.63	94.37	0.00
2019			5.80	94.20	0.00
2020			5.97	94.03	0.00
2021			6.14	93.86	0.00
2022			6.32	93.68	0.00

URBAN: BLOOD–DONORS FOR 1992, OTHER YEARS ADJUSTED

RURAL: ANTE–NATAL RATE IN 1993 ASSUMED TO BE 7.6%, OTHER YEARS ADJUSTED

ADULT PREVALENCE RATE, 1987-2022, DISTRICT : RUMPHI RUMPHI

	PREVRATE URBAN	PREVRATE RURAL	% ADULTS URBAN	% ADULTS RURAL	PREVRATE AGGREGATE
1987	9.00	4.00	7.69	92.31	4.38
1988	10.60	4.95	7.82	92.18	5.39
1989	12.20	5.90	7.95	92.05	6.40
1990	13.80	6.85	8.08	91.92	7.41
1991	14.00	7.80	8.21	91.79	8.31
1992	16.37	8.75	8.33	91.67	9.38
1993	17.17	9.70	8.41	91.59	10.33
1994	19.67	12.67	8.48	91.52	13.46
1995	21.67	14.67	8.55	91.45	15.47
1996	22.67	15.67	8.62	91.38	16.47
1997	18.67	11.67	8.70	91.30	12.48
1998	16.67	9.67	8.98	91.02	10.50
1999	14.67	7.67	9.27	90.73	8.52
2000	12.67	5.67	9.55	90.45	6.54
2001	10.67	3.67	9.84	90.16	4.56
2002	8.67	1.67	10.13	89.87	2.58
2003	6.67	1.00	10.44	89.56	1.61
2004	4.67		10.76	89.24	0.52
2005	2.67		11.07	88.93	0.32
2006	0.67		11.39	88.61	0.10
2007			11.70	88.30	0.00
2008			12.24	87.76	0.00
2009			12.79	87.21	0.00
2010			13.33	86.67	0.00
2011			13.87	86.13	0.00
2012			14.41	85.59	0.00
2013			14.81	85.19	0.00
2014			15.21	84.79	0.00
2015			15.61	84.39	0.00
2016			16.01	83.99	0.00
2017			16.41	83.59	0.00
2018			16.99	83.01	0.00
2019			17.57	82.43	0.00
2020			18.15	81.85	0.00
2021			18.73	81.27	0.00
2022			19.31	80.69	0.00

URBAN: BLOOD-DONORS FOR 1990, ASSUMED 14% FOR 1991, OTHER YEARS ADJUSTED
RURAL: ANTE-NATAL RATE IN 1989 ASSUMED TO BE 9.7%, OTHER YEARS ADJUSTED

ADULT PREVALENCE RATE, 1987–2022, DISTRICT : SALIMA SALIMA

	PREVRATE URBAN	PREVRATE RURAL	% ADULTS URBAN	% ADULTS RURAL	PREVRATE AGGREGATE
1987	7.00	4.00	7.69	92.31	4.23
1988	9.77	4.60	7.85	92.15	5.01
1989	12.53	5.20	8.01	91.99	5.79
1990	15.30	5.80	8.16	91.84	6.58
1991	18.30	6.40	8.32	91.68	7.39
1992	20.67	7.00	8.47	91.53	8.16
1993	21.47	7.60	8.66	91.34	8.80
1994	24.17	10.17	8.85	91.15	11.41
1995	26.17	12.17	9.04	90.96	13.43
1996	27.17	13.17	9.23	90.77	14.46
1997	23.17	9.17	9.42	90.58	10.49
1998	21.17	7.17	9.59	90.41	8.51
1999	19.17	5.17	9.75	90.25	6.53
2000	17.17	3.17	9.92	90.08	4.56
2001	15.17	1.17	10.09	89.91	2.58
2002	13.17	0.50	10.26	89.74	1.80
2003	11.17		10.56	89.44	1.18
2004	9.17		10.86	89.14	1.00
2005	7.17		11.16	88.84	0.80
2006	5.17		11.46	88.54	0.59
2007	3.17		11.76	88.24	0.37
2008	1.17		12.32	87.68	0.14
2009	1.00		12.88	87.12	0.13
2010			13.44	86.56	0.00
2011			14.00	86.00	0.00
2012			14.55	85.45	0.00
2013			15.02	84.98	0.00
2014			15.48	84.52	0.00
2015			15.95	84.05	0.00
2016			16.41	83.59	0.00
2017			16.87	83.13	0.00
2018			17.50	82.50	0.00
2019			18.12	81.88	0.00
2020			18.75	81.25	0.00
2021			19.37	80.63	0.00
2022			20.00	80.00	0.00

URBAN: BLOOD–DONORS FOR 1990 AND 1991, OTHER YEARS ADJUSTED

RURAL: ANTE–NATAL RATE IN 1993 ASSUMED TO BE 7.6%, OTHER YEARS ADJUSTED

ADULT PREVALENCE RATE, 1987-2022, DISTRICT : THYOLO THYOLO

	PREVRATE URBAN	PREVRATE RURAL	% ADULTS URBAN	% ADULTS RURAL	PREVRATE AGGREGATE
1987	9.00	4.00	2.17	97.83	4.11
1988	12.67	6.08	2.18	97.82	6.22
1989	16.33	8.16	2.19	97.81	8.34
1990	20.00	10.23	2.20	97.80	10.45
1991	20.00	12.31	2.21	97.79	12.48
1992	22.37	14.39	2.22	97.78	14.57
1993	23.17	16.47	2.28	97.72	16.62
1994	25.87	18.87	2.34	97.66	19.03
1995	27.87	20.87	2.40	97.60	21.08
1996	26.87	21.87	2.46	97.54	22.04
1997	24.87	17.87	2.52	97.48	18.04
1998	22.87	15.87	2.57	97.43	16.05
1999	20.87	13.87	2.62	97.38	14.05
2000	18.87	11.87	2.68	97.32	12.05
2001	16.87	9.87	2.73	97.27	10.06
2002	14.87	7.87	2.79	97.21	8.06
2003	12.87	5.87	2.84	97.16	6.07
2004	10.87	3.87	2.90	97.10	4.07
2005	8.87	1.87	2.96	97.04	2.07
2006	6.87	1.00	3.02	96.98	1.18
2007	4.87		3.07	96.93	0.15
2008	2.87		3.23	96.77	0.09
2009	1.00		3.38	96.62	0.03
2010			3.54	96.46	0.00
2011			3.69	96.31	0.00
2012			3.85	96.15	0.00
2013			4.00	96.00	0.00
2014			4.15	95.85	0.00
2015			4.29	95.71	0.00
2016			4.44	95.56	0.00
2017			4.59	95.41	0.00
2018			4.77	95.23	0.00
2019			4.95	95.05	0.00
2020			5.12	94.88	0.00
2021			5.30	94.70	0.00
2022			5.48	94.52	0.00

URBAN: BLOOD-DONORS FOR 1990 AND 1991 ASSUMED 20%, OTHER YEARS ADJUSTED
RURAL: ANTE-NATAL RATE IN 1989 ASSUMED TO BE 16.47%, OTHER YEARS ADJUSTED

ADULT PREVALENCE RATE, 1987–2022, DISTRICT : ZOMBA ZOMBA

	PREVRATE URBAN	PREVRATE RURAL	% ADULTS URBAN	% ADULTS RURAL	PREVRATE AGGREGATE
1987	9.00	4.00	9.84	90.16	4.49
1988	14.25	6.45	10.17	89.83	7.24
1989	19.50	8.90	10.51	89.49	10.01
1990	24.75	11.35	10.84	89.16	12.80
1991	30.00	13.80	11.18	88.82	15.61
1992	32.37	16.25	11.51	88.49	18.11
1993	33.17	18.70	11.92	88.08	20.42
1994	35.87	20.87	12.32	87.68	22.71
1995	37.87	22.87	12.73	87.27	24.78
1996	36.87	23.87	13.13	86.87	25.84
1997	34.87	19.87	13.54	86.46	21.90
1998	32.87	17.87	14.02	85.98	19.97
1999	30.87	15.87	14.50	85.50	18.04
2000	28.87	13.87	14.98	85.02	16.11
2001	26.87	11.87	15.45	84.55	14.18
2002	24.87	9.87	15.93	84.07	12.26
2003	22.87	7.87	16.49	83.51	10.34
2004	20.87	5.87	17.04	82.96	8.42
2005	18.87	3.87	17.59	82.41	6.50
2006	16.87	1.87	18.14	81.86	4.59
2007	14.87	1.00	18.69	81.31	3.59
2008	12.87		19.28	80.72	2.48
2009	10.87		19.86	80.14	2.16
2010	8.87		20.45	79.55	1.81
2011	6.87		21.03	78.97	1.44
2012	4.87		21.62	78.38	1.05
2013	2.87		22.32	77.68	0.64
2014	0.87		23.02	76.98	0.20
2015			23.73	76.27	0.00
2016			24.43	75.57	0.00
2017			25.13	74.87	0.00
2018			25.87	74.13	0.00
2019			26.61	73.39	0.00
2020			27.34	72.66	0.00
2021			28.08	71.92	0.00
2022			28.82	71.18	0.00

URBAN: BLOOD–DONORS FOR 1990 ASSUMED 30%, OTHER YEARS ADJUSTED

RURAL: ANTE–NATAL RATE IN 1990 ASSUMED TO BE 19.7% (AVERAGE FOR SOUTHERN REGION), OTHER YEARS ADJUSTED