

Spectrum

Quick Start Tutorial



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Introduction

Spectrum is a policy modeling system. It contains modules for a number of reproductive health areas. For the purposes of making a national HIV estimate, two Spectrum modules are used: DemProj (for the demographic projection) and AIM for the epidemiological projection. This manual describes the basics of using these modules to make a national HIV estimate and projection. This tutorial just provides the minimum information needed to use Spectrum. Additional details are available in the manuals for these modules:

- Stover, John and Sharon Kirmeyer. ***DemProj Version 4. A computer program for making population projections.*** Washington, DC: The POLICY Project/Futures Group, December 2004.
- Stover, John. ***AIM Version 4. A computer program for making HIV/AIDS projections and examining the social and economic impacts of AIDS.*** Washington, DC: The POLICY Project/Futures Group. February 2005.

These manuals are available from the POLICY Project, One Thomas Circle, Washington, DC 20005 or from the Futures Group web site at www.FuturesGroup.com.

The UNAIDS approach to making national estimates is based on the use of surveillance data to describe levels of infection in specific populations. For generalized epidemics, these data are used with the (Epidemic Projection Package) to estimate adult prevalence over time based on surveillance data from ante-natal clinics. For low-level and concentrated epidemics these data are used with the Projections Workbook to estimate adult prevalence based on surveillance data from populations at risk. Spectrum reads the adult prevalence estimates from either EPP or the Workbook and calculates additional indicators, such as the number of people infected, the number of new infections, AIDS cases, AIDS deaths, the number of people needing treatment and the number of orphans. These calculations may be based on national demographic projections or on population estimates and projections prepared by the United Nations Population Division. Information on epidemic patterns is prepared by the UNAIDS Reference Group. These patterns describe the progression from infection to death, the distribution of infection by

age and sex, transmission of HIV from mother-to-child, the effect of HIV infection on fertility, and the effects of anti-retroviral therapy.

What you will learn

At the end of this training, you will be able to:

- Create a demographic projection using data from the United Nations Population Division.
- Create an HIV/AIDS projection using data from EPP or the Projections Workbook.
- Display various HIV/AIDS indicators such as the number of people infected, the number of new infections, AIDS cases, AIDS deaths, the number of people needing ART and the number of orphans.

Basic Steps in Using Spectrum

Step 1. Installing Spectrum

The Spectrum program is distributed on CD-ROM and through the Internet at <http://www.futuresgroup.com>. It can be run from a CD-ROM or installed on a hard disk. Spectrum will run on any computer running Windows 95 or later Windows versions. It requires about 9MB of hard disk space.

To install Spectrum from a CD-ROM or from a file downloaded from the internet, just double click on the file named “spectrum.exe”. This will start the installation program. Just follow the instructions on the screen to complete the installation.

Step 2. Changing the language in Spectrum

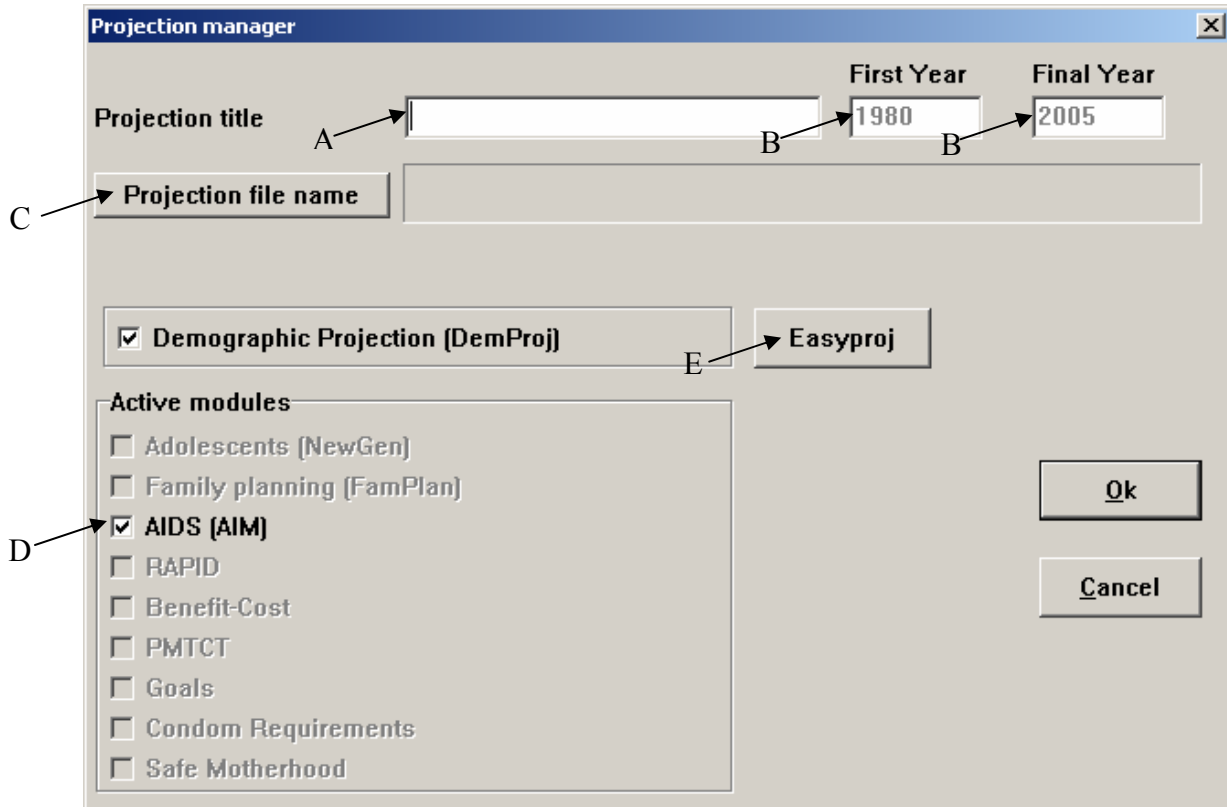
The first time you run Spectrum after installing it, all the displays will be in English. You can change to another language by selecting “Options” and “Environment” from the Spectrum menu. Then select the language you want to use and click on the “Ok” button. If you select a language other than French, Spanish or Portuguese, you must have the proper fonts or version of Windows to display the language correctly.

Step 3. Start Spectrum

Start the Spectrum program by selecting it from the menu on the CD-ROM or by selecting it from the “Start” menu on your computer.

Step 4. Create a population projection

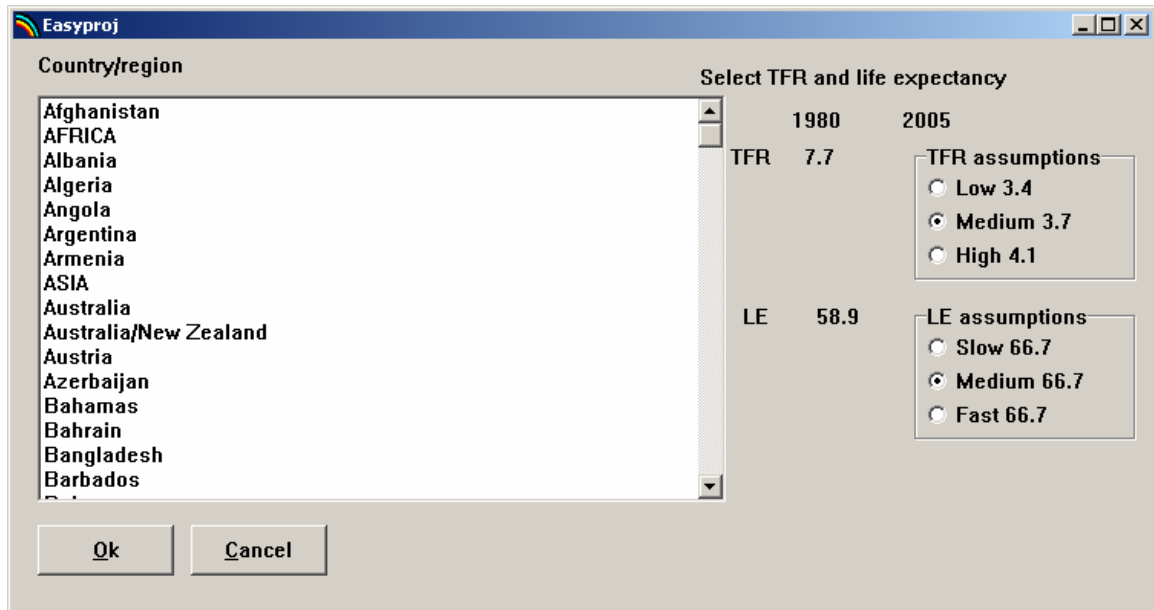
Create a new population projection by selecting “File” and “New projection” from the Spectrum menu. The “Projection manager” dialogue box will appear and will look like the following screen:



Follow these easy steps to complete the “Projection manager” screen:

- A. Click in the box next to “Projection title” and type a title for the projection.
- B. Set the “First year” to 1980 and the “Final year” to 2005.
- C. Click on the “Projection file name” button and enter a file name for this projection. (Be sure to select a location on the hard disk, C: drive for the file and not on the CD-ROM since the program cannot write a file to the CD-ROM.)
- D. Click the check box next to “AIDS (AIM)” to add the AIM module to the program.

- E. Then click the “EasyProj” button. The EasyProj dialogue box will appear and will look like the following screen:



On the EasyProj screen scroll down the list of countries until you find yours. Highlight the country by clicking it once. Then select “OK” and “OK” again on the “Projection Manager” dialogue box and the program will load all the necessary demographic data.

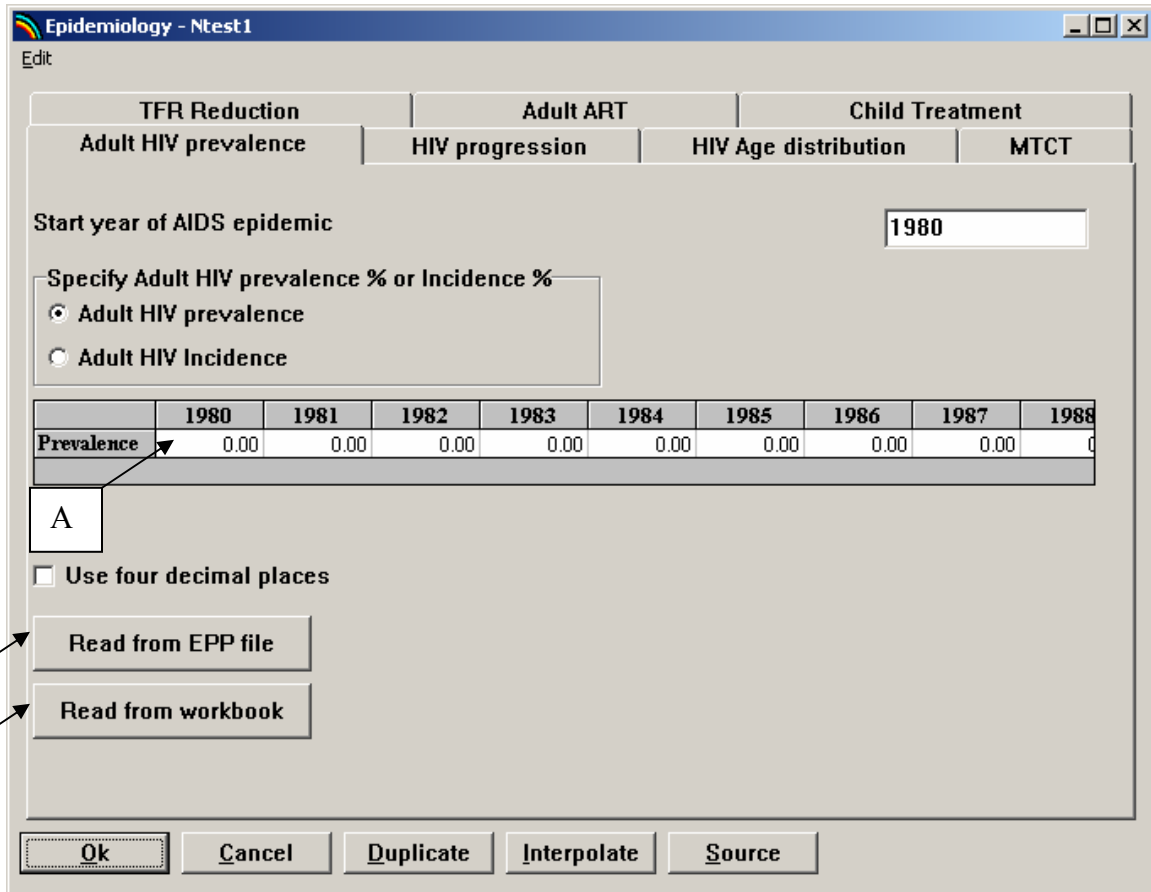
Step 5. Read the prevalence and projection estimates

Select “Edit” and “AIDS (AIM)” from the Spectrum menu. Next, click “Epidemiology” from the dialog box. Then you will see the editor for the prevalence projection. It will look like the screen shown below.

This editor allows you to enter the adult HIV prevalence. This can be done in several ways:

- A. **Enter the prevalence manually** by typing the values in the editor. You can copy a value to several years by selecting the value and the years to copy to and pressing the “Duplicate” button. You can interpolate between two years by outlining the range, including the first and last year, and pressing the “Interpolate” button.
- B. **Read the prevalence estimate and projection from EPP.** Click the button “Read from EPP file”. This will display a “file open” dialog box. Navigate to the directory where your EPP file is stored (for example C:\Program files\EPP2\epppout), select the appropriate file and click “Open” to complete this step. The prevalence projection from this file will be read into Spectrum and displayed in the editor.

- C. **Read the prevalence from the Projections Workbook.** Click the button “Read from workbook”. This will display a “file open” dialog box. Navigate to the directory where your Workbook file is stored (for example C:\Country files\projection), select the appropriate file and click “Open” to complete this step. The prevalence projection from this file will be read into Spectrum and displayed in the editor.



Step 6. Read the HIV Age Distribution estimates

Select the tab “HIV Age distribution” and the following screen will appear. This editor shows the age distribution of prevalence for males and females and the ratio of female to male prevalence over time.

The screenshot shows the 'Epidemiology - Ntest1' software interface. The 'HIV Age distribution' tab is selected. The interface includes several buttons and a table. Callouts A, B, C, and D point to specific elements: A points to 'Apply generalized epidemic pattern', B points to 'Apply concentrated epidemic pattern', C points to 'Enter DHS data', and D points to the 'DHS Year' dropdown menu which is set to '2003'. Below these is a table titled 'Male ratio of HIV prevalence to prevalence at 25-29' with columns for years 1980-1987 and rows for age groups 0-4 to 50-54. At the bottom are buttons for 'Male distribution', 'Female distribution', and 'Sex ratio', along with 'Ok', 'Cancel', 'Duplicate', 'Interpolate', and 'Source'.

Age	1980	1981	1982	1983	1984	1985	1986	1987
0-4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5-9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10-14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15-19	0.45	0.44	0.42	0.41	0.40	0.37	0.35	0.33
20-24	0.52	0.51	0.51	0.50	0.49	0.48	0.46	0.45
25-29	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30-34	1.63	1.64	1.66	1.67	1.68	1.71	1.74	1.76
35-39	0.84	0.85	0.87	0.88	0.90	0.93	0.96	0.99
40-44	0.78	0.80	0.82	0.84	0.85	0.88	0.92	0.94
45-49	0.83	0.84	0.85	0.86	0.87	0.88	0.90	0.90
50-54	0.31	0.32	0.33	0.35	0.35	0.36	0.38	0.40

Here you have three options.

- If your country has a generalized epidemic you should click the button “Apply generalized epidemic pattern”. This will insert the default age and sex pattern for generalized epidemics.
- If your country has a low level or concentrated epidemic, you should click the button, “Apply concentrated epidemic pattern”. This will insert the default age and sex pattern for low level and concentrated epidemics.
- If you have had a recent DHS or other general population survey that reported HIV prevalence by age and sex, then you can enter this information by clicking the “Enter DHS data button”. Enter the prevalence by age and sex and specify the year of the survey [D]. The program will automatically adjust the pattern in the editors to match the survey data in that year. Data for all other years will be adjusted proportionately.

Step 7. Describe mother-to-child transmission

Select the tab “MTCT” and the following screen will appear:

The screenshot shows the 'Epidemiology - Namibia base' software window. The 'MTCT' tab is selected. The interface is organized into three main columns: 'TFR Reduction', 'Adult ART', and 'Child Treatment'. The 'MTCT' section is active and contains three sub-sections: 'Med. duration of BF in pop.', 'Treatment Program', and 'Infant Feeding Options'. A table shows 'Base transmission rate (no program)' and 'Transmission rate with program' both set to 32.00. Below this, there are radio buttons for 'Specify pregnant women receiving PMTCT services as:'. At the bottom, a table shows 'Percent receiving PMTCT' for years 1980-1986, all set to 0.00. Callout boxes A through G point to various elements in the interface.

	1980	1981	1982	1983	1984	1985	1986	1987
Percent receiving PMTCT	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

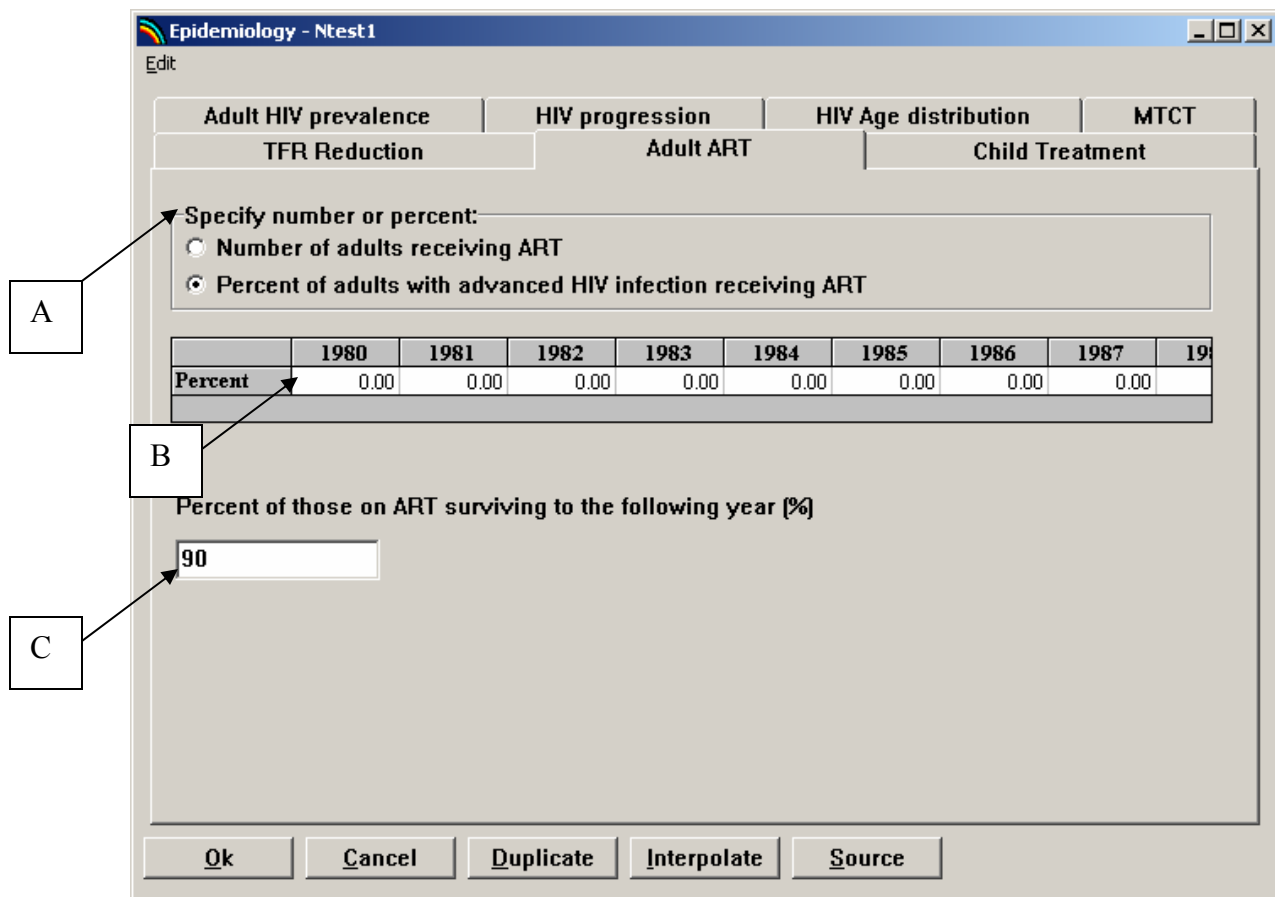
If there is no program to prevent mother-to-child transmission in your country then you can just accept the default values in this screen. However, most countries have such programs. You need to specify the type and scope of the program.

- Specify the median duration of breastfeeding.** Select the radio button that describes current breastfeeding practices.
- Select the treatment option.** Select the radio button that most closely describes the treatment available.
- Select the infant feeding option.** Select the type of infant feeding promoted by the program.
- Set the base transmission rate.** The mother-to-child transmission rate with no program is set by default depending on the median duration of breastfeeding to 30% when the period of breastfeeding is short, 32% when it is of medium length and 35% when it is long. If you have information about this rate in your country you can change this value.

- E. **Set the transmission rate for the program.** For those who served by the PMTCT program the transmission rate will be lower than the base rate due to treatment or alternative infant feeding practices. As you change the treatment and infant feeding selections the transmission rate will change to reflect the latest information available. If you wish, you can enter your own estimate of the transmission rate for those in the PMTCT program.
- F. **Set the program scope.** You can define the scope of the program either as the number of women receiving PMTCT services or as the percentage of pregnant women receiving services.
- G. **Enter the scope.** Specify the number or percent of pregnant women receiving PMTCT services each year of the projection.

Step 8. Describe the adult ART program

Select the Adult ART tab and you will see a screen that looks like the one below. Here you can describe the scope of antiretroviral treatment.



- A. **Set the program scope.** You can describe the scope of the ART program either as the number of people receiving ART or the percent of those who need it.
- B. **Enter the scope.** Enter the number or percent of people receiving ART for each year in the projection.

- C. **Define effectiveness.** Enter the effectiveness of ART treatment in terms of the percentage of those on ART who successfully continue on it the following year. By default this is set to 90%.

Step 9. Describe the child treatment program

Select the Child Treatment tab and you will see a screen that looks like the on below. Here you can describe the type and scope of child treatment.

The screenshot shows the 'Epidemiology - Namibia base' software window. The 'Child Treatment' tab is selected. The interface contains the following elements:

- Table 1:** A table with columns for years 1980, 1981, 1982, and 1983.

	1980	1981	1982	1983
Percent of children born to HIV+ mothers receiving cotrimoxazole	0.00	0.00	0.00	0.00
Percent of children with moderate-to-severe HIV disease receiving ART	0.00	0.00	0.00	0.00
- Table 2:** A table with a 'Percent' column.

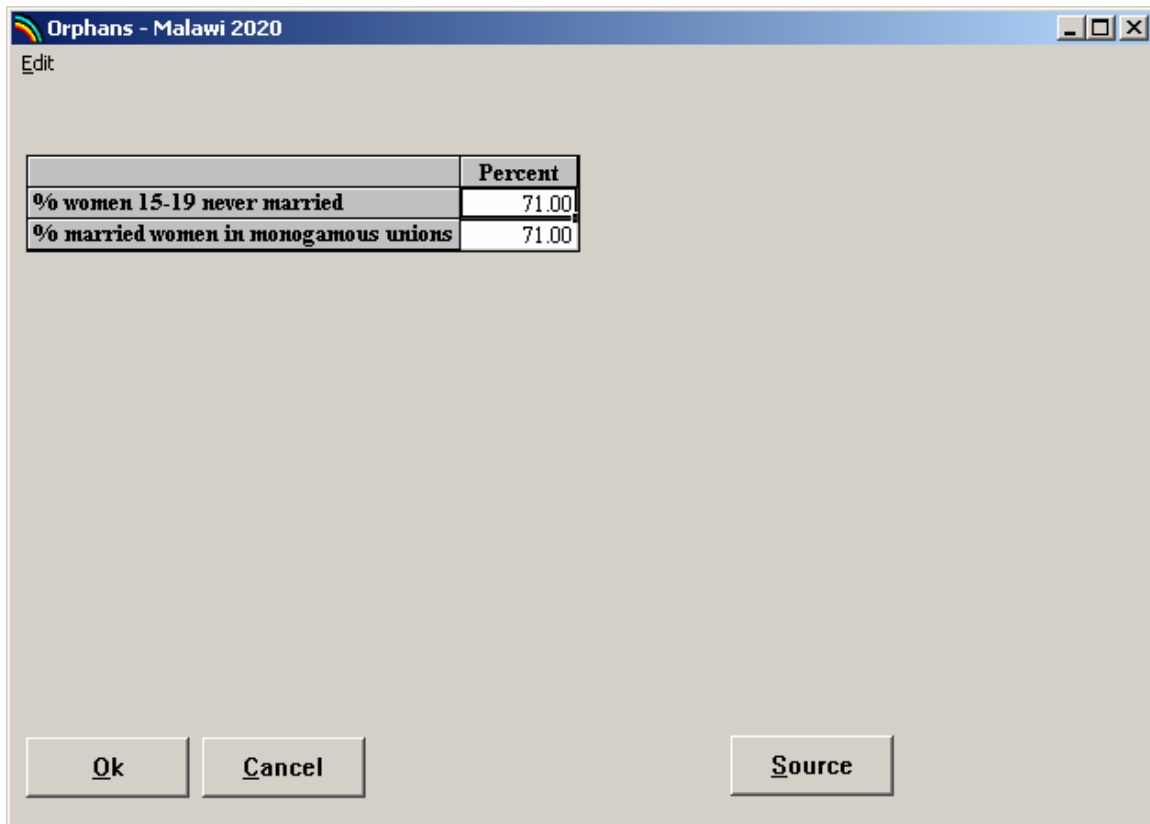
	Percent
% of children on cotrimoxazole surviving to the next year	91.00
% of children with moderate-to-severe HIV disease on ART surviving to the next year	90.00
% of children with moderate-to-severe HIV disease on ART and cotrimoxazole surviving to the next year	94.20
- Radio Button Group:** A section titled 'Is early diagnosis of HIV-infection available?' with two options: 'Yes' (unselected) and 'No' (selected).

- A. **Percent of children born to HIV+ mothers receiving cotrimoxazole.** Enter the percentage of children need cotrimoxazole who receive it. Children needing cotrimoxazole are defined as all children aged 0-18 months born to HIV+ mothers and all children aged 18 months to 15 years who are HIV+.
- B. **Percent of children with moderate-to-severe HIV disease receiving ART.** Enter the percent of HIV+ children with moderate-to-severe HIV disease who are receiving ART.
- C. **Effects of treatment.** Enter the percentage of children being treated with cotrimoxazole, ART or both who survive to the following year. The default values are 91%, 90% and 94%.
- D. **Early diagnosis.** With the typical antibody tests in use in most developing countries children born to HIV+ mothers cannot be diagnosed has HIV+ until

the age of 18 months. Therefore cotrimoxazole is recommended for all children born to HIV+ mothers until their own status can be determined and ART is generally not recommended until HIV+ status can be confirmed. Early diagnosis of HIV is possible with PCR tests. If early diagnosis is available then ART can start earlier.

Step 10. Specify parameters for estimating double AIDS orphans

Spectrum calculates the number of AIDS and non-AIDS orphans by type: maternal, paternal and double. It uses a regression equation to estimate the probability that both parents will die from AIDS. This equation requires two additional inputs. Select “Edit” from the main menu, “AIDS” from the pull down menu, and click on the “Orphans” button. This will display an editor like the one shown below.



	Percent
% women 15-19 never married	71.00
% married women in monogamous unions	71.00

Both of the inputs are available from DHS or other national surveys. The table below shows values for countries in sub-Saharan Africa with recent DHS surveys.

Table 5. Percent of Women 15-19 Never Married and Percent of Married Women in Monogamous Unions from Various DHS Reports

Country	Percent 15-19 never married	Percent of married women in monogamous unions
Benin 2001	76.1	54.2
Botswana 1988	93.9	
Burkina Faso 1998/99	65.2	45.3
Burundi 1987	93.2	88.3
Cameroon 1998	64.2	66.9
CAR 1994/95	57.7	71.5
Chad 1996/97	51.4	60.8
Comoros 1996	88.5	74.7
Cote d'Ivoire 1998/99	74.6	65.0
Eritrea 1995	62.4	92.9
Ethiopia 2000	70.0	86.4
Gabon 2000	77.6	78.0
Ghana 1998	83.6	77.3
Guinea 1999	53.9	46.3
Kenya 1998	83.3	83.7
Liberia 1986	64.0	61.9
Madagascar 1997	66.3	96.0
Malawi 2000	63.2	
Mali 1995/1996	50.3	55.7
Mauritania 2000/01	72.3	88.4
Mozambique 1997	52.9	71.5
Namibia 1992	92.3	74.6
Niger 1998	38.1	62.2
Nigeria 1999	72.5	64.3
Rwanda 1992	90.2	85.6
Senegal 1997	71.0	51.4
Sudan 1990	84.1	79.6
Tanzania 1999	72.8	
Togo 1998	80.1	57.2
Uganda 2000/01	67.7	67.3
Zambia 1996	72.7	82.9
Zimbabwe 1999	77.3	

Step 10. Display the output

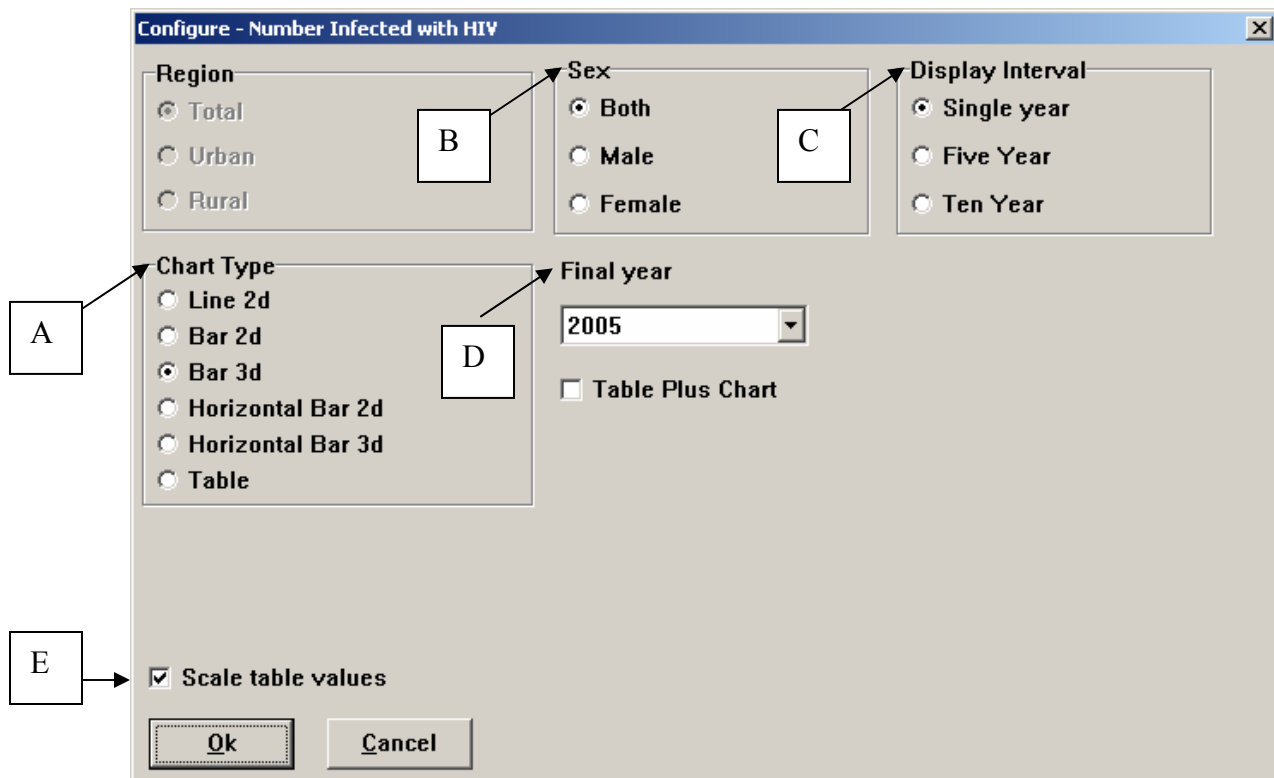
From the main Spectrum menu, select “Display” and the “AIDS (AIM)”. You will then see a drop down menu with the categories of HIV/AIDS indicators. They are:

- Total population
- Adults (15-49)
- Children (0-14)
- Regional table
- Ranges summary
- AIDS impacts
- Orphans

Each category contains indicators that Spectrum can display.

The first time you select a display after you have changed input values, you will see the message “Inputs have been changed. Re-project population now?” Click on the “Yes” button to tell Spectrum to re-calculate the projection. Next you will see the display configuration dialog box. Click “OK” and you will see a table displaying the results of the projection. Select “Close” to return to the main Spectrum menu.

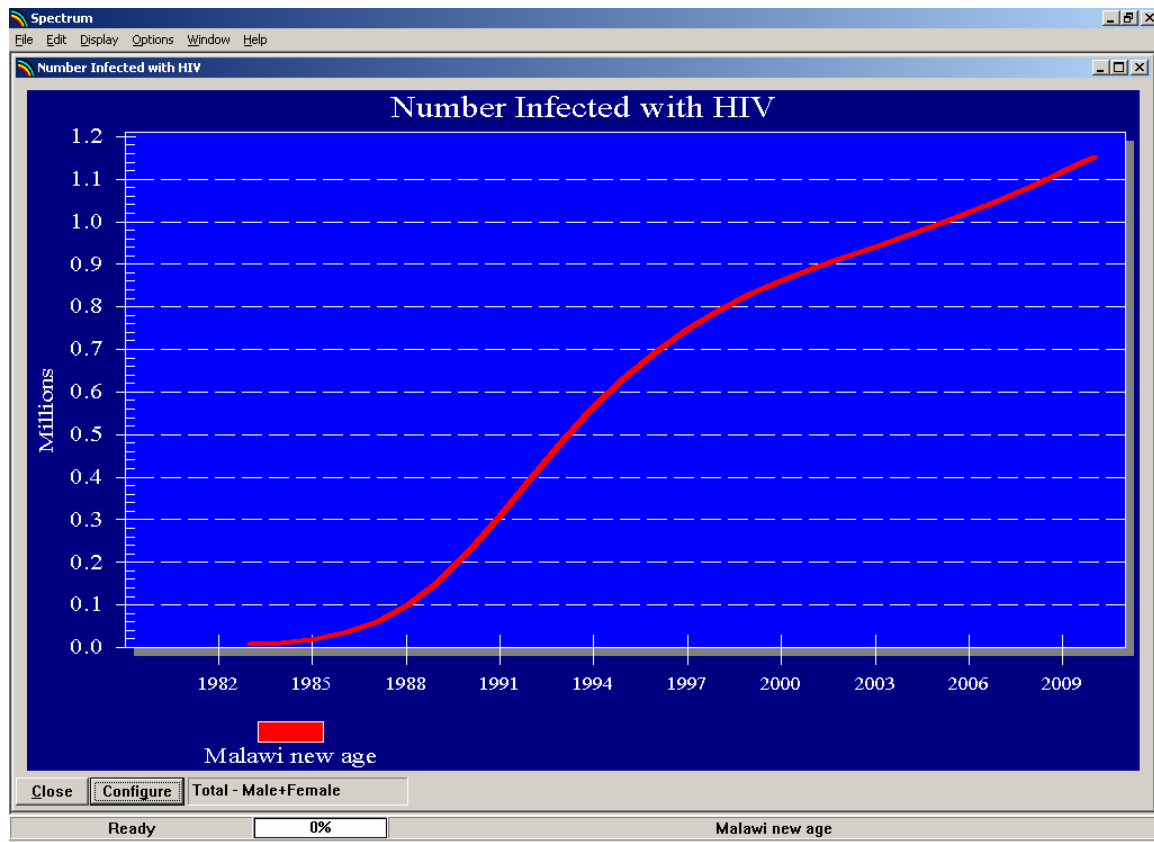
To see other specific outputs produced from your country data, repeat the first part of Step 10 again: from the main Spectrum menu, select “Display” and “AIDS (AIM)”. You will then see a drop down menu with a list of HIV/AIDS indicators. Choose one of these indicators, for example, “Number Infected with HIV.” The following screen will appear:



On this screen you can set the options for displaying the results.

- A. **Chart type.** Select the type of chart you wish to display.
- B. **Sex.** By default this is set to display both sexes, but you can change it to male or female only.
- C. **Display interval.** By default this is set to display every year.
- D. **Final year.** By default this is set to the final year of your projection.
- E. **Scale.** When this box is checked, Spectrum will calculate an appropriate scale for each indicator, such as thousands or millions. If you want to compare results for several indicators or several countries, you may want to turn scaling off, by removing the check mark, in order avoid different indicators having different scaling factors.

Once you have set the options, click “OK” at the bottom of the screen. This will display a chart showing the indicator you have chosen, according to the variables you have selected on the previous screen. The following is an example of a line graph:



Step 11. Save the projection

Save the projection by selecting “File” and “Save” or “Save As” from the Spectrum menu.