

# Resource Needs for HIV/AIDS:

Model for Estimating Resource  
Needs for Prevention, Care, and  
Mitigation



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The conceptual framework that is utilized here is based on a model initially developed by Lilani Kumaranayake and Charlotte Watts of the London School of Hygiene and Tropical Medicine, in a project financed by the World Bank, as well as on a model estimating the cost of care developed by Bernhard Schwartlander, now of the World Health Organization. The initial framework was further modified and described in a report by Rene Bonnel for the AIDS Campaign Team for Africa, World Bank. These initial models were developed further as part of a team that estimated the global funding requirements for HIV/AIDS for the United Nations General Assembly Special Session on HIV/AIDS in June, 2001, as summarized in a paper by Schwartlander et al. (2001). References in the manual to various assumptions or data used in 'earlier work' refer to these three pieces of analysis.

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# I. Introduction

## A. What is the Resource Needs Model?

The Resource Needs Model (RNM) calculates the total resources needed for prevention, care, and orphan support for HIV/AIDS on a national level. The RNM can assist national-level strategic planning efforts by providing a tool and methodology to examine the financial resources needed to implement a variety of prevention interventions, care and treatment programs, and orphan support.

In 1999, the United Nations set ambitious goals for reducing incidence through the expansion of prevention efforts and increasing access to care and support for all people living with HIV/AIDS, first at the 21st special Session of the General Assembly, then at the special meeting of the Security Council on HIV/AIDS. In June 2001, a Special Session of the General Assembly was held to discuss further these important issues. The Resource Needs Model was utilized to estimate the costs of reaching the goals stated at the UNGASS on HIV/AIDS.<sup>1</sup>

The model contains three sub-models:

- The **prevention model**, which calculates the cost of twelve prevention interventions, including:
  - Youth focused interventions
  - Interventions focused on sex workers and their clients
  - Condom social marketing
  - Public and commercial sector condom provision
  - Improving STI management
  - Voluntary Counseling and Testing
  - Workplace programs
  - Blood safety
  - Prevention of mother-to-child transmission
  - Mass media
  - Harm reduction programs
  - Interventions focused on men who have sex with men
- The **care and treatment model**, which estimates the cost of five care and treatment programs, including:

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<sup>1</sup> Schwartlander et al. (2001) "Resource Needs for HIV/AIDS," *Science* 292:2434-2436, 29 June 2001.

- Palliative care
  - Treatment of opportunistic infections (OIs)
  - Diagnostic HIV testing
  - OI prophylaxis in symptomatic patients
  - Highly active antiretroviral therapy (ARV) and its associated laboratory support
- The ***orphan support model***, which calculates the cost of three interventions to support children orphaned by AIDS:
    - Orphanage care
    - Community assistance
    - Subsidies for school expenses

There are three main elements in the methodology of each sub-model:

- *Population target groups*
- *Unit costs*
- *Coverage or access targets*

The final expenditure on any program is a combination of these three elements.

## B. Steps in Using the Resource Needs Model

There are five major steps involved in using the RNM:

1. **Form a national team to implement the model.** The model needs to be implemented by a national team that can be trained in the use of the model. This team will generally receive some initial training in the use of the model and then extensive training as the model is set up and used. Ideally the model will be implemented by a multi-disciplinary team composed of participants with various areas of expertise (demography, epidemiology, health finance, planning) representing different aspects of society (government, civil society, private sector, donors).
2. **Collect data on socio-demographic variables, health systems, HIV prevalence and condom use, and the costs of prevention and care programs.** The RNM contains default values for many of the variables used by the model. These values are derived from information obtained from published studies on the cost of prevention and care programs. This information can be used or replaced with locally available data. It also requires national data on the population size and distribution, adult HIV and STI prevalence and sexual behavior (e.g., condom use).

3. **Enter data specific to RNM.** Once the data described in step 2 are collected for the relevant year, the data are entered into the RNM model.
4. **Conduct workshops on resource needs.** In most applications the model will be used in a workshop with decision makers. The workshop will be an interactive session where participants will validate the assumptions that are important in the model, such as coverage targets and certain unit costs.
5. **Follow-up on workshop outcomes.** A variety of workshop outcomes are possible. Ideally the model is applied as part of the overall strategic planning process. In this case the model may continue to be used as goals are revised and funding plans are developed. The workshop may result in a new budget for the plan, or a commitment to raise additional funds to pay for essential programs. Reports and presentations may need to be prepared in order to disseminate the results to national decision makers, donors and program partners.

## C. Contents of the Manual

After this brief introductory section, Section II in the manual describes the model in general terms. Each of the three sub-models is discussed briefly, along with the basic default values used for each of the elements of the sub-models.

Section III describes the inputs required by the model in some detail. In addition to defining each of the input variables, possible sources are described for many of the inputs. The sources for the default values that are contained in the model workbook are also described.

Section IV contains a listing of the various outputs that are available once the data have been entered into the model. These include tables as well as charts showing the results that are obtained.

Section V has a more detailed description of the model. The equations for the various sub-models are listed, along with further discussion of the methodology in general.

Section VI presents the references used in the manual, as well as any references utilized by the model.

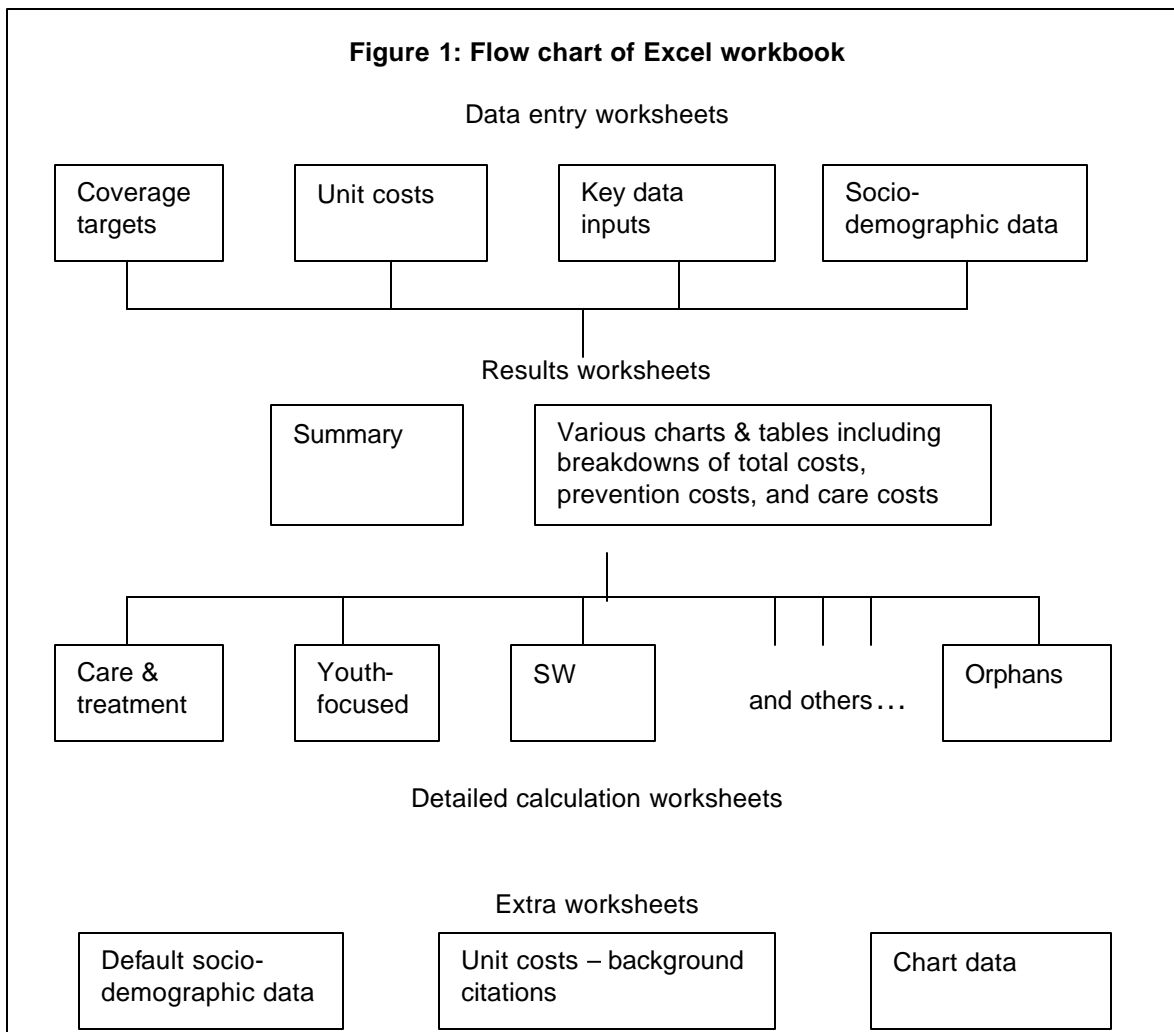
Section VII contains a list of acronyms and abbreviations that are used throughout the manual.

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## II. Description of the Model

### A. Methodology – General Principles

The aim of the RNM is to estimate the cost of HIV/AIDS prevention, care, and orphan support needs in a particular country. Although two separate spreadsheet models were developed originally to derive these estimates, they have now been combined into one model, based in Excel. As described below, the modeling approach to prevention and support to orphans differed slightly from that used for care. As such, there are three different sets of methodologies described: prevention, care, and mitigation activities for orphans. The model is contained in an Excel workbook. A flow chart of the structure of the model is pictured below in Figure 1.



The initial worksheets are input areas, and include four worksheets: 'Coverage targets', 'Unit costs', 'Key inputs', and 'Socio-demographic data'. After these four worksheets, the next set of worksheets contains graphical and tabular output from the model, beginning with the worksheet labeled 'Summary', and ending with the worksheet labeled 'Service requirements'. The final set of worksheets contains the calculations underlying the output results. Detailed calculations are presented for each intervention, including prevention, care, or orphan support, and the calculations for each intervention are contained in separate worksheets. Finally, at the end of the workbook are various background worksheets, including default data, references for the background data on unit costs, and tabular data for output charts. Each area of the workbook – inputs, outputs, and methodology for calculations – is described in detail in subsequent chapters.

Two caveats about the model should be noted. First, the model estimates feasible coverage targets assuming an ambitious expansion of current coverage unfettered by current financial resource constraints but without significant development in infrastructure. That is, there are no additional expenditures provided for infrastructure development, with two exceptions. The expenditures in-school education interventions consist mainly of teacher training, and as such represent investment in human infrastructure. In addition, there is a cost built in for strengthening the infrastructure system to deliver interventions to prevent mother-to-child transmission. Second, the issue of sources of funding is not addressed in this model; instead, activities covered by all sources of funding are included.

## **B. Methodology for Prevention**

The funding requirements for twelve categories of prevention activities are calculated for a representative country. These calculations are a modified version of the methodology developed by the London School of Hygiene and Tropical Medicine, the World Bank, and UNAIDS.<sup>2</sup> Calculations are performed for urban and rural populations and summed to produce national totals.

There are three main sets of assumptions that underlie the prevention model presented here:

- ***Population target groups***
- ***Coverage targets***
- ***Unit costs***

For each prevention activity, the model first estimates the ***population target group*** in need of prevention services that could potentially have access to those

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<sup>2</sup> Kumaranayake L, Watts C. (2001). *Scaling-up priority HIV/AIDS programmes: a problem of constrained optimisation*. Public Health and Policy Departmental Publication, London School of Hygiene and Tropical Medicine.

services given existing infrastructure. For facility-based services, such as treatment for sexually transmitted infections (STI), access is estimated as mirroring the access calculated for treatment of opportunistic infections (explained below). The population target groups for other interventions consist of the relevant population sub-group; for example, the population target group for school-based programs are those enrolled in school. A complete description of target groups for each intervention is shown in Table 1.

A **coverage target** is then supplied to estimate the population that would actually use the service. Coverage rates are intended to indicate what is feasible and necessary. For example, every sex act does not need to be protected by condom use, but high rates (e.g., 60 percent) of condom use in casual sex are necessary to control the epidemic. These rates may vary either according to the level of HIV prevalence (a measure of need) or economic development (a measure of infrastructure limitations). For example, in high prevalence countries it may be assumed that all school children should have regular HIV/AIDS education, while in low prevalence countries less intensive education is sufficient. The default coverage goals for each intervention are described in Table 1 as well.

Total costs are estimated by multiplying the number of people using the prevention service by the **unit cost** to provide that service. No changes in unit costs are assumed as programs are scaled up. Instead the default costs are based on the low end of the range of published studies in order to provide a conservative estimate of funding requirements. These unit costs are based on over 125 different cost studies throughout the world. The default unit cost estimates are also shown in Table 1; when regional cost data are available, the range of cost estimates used is indicated. A complete listing of background unit cost data can be found in one of the last worksheets of the model, labeled 'Unit cost - reference.' The complete bibliographic citations for this worksheet can be found in the References section of this manual.

The complete set of equations used to make these estimates, along with detailed descriptions of unit cost figures, coverage targets, and data sources for population target groups, is available in the Methodology section of this manual.

**Table 1. Prevention activities, target populations, default coverage rates and unit costs**

Category	Activity	Target population	Default Coverage (Varies by severity of epidemic or level of economic development)	Default Unit Costs US\$ at 2000 prices (May vary by region)
Youth-focused interventions -In-school youth  -Out-of-school youth	-Teacher training, peer education -Peer education	-Primary and secondary students -Out-of-school youth ages 6-11 and 12-15	-10-33% of primary teachers -2-12% of secondary teachers -10-50% of out-of-school youth	-\$26-84 per primary teacher trained -\$15-50 per secondary teacher trained -\$8 per out-of-school youth reached
Commercial sex workers (SW) and their clients	Male and female condoms	Commercial sex workers	-60% of SWs reached -60-80% condom use by those reached -5% are female condoms	-\$15.83 per SW reached -\$0.10 per male condom distributed -\$1.00 per female condom distributed
Public and commercial sector condoms	Condom promotion	Single and married men with casual partners	-20-60% of casual sex acts use condoms -10-30% of married couples with casual partners use condoms in marital sex -70-80% of condoms distributed by public and commercial sector	-\$0.15 per male condom distributed
Condom social marketing	Condom promotion	Single and married men with casual partners	-10-20% of condoms distributed through CSM -10% of condoms are female condoms	-\$0.12-0.25 per male condom distributed -\$1 per female condom distributed
Sexually transmitted infections (STIs)	Treatment of STIs	Men and women with symptomatic STIs with access to health system services	-60-100% of symptomatic STI cases with access to health facilities -60-100% of pregnant women with syphilis	-\$8.34-9.26 per STI case treated -\$0.91 per woman screened for syphilis at ante-natal clinics -\$8.34-9.26 per

<b>Category</b>	<b>Activity</b>	<b>Target population</b>	<b>Default Coverage (Varies by severity of epidemic or level of economic development)</b>	<b>Default Unit Costs US\$ at 2000 prices (May vary by region)</b>
			attending ante-natal clinics	syphilis case treated at ante-natal clinics
Voluntary counseling and testing (VCT)	Testing and counseling	Those desiring to be tested	Estimated as twice the number of people infected with HIV tested every five years	\$10.60 per person counseled and tested
Workplace prevention	-Condom promotion  -Treatment of STIs	-Men employed in the formal sector with casual partners -Men and women employed in the formal sector with symptomatic STIs	-3-50% for peer counseling -70% of employees with symptomatic STIs treated -10% of all condoms distributed through workplace programs	-\$3.36 per employee reached with peer education -\$8.34-9.26 per STI case treated -\$0.10 per male condom distributed
Blood safety	Screening blood for transfusions	Units of blood required for transfusion	100% of blood tested	\$4.88-15.00 per safe blood unit available
Prevention of mother-to-child transmission of HIV (MTCT)	-Testing  -Short course anti-retroviral treatment, replacement feeding	-Pregnant women attending ante-natal clinics -HIV+ pregnant women attending ante-natal clinics	-10-50% of women attending ante-natal clinics tested -90% of those found to be HIV+ accept treatment -50% of those found to be HIV+ use replacement feeding	-\$3.80 per woman screened -\$18.70 per woman receiving ARV regimen (includes drugs and service strengthening) -\$50 per women receiving formula
Mass media	Mass media campaigns	Country	2-6 campaigns per country per year	\$490,000 per campaign
Harm reduction	Harm reduction programs	Intravenous drug users (IDUs)	25-75% of IDUs	\$3.21-12.50 per person reached
Men who have sex with men (MSM)	Peer counseling	Men who have sex with men	-60% of MSMs reached by peer counseling -60-80% condom use among those reached	-\$15.83 per person reached -\$0.10 per male condom distributed

## C. Methodology for Care and Treatment

### Model structure and included interventions

The care and treatment section of the RNM utilizes a similar methodology as the prevention section in that it combines estimates of population target groups, unit costs, and coverage targets, based on access to care and treatment. There are some differences, however, that are explained in detail below.

The model utilizes current access to five clusters of HIV/AIDS care interventions:

- (1) palliative care;
- (2) treatment of opportunistic infections (OIs);
- (3) diagnostic HIV testing;
- (4) OI prophylaxis in symptomatic patients; and
- (5) highly active antiretroviral therapy (ARV) and its associated laboratory support (see Table 2).

The model then utilizes growth rates for the interventions that are applied to the estimates of current access to derive feasible coverage targets for the future.

**Table 2: Default care and treatment activities and unit costs**

Category	Activities	Annual costs US\$ 2000 per person
Palliative care	Symptomatic care and support provided to those people nearing death	75 <sup>+</sup>
OI treatment	Medications and medical care for the common opportunistic infections associated with HIV	300 <sup>+</sup>
Diagnostic HIV testing	Testing of symptomatic patients prior to the provision of prophylaxis for the prevention of opportunistic infections or ARV	5
OI prophylaxis	Isoniazid – to prevent reactivation of latent TB and cotrimoxazole – to protect against the pathogens responsible for pneumonia and diarrhea	32
ARV	Treatment with three antiretroviral drugs	350-2900, depending on country wealth
	Laboratory testing to enable monitoring of ARV treatment	140

+ Lifetime costs

### People needing care

The population newly requiring treatment in a particular year is assumed to be equal to the number of people living with HIV who are newly symptomatic during that year. This population is estimated as equal to the number of people who would be expected to die of AIDS, in absence of treatment, two years hence. People needing ongoing treatment (ARV and OI prophylaxis) include

those who are newly symptomatic and those who were receiving treatment the previous year. Newly symptomatic people initiating OI prophylaxis without ARV are assumed to live on average two years, using a Poisson distribution to determine the probability of death in a given year. The same is true for those initiating ARV, but the average survival is adjusted for each country according to available health care infrastructure and using a maximum survival of 7 years as reference for high quality care.

In the base year, the treatment population is estimated to equal the estimated AIDS death cohort two years hence. For each of the following years, the treatment population is estimated to equal the estimated AIDS death cohort for the following year plus the carry over of populations receiving prophylaxis for the prevention of opportunistic infections and ARV. This carry over is calculated using a Poisson distribution for the probability of death in a given year, with the country specific life expectancy for people with ARV and 2 years for all others. People receiving ARV in a given year include the people getting ARV in that year plus the survivors from the previous years.

### **Baseline access and growth rates**

Since few indicators are available to measure current access to HIV/AIDS care services, default access figures were estimated using the same composite proxy indicator described above for prevention. One possible source of access to some levels of care is:

J. Stover and B. Schwartlander, "The Health Sector Response to HIV/AIDS: Coverage of Selected Services in 2001," World Health Organization, July 2002.

The default values for current coverage were estimated to be progressively lower for increasingly sophisticated care, as outlined in Table 3. That is, the greatest number of people would have access to palliative care, while fewer would have access to OI treatment, while fewer still would have access to OI prophylaxis and ARV.

No estimates of maximum growth rates exist for HIV/AIDS or other care services. However, the capacity of health services to expand in the short-term is limited by many factors, including the current endowment of physical infrastructure and number of highly trained professionals. The model estimates national growth rates defined in terms of unmet need, that is, as the maximum annual decrease in unmet need (people needing care who are without coverage). Default values for these growth rates assume that the unmet need of relatively poorer countries can decrease up to 10% per year and the unmet need of relatively richer countries can decrease up to 25% per year.

**Table 3: Default values for baseline access to care**

Category of care	Default values for estimated access
Percent of treatment population with access to palliative care	Median of the percent of the population with access to DOTS, DPT immunization, antenatal care and attended delivery
Percent of treatment population with access to treatment of opportunistic infections	Median of the percent of the population with access to DOTS, DPT immunization, antenatal care and attended delivery raised to 2.5
Percent of treatment population with access to HIV testing	Data from the coverage document mentioned above, imputing for the missing countries using the existing data
Percent of treatment population with access to prophylaxis to prevent opportunistic infections	Data from the coverage document mentioned above, imputing for the missing countries using the existing data
Percent of people needing care with access to ARV	Data from the coverage document mentioned above, imputing for the missing countries using the existing data

**Unit costs of care interventions**

Published and unpublished literature was reviewed for cost data of these HIV/AIDS care interventions but only very limited information was available. The model therefore uses default cost data from studies in sub-Saharan Africa, as in Kumaranayake and Watts (2001) and Bonnel (2001). Costs for palliative care and OI treatment are estimated as lifetime costs and are assumed not to change with provision of ARV. Diagnostic HIV testing is a one-time cost; costs for OI prophylaxis and ARV are annual costs. The default values for these variables can be changed.

The value for the cost of ARV should vary according to the economic status of a country. The default values used by the model assume differential pricing for ARV with the minimum price applying to all low-income countries, and the maximum price in the wealthiest middle-income countries. In addition, the minimum price may apply to middle income countries with HIV prevalence in excess of 5% (e.g., South Africa and Botswana). Cost of care for children living with HIV is estimated to be 50 percent of the country-specific adult cost. The default values for these variables can change, as well.

Further details of the care and treatment methodology can be found in the Methodology section of this manual.

**D. Methodology for Support to Orphans**

Orphan support is assumed to consist of three different interventions: orphanage care; assistance with living expenses in a community; and assistance with school expenses. The methodological approach is analogous to that described in the

prevention section above, combining estimates of the population target group, coverage rates, and unit costs.

The target group is the total number of orphans to be provided care; definitions of this group may vary. Default data available from UNAIDS define orphans as all maternal, paternal, and dual orphans from AIDS and non-AIDS causes. The default unit cost data are drawn from the limited orphan care cost data available, primarily from sub-Saharan Africa. The default coverage rates are assumed to vary by national HIV prevalence, with the exception of the proportion of orphans cared for in orphanages, which is held constant at 5%. Coverage of assistance with living and expenses is assumed to be 5% for HIV prevalence <1%, and 10% and 15% for HIV prevalence from 1% to 5% or >5%, respectively, while assistance with school expenses varies by HIV prevalence level between 5% and 20% (see Table 4). For additional methodological details, see the Methodology section of this manual.

**Table 4: Orphan support activities, target population, default coverage rates and unit costs**

Category	Activity	Target population	Default Coverage (Varies by severity of epidemic)	Default Unit Costs US\$ at 2000 prices (May vary by region)
Orphan support	Orphanage care	Orphans	5% regardless of HIV prevalence	416
	Assistance with living expenses in a community	Orphans	5%, 10%, and 15% for HIV prevalence <1%, 1-5%, and >5%	58
	Assistance with school expenses	Orphans	5%, 15%, and 20% for HIV prevalence <1%, 1-5%, and >5%	25

Note that total costs are increased by 5 percent to account for policy, advocacy, administration and research activities.

### III. Inputs Needed for RNM

The RNM is organized in an Excel workbook containing a number of worksheets. A flow chart of the workbook can be seen in Figure 1 above in section II.A, 'Methodology – General Principles'. A wide variety of inputs is required by the model, including socio-economic data, unit costs, and assumptions about coverage targets and access to various services. Some of these inputs are generally available, such as the socio-economic data, while default values can be used for some of the inputs that are more difficult to obtain, such as unit costs. Finally, some of the inputs are assumptions, such as the target coverage rates.

The inputs required to calculate the total resource needs for HIV/AIDS in a country are listed in five separate worksheets, labeled:

- Setup
- Socio-demographic data
- Key inputs
- Unit costs
- Coverage targets

Each of the inputs necessary to run the model is described in detail below, sorted by the worksheet in which it appears. The areas highlighted in blue indicate the cells that require input. Some of these cells contain default data, while others are blank, and must have data entered. Note that any of the default values may be over-written. When cells should not be changed, they are protected.

The data source for each variable may be entered in column 'F' of the worksheets labeled 'Socio-demographic data' and 'Key inputs', and column 'C' of the worksheet labeled 'Unit costs'. It is highly recommended that sources for all data used in the model are documented, to avoid confusion at later stages.

#### A. Setup

The purpose of this worksheet is to initialize the settings necessary to run the model. There are only two inputs on this sheet: name of the country (which is used in titles for results and to obtain default data values), and the language the workbook will use.

**Country:** The country of analysis. This is used to define some of the default values for various variables.

**Language:** The language in which the workbook will be displayed. Note that the selected language must match the possible languages exactly, that is, with appropriate upper-case letters and special characters, such as 'ñ'.

## B. Socio-demographic data

Most of the inputs in this worksheet are derived from the default data worksheet, located at the end of the workbook and described above. The data are from sources such as the World Bank World Development Indicators database, the United Nations Population Prospects, and other definitive sources of data. While any of the values in these cells can be changed, it is more likely that data in the 'Key inputs' worksheet would need to be changed.

**Start year:** The year for which initial estimates are being calculated. The final year of analysis is assumed to be six years after the initial start date.

### Demography

Most of the variables in this section require two inputs, an initial data point for the start year, and a value for the final year of analysis. Values for the intervening years are interpolated based on the growth rate between the start and final years, and are calculated by the model. In the case of school age children, separate growth rates for primary and secondary age children are required as inputs to the model.

**Total population:** Total population, all ages, in thousands, for both the start year and the final year to be analyzed. One possible source for this is national projections, while another possible source is the UN Population Prospects.

**Primary school age children – males/females:** The total number of primary school age children who are male/female, in the start year. Although the definition of the age group varies by country, one common age group is those children aged 6-11. These data may be available from national sources, or from the UN Population Prospects, after some manipulation of available data.

**Annual growth rate of primary school age children:** The annual percentage growth rate for children of primary school age, to be applied to each year after the start year. This may be available from national sources, or may be assumed to be similar to the growth rate calculated for the total population.

**Secondary school age children – males/females:** The total number of secondary school age children who are male/female, in the start year. Again, the age group definition may be different across countries, but one common grouping is those aged 12-15. National sources may have this variable, or it can be calculated from the UN Population Prospects.

**Annual growth rate of secondary school age children:** The annual percentage growth rate for those of secondary school age, applied between the start and final years of analysis. National sources may have this variable, or growth rates similar to total population growth rates may be used.

**Male/Female Population 15-49:** The male/female adult population, those aged 15-49, in the start year and the final year, in thousands. Projections from a national source or from the UN should have this information.

**Female population 15-34:** The number of females aged 15-34 in the start year and the final year. Projections from a national source or from the UN should have this information. Note that this variable is in units, that is, it should not be entered in thousands.

**Male/Female population 15-64 in target year:** The number of males/females aged 15-64 in the target year, in thousands. This variable is used to calculate labor force data. Projections from a national source or from the UN should have this information.

**Crude birth rate:** The number of live births per 1,000 population in the start year. This statistic should be available from a national source or from the UN Population Prospects.

**Percent of population living in urban areas:** The percentage of the total population that lives in urban areas. One possible source for this is the World Bank World Development Indicators database. Note that this variable is in percentage form.

## Health Status

**Births attended by health staff:** The percentage of deliveries attended by personnel trained to give the necessary supervision, care, and advice to women during pregnancy, labor, and the postpartum period, to conduct deliveries on their own, and to care for the newborn and the infant. Again, a possible source for this information is a reproductive health survey for the country, such as a Demographic and Health Survey.

**Women who had some antenatal care:** The percentage of women attended at least once during pregnancy by skilled health personnel for reasons related to pregnancy. One possible source for this information is a reproductive health survey for the country, such as a Demographic and Health Survey.

**DOTS detection:** The percentage of estimated new infectious tuberculosis cases detected under the directly observed treatment, short-course (DOTS) case detection and treatment strategy. One possible source for this information is a World Health Organization report, *Global Tuberculosis Control 2000* - WHO/CDS/TB/2000.275.

**Immunization, DPT:** The percentage of children vaccinated under one year of age. A child is considered adequately immunized against diphtheria, pertussis (or whooping cough), and tetanus (DPT) after receiving two or three doses of vaccine, depending on the immunization scheme. This variable is available through the World Bank World Development Indicators database, as well as through reproductive health surveys and other national sources.

**Population with access to health services:** The composite access to care indicator, calculated as the median of the four indicators above: women who had some antenatal care, percent of births attended by health staff, DOTS case detection rate, and immunization. Because the cell is calculated by the model, it is write-protected, and it cannot be changed.

**Blood units required per 1000 people:** The number of blood units that would be required during one year for transfusions and other medical purposes per 1000 people in the total population. This is used to calculate how many blood units need to undergo screening for HIV. Possible sources include national sources, as well as regional levels from the Global Data Base on Blood Safety from the World Health Organization, available at:

[http://www.who.int/bct/Main\\_areas\\_of\\_work/BTS/GDBS/GDBS.htm](http://www.who.int/bct/Main_areas_of_work/BTS/GDBS/GDBS.htm)

**Cost of care for HIV+ children as a percent of cost of care for HIV+ adults:** The reduction in the cost of HIV-related care for infected children, relative to adult costs. This assumption is used to impute adult-equivalent costs in the overall calculation of total care and treatment costs. One data source cites 75% as the appropriate percentage, based on cases at the Chris Hani Baraghwane and Kimberly Hospitals in South Africa.

**Expected years of life without ARV:** By definition, the number of people needing care in this model is the number of people in their last two years of life, so that the default value for expected years of life without some kind of antiretroviral care is two.

## Education

**Primary school enrollment – gross – male/female:** The ratio of total enrollment of males/females, regardless of age, to the population of the age group that officially corresponds to the primary school level of education, for the start and final years. Note that this ratio can be greater than one. Primary education provides children with basic reading, writing, and mathematics skills along with an elementary understanding of such subjects as history, geography, natural science, social science, art, and music. This information is available from the World Bank World Development Indicators database, or from national sources. Enrollment rates for the intervening years are calculated based on the growth rate between the start and final years.

**Secondary school enrollment – gross – male/female:** The ratio of total enrollment of males, regardless of age, to the population of the age group that officially corresponds to the secondary school level of education. Note that this ratio can be greater than one. Secondary education completes the provision of basic education that began at the primary level. This information is available from the World Bank World Development Indicators database, or from national sources. Enrollment rates for the intervening years are calculated based on the growth rate between the start and final years.

**Primary/secondary pupil-teacher ratio:** The number of pupils enrolled in primary/secondary school divided by the number of primary/secondary school

teachers. This information is available from the World Bank World Development Indicators database, or from national sources. Pupil-teacher ratios for the intervening years are calculated based on the growth rate between the start and final years.

***Frequency of teacher re-training:*** The average number of years that pass between in-service training sessions for teachers. Various factors influence this number, including the attrition rate of teachers (which can be affected by AIDS deaths, higher in countries with higher HIV prevalence rates), and the frequency of in-service training efforts. A default value of two years between training sessions is used in the UNGASS global estimates.

### **Sexual behavior and condom use**

***15-49 sexually active:*** The percentage of adults, those aged 15-49, who are sexually active during the start year. One possible source for this information is a reproductive health survey for the country, such as a Demographic and Health Survey.

***Males 15-49 in regular partnerships:*** The percentage of males aged 15-49 in regular sexual partnerships, defined by the Demographic and Health Survey questionnaire as those who are married or those with whom they have been having sex for about a year or more.

***Males 15-49 reporting non-regular partnerships:*** The percentage of males aged 15-49 who have had a non-regular sexual partner in the last 12 months, defined by the Demographic and Health Survey questionnaire as someone who is not a spouse or a regular partner.

***Number of sex acts for casual non-regular partners per year:*** The average number of sex acts that take place between men reporting non-regular partnerships and their casual, non-regular partners per year. This is the sum of sex acts for all non-regular partners. The default value is based on values used in earlier work.

***Number of sex acts with regular partners per year:*** The average number of sex acts between regular partners per year. One source of this information is a national reproductive health survey, such as a Demographic and Health Survey.

***Number of commercial sex acts/SW/year:*** The average number of sex acts undertaken per year by a representative commercial sex worker. This is the sum of all sex acts, not number of sexual partners. The default value is based on values used in earlier work.

***Condom wastage during storage and distribution:*** The percentage of condoms in a country's condom supply that ends up wasted during the storage and distribution processes. The default assumption is that a flat 10 percent of condoms are lost due to this wastage.

## Curable STIs

**Number of new cases of treatable STIs – male/female:** The number of new, treatable sexually transmitted infections expected during the target year for males/females. One possible source of this information is the US Census Bureau data base:

<http://www.census.gov/ftp/pub/ipc/www/hivaidsn.html>

The default value is based on Gerbase (1999).

**Growth rate in incidence of treatable STIs – male/female:** The growth rate in the incidence of treatable STIs, applied after the start year to each subsequent year. Note that this growth rate could also be equal to zero.

**Percent of STIs that are symptomatic – males/females:** The proportion of sexually transmitted infections for males/females that exhibit symptoms. The default values are based on values used in earlier work.

**Percent of male/female STIs that are urban:** The percentage of male/female STIs that are in urban areas. The default values are based on Gerbase (1999).

**Number of existing cases of syphilis in women – urban/rural:** The prevalence of syphilis for women in both urban and rural areas. The default values are based on Gerbase (1999).

## Orphans

**Number of orphans:** The number of orphans that require support in the community in the start year and the final year. The values for the intervening years are based on the growth rates calculated from the figures for the start and final years.

Default values for the start and final years are derived from data from UNAIDS. The UNAIDS Reference Group on Estimates, Modelling and Projections recently published a revised methodology for estimating the number of maternal, paternal, and dual AIDS and non-AIDS orphans.<sup>3</sup> A consensus was reached to define orphans in need of support as all of these orphans, that is, maternal, paternal, and dual AIDS orphans, as well as maternal, paternal, and dual non-AIDS orphans. This definition of orphans has now been adopted by the US Census Bureau, UNAIDS, UNICEF, and USAID.

In countries where HIV prevalence is high, and children whose parent(s) have died of AIDS form a large proportion of total orphans, it may make sense to use all orphans in estimating total number of orphans requiring support. In low-prevalence countries, however, where a small percentage of total orphans are AIDS orphans, we recommend using AIDS orphans only.

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<sup>3</sup> The UNAIDS Reference Group on Estimates, Modelling and Projections. (2002) "Improved methods and assumptions for estimation of the HIV/AIDS epidemic and its impact: Recommendations of the UNAIDS Reference Group on Estimates, Modelling and Projections," *AIDS* 2002;16:W1-W16.

## Economic Indicators

**Percent labor force in services & industry:** The proportion of the total labor force recorded as working in wholesale and retail trade and restaurants and hotels; transport, storage, and communications; financing, insurance, real estate, and business services; community, social, and personal services; mining and quarrying (including oil production), manufacturing, electricity, gas and water, and construction. The labor force is defined as the economically active population. This information is available from the World Bank World Development Indicators database, or from national sources.

**Labor force participation rate – male/female:** The proportion of the total number of persons in the labor force to the total population ages 15-64. These data can be found at the web site of the International Labour Organization:

<http://www.ilo.org/public/english/support/publ/wer/index2.htm>.

**Wage employment in agriculture – males/females:** The number of males/females in the agricultural labor force that is employed in formal sector agriculture, in thousands. The formal sector is defined as the sector in which workers are paid a stable income wage, or have a contract, or have fringe benefits. This variable is used to calculate the population target group for workplace programs. One possible source is the UN Statistical Yearbook.

**Annual growth rate of wage employment in ag – males/females:** The average annual growth rate of wage employment in agriculture, applied between the start and final years. One proxy for this might be the growth rate in agricultural employment in general, available historically from the World Bank World Development Indicators database.

**GDP per capita based on purchasing power parity:** Gross domestic product per capita converted to international dollars using purchasing power parity rates. An international dollar has the same purchasing power over GDP as the U.S. dollar in the United States. This variable is used to calculate coverage rates for interventions that are classified according to economic level. This information is available from the World Bank World Development Indicators database.

## HIV prevalence and AIDS

**ANC HIV prevalence (major urban area/rural areas) adjusted:** The percent of blood samples taken from pregnant women that test positive for HIV during routine sentinel surveillance at selected major urban area/rural area antenatal clinics. These data may be found at the UNAIDS web site:

<http://www.unaids.org>

**Adult prevalence (15-49) in start year:** The percentage of adults (population ages 15-49) who are infected with HIV in the base year. Again, possible sources of these data are the UNAIDS web site, or the US Census Bureau data base:

<http://www.census.gov/ftp/pub/ipc/www/hivaidn.html>

**Adult prevalence (15-49) in final year:** The percentage of adults (population ages 15-49) who are infected with HIV in the target year. Projections are available from national sources, or from using the UNAIDS Epidemic Projection Package (EPP), available at their web site, or at

<http://www.futuresgroup.com>

## C. Key inputs

The data in this worksheet are also based on default values found in the worksheet labeled 'Default data'. These data should be examined, as they are more likely to change than the socio-demographic data, as more reliable data become available.

### SW

**Number of SWs:** The total number of commercial sex workers in the country during the start year. The default value is based on data from UNAIDS.

**Annual growth rate in SWs:** The average annual growth rate in the number of commercial sex workers, applied after the start year.

### IDU

**Number of IDUs:** The total number of intravenous drug users in the start year. The default value is based on data from UNAIDS.

**Annual growth rate of number of IDUs:** The average annual growth rate in the number of intravenous drug users, applied to each year after the start year.

### MSM

**Number of MSMs:** The total number of men who have sex with men in the target year. The default value is based on data from UNAIDS.

**Annual growth rate of number of MSMs:** The average annual growth rate in the number of men who have sex with men, applied to each year after the start year.

**Number of sex acts per MSM per year:** The number of sex acts performed with other men per year by men who have sex with men. The default value is based on values used in earlier work.

### Other vulnerable groups 1 and 2

To allow for the possibility of additional prevention interventions that are not included in the original set of interventions, input areas for two optional interventions are provided. Inputs from the socio-demographic data worksheet

are combined with unit costs and coverage assumptions to calculate the total cost of additional interventions. Possible extra interventions include those targeting indigenous groups, prisoners, or other vulnerable groups.

**Number in group:** The total number of people in the vulnerable group targeted by the additional prevention intervention in the start year.

**Annual growth rate of number in group:** The annual average growth in population of the vulnerable group under analysis, applied between the start and final years.

## People needing care

### **Percentage of people needing care with access to types of care in start year:**

There are five separate figures for access, related to the five different types of care:

- palliative care
- HIV diagnostic testing
- treatment for opportunistic infections
- prophylaxis for opportunistic infections
- antiretroviral treatment

Initial access in the start year for each of the types of care should be entered. There are default values supplied by the program. The access figure for palliative care is equal to the variable in the socio-demographic worksheet, 'Population with access to health services,' itself the median of four variables related to different dimensions of the health industry. The access figure for the access figure for OI treatment is this figure raised to the second power – thus smaller than the initial palliative care access number, as this number is less than one. The default data for the other access to care figures are from a recent publication by the World Health Organization, cited above:

J. Stover and B. Schwartlander, "The Health Sector Response to HIV/AIDS: Coverage of Selected Services in 2001," World Health Organization, July 2002.

**Health care services coverage growth rate:** After the initial year, a growth rate is applied to increase the percentage of those needing care that will have access to care in the future. Because countries may have different base levels of access, this growth rate actually is applied to those who do not have access. That is, rather than calculate the increase in access to health care services, the growth rate calculates the decrease in non-access to care. The equations for this calculation are explained further in the Methodology section below.

Although any access figure can be input in the model, it is probably reasonable to assume that the highest access figure will be for palliative care, followed by treatment for opportunistic infections, then prophylaxis for opportunistic infections and antiretroviral therapy. The percentage of those with access to HIV

diagnostic testing is probably quite similar to those with access to treatment for opportunistic infections, as this is the testing associated with diagnosing someone with HIV.

***Expected years of life with prophylaxis for opportunistic infections:*** The number of years that can be expected if someone is on prophylaxis such as cotrimoxazole or isoniazid. Note that this figure includes the last two years of life. The default value of three thus assumes that an additional year of life is gained due to prophylaxis treatment.

***Expected years of life with ARV:*** The number of years that someone can expect to live if they are on antiretroviral therapy. Note that this figure includes the last two years of life. Thus the default value incorporates an additional amount of years of life due to receiving antiretroviral therapy, related to the health care infrastructure in the country.

***Number of adults newly showing HIV/AIDS symptoms:*** The number of HIV positive adults who newly require care in each of the years under analysis. This is generally defined as the cohort of HIV positive adults who would be expected to die of AIDS in two years, thus the number of HIV positive adults two years prior to their death. One possible source for these data is the AIDS Impact Model (AIM), part of the Spectrum family of models, available at:

<http://www.futuresgroup.com>

The AIM model utilizes the projections of HIV prevalence calculated by the Epidemic Projection Package, described above.

***Number of children newly showing HIV/AIDS symptoms:*** The number of HIV positive children who require care beginning in the year listed. Again, these are the children who will likely die of AIDS in two years time, and as such require palliative care and treatment of opportunistic infections during that time. These data are also available from the AIM model, described above.

***Adults currently on ARV:*** The number of adults that are already receiving ARV during the start year.

***Average time on ARV for those currently on ARV:*** The average number of years that adults already receiving ARV in the start year have already been receiving ARV therapy as of the start year.

***% people on ARV that need prophylaxis for OIs:*** The percentage of people on ARV therapy that also take prophylaxis for opportunistic infections. There may be a reduction in OI prophylaxis costs because someone is on antiretroviral therapy. Once CD4 counts reach a certain level due to antiretroviral therapy, it is recommended that they cease prophylaxis for opportunistic infections. Thus only a certain percentage of those on ARV therapy need to take prophylaxis as well as ARV therapy. The default value is 50%.

## D. Unit costs

The next input worksheet in the RNM workbook is the worksheet containing data on unit costs for prevention and orphan support. All data need to be entered into column 'B' of the worksheet. If desired, the source that was used for the unit cost value can be entered in column 'C'.

Most of the default values that are displayed when the worksheet is selected are based on a number of different cost studies from around the world. Regional averages calculated from these different studies are displayed to the right of column 'C', beginning in column 'D'. The complete background on the derivation of each average in these cells can be found in the worksheet labeled, 'Unit costs – reference', which appears as one of the last worksheets in the workbook. Both 'low' and 'medium' default regional averages are listed on the right-hand side of the worksheet to provide an idea of a range of values. The complete bibliographic citations for the unit cost background worksheet can be found in the References section of this manual. Because the background data are documented in the workbook itself, the following section only defines each unit cost variable; the derivation of the default values used can be examined in the worksheet. The only exceptions to this are the default values for the care and treatment costs; the sources for these are noted here.

### Youth focused interventions

***Cost per teacher trained in primary/secondary school education:*** The amount it costs to equip a primary/secondary schoolteacher to carry out a school-based intervention. This input is combined with the number of teachers trained per student to calculate the annual cost of school-based interventions. The cost should include the operating costs of the program, including training, curriculum materials, and labor costs associated with the actual intervention of the teacher reaching the students.

***Cost per youth reached by peer education for out of school youth:*** The annual cost to reach a male/female who is out of school with a peer education program. There are no published studies that provide data on the cost of peer education per youth reached. Therefore, following the methodology described in earlier work, the default cost per youth reached by a peer educator is assumed to fall somewhere between the cost of a workplace program and the cost of reaching a sex worker.

### Interventions focusing on SWs and clients

**Cost per SW targeted:** The annual cost of reaching a commercial sex worker with a prevention intervention. This value consists of the program costs associated with a peer education program for sex workers, including training the peer educators and the time spent in the field. Condom costs of the intervention are estimated separately, and are described below.

## Condom costs

**Cost per male/female condom distributed in SW interventions, by the public/commercial sectors, and by social marketing:** The cost of a distributed condom should reflect the cost to the government or to the social marketing program. Sometimes this cost will be the commodity cost alone, while other times the cost will include the distribution costs associated with it, including operational and management costs. In Stallworthy (1998), the unit cost associated with social marketing programs included costs such as cost of the condom, operations, management, technical assistance and other indirect costs. Although the cost per condom sold varied between US\$0.08-US\$0.13 for several large countries with long-running programs, the average unit cost per condom sold for 13 other countries ranged between US\$0.17-US\$0.34. In addition, there were a few outliers where costs were greater than US\$0.40 per condom. Note that these costs include the commodity cost of the condom.

Thus the default value for male condoms distributed in social marketing networks is assumed to be US\$0.12 in urban areas. The cost is assumed to be twice as high in rural areas as in urban areas for socially marketed condoms, at US\$0.25. The default values for public and commercial sector condom distribution are estimated to be less than the social marketing costs, due to lower overhead costs. There is a cost per condom, however, to strengthen condom logistics systems, including forecasting, procurement, shipment, warehousing, and distribution. The default value for condoms distributed for SW interventions uses the public and commercial condom price, as it is assumed the condom supply will be from the public sector for those interventions. The user may change these values, if desired.

## Improving STI management

**Cost per STI case treated in clinics:** This input variable is the total cost per sexually transmitted infection that is treated in a clinic, including the cost of drugs, capital costs, training costs, labor costs, and costs of administrative support.

**Cost per woman screened for syphilis, other STIs in ANC:** The cost of screening a pregnant woman during an antenatal clinic visit for syphilis and other sexually transmitted infections.

**Cost per STI case treated ANC service:** The cost of treating any sexually transmitted infection that was found during the screening process at antenatal clinics. The default assumption is that this is the same as the cost per STI case treated in clinics, defined above.

## **Voluntary Counseling and Testing**

***Cost per person counseled and tested:*** The cost of a single session of voluntary counseling and testing for one person. Note that this is not the cost of a group session of counseling, but instead is the cost per person per session. Group counseling may take place as part of a PMTCT program, but those costs are calculated separately below.

## **Workplace interventions (including military, truckers)**

***Cost per person in employment reached (peer education):*** The unit cost per employee reached in workplace programs, including costs of the education program. Costs of STI treatments and condoms distributed through the intervention are calculated separately.

***Cost per STI treated in workplace:*** The cost of treating a sexually transmitted infection in the workplace, as part of a workplace intervention. The default assumption assumes that the cost is the same as treating an STI in a regular clinical setting.

***Cost per male condom distributed:*** The cost of a male condom distributed through a workplace intervention program. This is assumed to be the same as the cost of a male condom distributed in the public or commercial sector.

## **Strengthening blood transfusion system**

***Cost of screening a unit of blood for HIV:*** The unit cost of screening a unit of blood for HIV, including any associated risk screening. The full cost of testing a unit of blood includes collection costs and other testing, and is generally significantly higher than the marginal cost of testing for HIV alone. The default unit cost values that are provided consist only of the costs that are necessary to test for HIV; this definition, and default value, can be changed.

## **Prevention of MTCT**

***Cost per woman screened:*** The cost of screening a pregnant woman for HIV, including the cost of the HIV test and the cost of the counseling associated with the testing. At present, the usual practice is to provide one counseling session prior to the HIV test, usually in a group setting. This unit cost, however, should include only the counseling cost per woman.

***Cost per woman testing HIV+ and receiving ARV regimen:*** The cost per woman of a confirmatory HIV test, further counseling, and the antiretrovirals provided in the PMTCT program. The default value includes US\$1 for the confirmatory test and US\$4 for the antiretrovirals, assuming that nevirapine is used.

**Cost per woman testing HIV+ of strengthening delivery services to undertake regimens:** The annual cost of increasing the staff required to deliver the VCT services, including training of existing and additional staff.

**Cost per woman of six months of infant formula:** The cost for six months of providing replacement feeding for an HIV positive mother. If necessary, this cost should include the cost of providing bottled water.

## Mass media

**Cost per mass media campaign:** The cost per mass media campaign implemented in the country. There are two different ways of calculating the cost of a mass media intervention – the cost for each campaign, and the cost per person reached for each campaign. Here, the cost per campaign is used. This variable is combined with the number of campaigns per year to calculate the total amount spent on mass media.

## IDUs

**Cost of harm reduction programs per person contacted:** The annual unit cost of reaching someone in the IDU risk group. Depending on the structure of the program, costs could include outreach programs, IEC campaigns, distributing disinfectants and clean syringes, and distributing condoms.

## MSMs

**Cost per MSM targeted:** The annual unit cost of reaching someone in the MSM risk group. Condom costs are included separately. The default value matches the unit cost to reach sex workers, on the assumption that the costs would be similar.

**Cost per male condom distributed:** The cost per condom of male condoms distributed in an MSM intervention program. This cost matches the distribution cost of public and commercial sector condoms.

## Other vulnerable groups 1 and 2

**Cost per person reached:** The unit cost of reaching the additional vulnerable population groups, as outlined in the socio-demographic section above. In the absence of any specific unit cost figures for the target population, the unit cost figures developed for other vulnerable populations, such as SWs, MSMs, and IDUs, might be used.

## Care and treatment costs

The default costs are based on studies with African data, and therefore are adjusted based on country wealth. For each unit price, a non-tradable proportion was defined based on how labor intensive is each intervention. By definition, health care interventions are mostly labor intensive, This is even more relevant in low income settings, where access to advanced medical technology is limited, but at the same time labor has a low cost in these countries.

The non-tradable proportion for each unit price was adjusted for each country using a PPP factor, with a reference PPP from an average of low-income African countries. The tradable proportion was not adjusted.

***Palliative care (lifetime):*** The total lifetime cost of treating an HIV positive adult with palliative care. This is assumed to be two years of palliative care treatment, taking place in the last two years of life, if no ARV therapy or OI prophylaxis is given. The default value is US\$75.

***HIV test:*** The cost of testing in order to diagnose someone as HIV positive. This process is distinct from the testing that takes place during voluntary testing and counseling, a prevention intervention described above. Instead, it is the testing associated with beginning treatment for opportunistic infections. The process will usually consist of two tests, an initial test and a confirmatory test. The default value used here is US\$5.

***Treatment for opportunistic infections (lifetime):*** The cost of treating opportunistic infections over the lifetime of an HIV positive adult. As with palliative care, this is assumed to consist of two years of treatment. Even if a life is extended through the use of ARV therapy or OI prophylaxis, it is assumed that the full two years of OI treatment cost will be borne at some point throughout the lifetime. The default value is US\$300.

***Prophylaxis for opportunistic infections (annual):*** The annual cost of prophylaxis against opportunistic infections per HIV positive adult. Two prophylaxis drugs that may be included are cotrimoxazole and isoniazid. The default cost is US\$50, and includes both the drug costs and the service delivery costs. One possible source for costing information is the World Health Organization's web site on drugs and drug costs:

<http://www.who.int/medicines/organization/par/ipc/drugpriceinfo.shtml>

***Laboratory tests for ARV therapy (annual):*** The annual costs of laboratory tests associated with providing ARV therapy while monitoring patient progress. The default value is US\$140, and includes the costs of the lab tests and service delivery costs.

***ARV therapy (annual, various years):*** The annual cost of providing ARV therapy, including both the drugs and the service delivery costs. The default value of US\$350 for low-income countries is based on information available about the lowest price that was negotiated at the time of writing the manual, but will certainly change. The reference price used for wealthier countries is the Brazilian cost for the drugs, and is PPP adjusted. The World Health Organization's web site,

or other national sources, may have more recent data on ARV therapy costs. It is possible to vary this cost over time, with a separate variable for each of the seven years of the model, although the same cost may be entered for each year, if so desired.

## Orphans

**Cost per child in orphanage:** The annual cost per child living in an orphanage. Orphanage costs consist of living expenses, which include items such as food, clothing, and other basic commodities.

**Cost per child given assistance with living expenses in community:** The cost per orphan that is assisted by the community with living expenses. The cost for community assistance includes costs of community-based organizations visiting households with orphans and community feeding posts.

**Cost per child for school expenses:** The cost per orphan for providing them with money to cover school expenses. School expenses include consideration of school fees and uniforms.

## E. Coverage targets

The worksheet labeled 'Coverage targets' contains the assumptions relating to both initial coverage rates for a particular country in the start year, and the projected coverage rates in the final year for each of the prevention and orphan support interventions – the light blue cells in the worksheet. The model calculates values for the intervening years using a linear interpolation method, based on the values for the start and end dates - the dark blue cells in the worksheet.

Note that the coverage rates for care and treatment interventions are actually the assumptions regarding percentage of the population with access to the various interventions, found in the 'Key inputs' worksheet.

Column B in the 'Coverage targets' worksheet describes the assumptions required for each of the interventions. Each numbered assumption in the worksheet must have a value entered in columns C and I, the start and final years of the interventions. One possible set of values to be used to calculate the projected levels of coverage in the final year are those levels assumed for calculating the estimates for the June 2001 UN General Assembly Special Session (UNGASS) on HIV/AIDS.<sup>4</sup> These values are listed in column J as reference points. After coverage figures are entered into the light blue cells for the start and final years, the model calculates the intervening values by using growth rates interpolated between the start and final years. These values are entered into the

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<sup>4</sup> Schwartlander B, et al. (2001) "Resource Needs for HIV/AIDS," *Science* 292:2434-2436, 29 June 2001.

dark blue cells of the worksheet. These interpolated values may be overwritten, if so desired.

The default UNGASS assumptions are based on either HIV prevalence levels, or on levels of economic development. HIV prevalence levels are defined as:

- Very Low (VL): less than 0.5%
- Low (L): between 0.5% and 1.0%
- Medium (M): between 1.0% and 5.0%
- High (H): over 5.0%

The economic classification levels, based on World Bank definitions, are:

- Low (L): PPP-adjusted GDP per capita less than US\$2500 per year
- Medium (M): PPP-adjusted GDP per capita between US\$2500 and US\$6000 per year
- High (H): PPP-adjusted GDP per capita greater than US\$6000 per year

The coverage rates are intended to indicate what is feasible, as well as what is necessary, as described above in Section II. The reasoning underlying the default UNGASS assumptions for each intervention is described below. The complete list of assumptions used in calculating the UNGASS totals for each category can be viewed in columns K through Q in this worksheet.

### **Youth interventions**

School-based interventions require that teachers be trained, as they deliver the HIV/AIDS information to the students, as well as IEC materials be developed. The default unit costs used in the model include both curriculum development and teacher training costs. Note that teachers need not be trained every year; one of the coverage assumptions in 'Youth interventions' specifies the number of years between training sessions.

**% primary teachers trained in AIDS (recommended maximum = 33%):** The percentage of teachers that needs to be trained at the primary school level. Since students at the primary level tend to have fewer teachers during the day than at the secondary level, it is assumed that the recommended maximum percentage of teachers to be trained at the primary level is 33%, or one in three teachers. The default UNGASS assumptions are listed in column J. The default values assume that the percentage of teachers trained is a function of HIV prevalence levels; as prevalence levels increase, the percentage of teachers that needs to be trained is increased.

Note, however, that the actual value can be greater than this recommended maximum.

**% secondary teachers trained in AIDS (recommended maximum = 12.5%):** The percentage of teachers that needs to be trained at the secondary school level. As secondary level students have more teachers throughout the day than

primary level students, the recommended maximum number of secondary school teachers to be trained is 12.5%, or one in eight teachers, less than the maximum number of primary school teachers. The default UNGASS assumption is again a function of HIV prevalence levels, as with primary school teachers, where the percentage of secondary level teachers that are trained increases as the level of HIV prevalence increases.

Again, note that the value that is entered can be greater than the recommended maximum.

**% out of school youth reached 6-11 (12-15):** The percentage of youth between the ages of 6 and 11 (12 and 15) who are not currently in school who are reached each year through programs operated outside of schools. The default UNGASS assumptions regarding the percentage of out-of-school youth who will be reached by this type of intervention also vary by HIV prevalence level, ranging between 10 percent and 50 percent. Again, these values may be over-written.

### **Interventions focused on sex workers and clients**

There are three coverage assumptions that are combined with unit cost information and target population size to calculate total expenditures on sex worker interventions.

**% sex workers reached by intervention per year:** The percentage of the specified population target group that is reached by the intervention during one year. The default assumption is 60 percent coverage for all countries. These UNGASS default values reflect the assumption that all countries want to reach 60 percent of sex workers, as they are a high-risk group.

**Percentage of sex acts in which condoms are used among those reached by the intervention:** The percentage of sex workers reached by the intervention who use a condom consistently in all settings after the intervention. The default values for this assumption are based on HIV prevalence levels, assuming that SWs in countries with higher prevalence rates use condoms more consistently, as their actual and perceived risk of becoming infected is higher.

**% of all condoms that are female condoms:** The percentage of condoms used by sex workers that are female condoms. The remainder of condoms used by sex workers is assumed to be male. Changing these percentages will have an impact on the cost of the intervention, as female condoms are significantly more expensive than male condoms. The default value used in the UNGASS estimates is five percent female condoms.

### **Increased public sector condom provision**

**% of casual sex acts covered with condoms:** The percentage of sex acts that take place between casual, nonmarried partners that consistently use condoms. This assumption, along with the next assumption, both relate to consistent condom use during risky sex. The default assumptions reflect the belief that, as

HIV prevalence levels increase, people are more likely to take precautions to prevent transmission of the virus during risky sex. Thus the percentage of casual sex acts covered by condoms increases as prevalence levels increase.

**% of marrieds with casual partners using condoms in marital sex:** The percentage of marital sex acts that are consistently covered with condoms when one or both partners are having casual sex with others. The default coverage rates also assume that more precautions are taken as HIV prevalence levels rise, but the overall percentages are likely to be substantially lower among married partners who have casual partners than among the casual partners themselves.

### Condom social marketing

**% condoms distributed by social marketing programs:** The percentage of the total condom supply in a country that is provided by condom social marketing programs. The role played by condom social marketing is assumed to be the highest in the medium-income classification, with the amount of condoms supplied by social marketing less at both lower and higher incomes.

**% of CSM condoms provided that are female condoms:** The percentage of all condoms provided by the CSM program that are female. A higher percentage of female condoms will result in higher costs, as female condoms are significantly more expensive than male condoms. The default value for the percentage of female condoms provided by CSM programs is assumed to be 10 percent, slightly higher than the percentage assumed for SW interventions.

### Improving STI management

**% males/females with STI symptoms with access to services that are treated at clinics:** The percentage of people with symptomatic STIs that have access to treatment facilities and are treated for STIs at the facilities. Note that this coverage rate consists of three different dimensions: the percentage of people who have STIs that are symptomatic (calculated based on data in the 'Socio-demographic worksheet'); the percentage of people who have access to health services (calculated based on OI treatment access in the care portion of the model); and finally the percentage of people who are treated at the health facilities. Note that the number of people with access to health services is linked with the access numbers calculated in the care section of the model. Access to STI treatment facilities is assumed to be similar to access to facilities that provide OI treatment, and to grow at the same rate as access to OI treatment grows. The default UNGASS coverage assumptions vary from 60 to 100 percent, depending on economic classification level. The implication is that countries that are better off economically have more resources to spend on STI treatment. Overall, the coverage rate is relatively higher than for other prevention interventions, as STI treatment has been proven to be highly cost-effective in preventing HIV transmission.

**% syphilis cases among women attending ANC that are detected and treated (urban/rural):** The percentage of syphilis cases among women attending

antenatal clinics that are both detected and treated. Unit cost information includes costs for both screening ANC attendees and treating syphilis cases. The default coverage rates are the same as the rates for males/females treated for STIs, varying from 60 to 100 percent according to economic classification.

### **Voluntary counseling and testing**

**% of urban/rural adult population receiving VCT each year:** The percentage of adults who will volunteer to be counseled and tested for HIV each year. The recommended maximum value is related to the HIV prevalence level, corrected for frequency of testing. The default UNGASS values assume that people perceive themselves to be at risk of infection at a rate twice the prevalence level in the country. The default values assume further that these people will want to be tested every five years, on average. For example, if the HIV prevalence level is 10 percent, the recommended maximum coverage level for VCT is  $10 * 2 / 5$ , or 4 percent of the adult population.

### **Workplace interventions**

**% workforce with access to HIV peer education in workplace:** The percentage of the labor force that is employed by firms that offer peer education programs. There are three possible components to workplace interventions: peer education, condoms, and STI treatment. The default estimates assume that businesses will not become heavily involved in prevention efforts until HIV prevalence levels reach at least one percent nationally.

**% condoms needed by employees provided by workplace:** The percentage of condoms that are needed by employees that are supplied by firms in the workplace setting. Again, the default coverage rates vary by economic classification, as it is assumed that firms will not become active in supplying condoms until the national HIV prevalence level reaches over one percent.

**% workforce with access to STI treatment in workplace:** The percentage of the labor force that works in firms that provide STI treatment in the workplace. The default assumptions have very low coverage levels at low rates of HIV prevalence, with coverage increasing as prevalence levels increase.

**% men/women in workplace with symptomatic STIs and access to treatment in the workplace that are treated in the workplace:** The percentage of men/women with STIs that are symptomatic who are treated for them in the workplace. Note that these percentages are relative to the percentage of workers that are employed by firms offering STI treatment. For example, the default values for a low prevalence country imply that only three percent of firms will offer STI treatment programs. The default values further imply that in these firms, 70 percent of men and women with symptomatic STIs will be treated.

## Blood safety measures

**% of units of blood for transfusion tested – urban/rural:** The percentage of units of blood that will be used in transfusions that are tested for HIV. The default assumptions assume that 100 percent of the blood supply, both in rural and urban areas, are tested for HIV, as this is a highly cost-effective intervention.

## PMTCT interventions

**% urban/rural pregnant women attending ANC who are tested for HIV:** The percentage of all pregnant women, in either urban and rural areas, who are offered counseling and testing services while attending antenatal clinics. Note that the UNGASS goal for this coverage rate is fifty percent of all pregnant women who have access to antenatal clinic services. Thus this coverage measure considers access to antenatal services in addition to the provision of voluntary counseling and testing services at the ANC site.

**% pregnant women who test positive for HIV that are offered and complete ARV regimen:** The percentage of HIV positive women, identified through the counseling and testing process at an ANC site, who are offered and complete an antiretroviral therapy regimen. The default value of 90 percent reflects the fact that not all women who test positive accept and comply fully with the treatment that is offered.

**% pregnant women who test positive for HIV that receive infant formula:** The percentage of HIV positive women, identified through the counseling and testing process at ANC sites, who are offered and accept artificial feeding regimens. Again, not all women will accept this regimen, as there is a great deal of HIV-related stigma attached to not breastfeeding, particularly in Africa. Note that these women may or may not be offered and complete an ARV regimen, as well – the two interventions are calculated separately.

## Mass media

**Average number of campaigns per year:** The average number of national mass media campaigns undertaken during a calendar year. The default values assume that more campaigns are performed when HIV prevalence levels are higher. These values range from two campaigns per year for very low levels of prevalence, to six campaigns per year for prevalence levels over five percent.

## Orphans

**% of orphans in orphanages:** The proportion of orphans that are in publicly-financed orphanages. There are three different orphan support interventions: orphanage care, community assistance, and school subsidies. The default coverage rates assume that orphanage care is the least favorable arrangement for orphan care, and as such assumes only five percent coverage across all levels of HIV prevalence.

**% of orphans receiving community assistance:** The proportion of orphans in the country that are receiving financial assistance from the community. The default values assume that this assistance increases as HIV prevalence levels increase.

**% of orphans receiving subsidy for school education:** The proportion of orphans in the country that are receiving a subsidy for fees for school education. The default values assume that higher levels of coverage prevail for school subsidies than community assistance, although coverage levels for both interventions increase as HIV prevalence levels increase.

### **Harm reduction interventions**

**% of IDUs receiving harm reduction intervention:** The percentage of intravenous drug users who are reached by the harm reduction intervention. The default UNGASS coverage values for harm reduction programs are tied to the economic status of each country, as it was assumed that wealthier countries would have a greater ability to fund such programs.

### **MSM programs**

**% MSMs reached by intervention per year:** The percentage of MSMs reached by various interventions each year. The default UNGASS coverage assumptions assume that reaching MSMs as a vulnerable group is similar in importance to reaching SWs. Thus coverage rates are a uniform 60 percent across all coverage levels.

**Percentage of sex acts in which condoms are used among those reached by the intervention:** The percentage of MSMs reached by one of the interventions that consistently use condoms after being reached. As with SWs, the consistency of condom use is assumed to increase as prevalence rates increase and incentives for behavior change increase as well.

### **Other vulnerable groups 1 and 2**

**% reached by intervention per year:** The coverage rates for these two optional interventions should reflect the feasibility of reaching the vulnerable group in question with the intervention, as well as what might be necessary. If access to health facilities is a necessary part of the intervention, such as providing STI treatment, the coverage rate should reflect the percentage of the population that has access to health services, as well.

## IV. Outputs from RNM

The outputs from the RNM are contained in individual worksheets within the workbook. Some of the outputs are in tabular form, while other outputs appear in graphs. The outputs that can be obtained are listed below according to the title of each individual worksheet:

- **Summary:** A summary of the expenditures on each of the prevention, care, and orphan support activities, for each of the years under analysis.
- **Funding chart:** A stacked bar chart that shows the distribution of expenditures for each of the prevention, care, and orphan support activities, for each of the years under analysis.
- **Prevention funding chart:** A stacked bar chart, as in the 'Funding chart' worksheet, except focusing on prevention activities only, for each of the years under analysis.
- **Care funding chart:** A stacked bar chart, as in the 'Funding chart' worksheet, except focusing on care and orphan support activities only, for each of the years under analysis.
- **Prevention chart 2001:** A pie chart showing the percentage contribution for each prevention activity to overall prevention expenditures, for the start year.
- **Prevention chart 2007:** A pie chart showing the percentage contribution for each prevention activity to overall prevention expenditures, for the final year.
- **Care chart 2001:** A pie chart showing the percentage contribution for each care and orphan support activity to overall care and support expenditures, for the start year.
- **Care chart 2007:** A pie chart showing the percentage contribution for each care and orphan support activity to overall care and support expenditures, for the final year.
- **Service requirements:** A table depicting the amount of various key indicators that are associated with the different levels of expenditure, by year, such as number of condoms required and number of STI cases treated.

# V. Methodology

This chapter gives the mathematical formulation of the methodology used to calculate the costs of prevention, care, and orphan support activities. The model calculates the costs of 15 prevention interventions, including two optional interventions, one set of interventions for orphan care, and six care interventions. Here, we present the model in equation form, by intervention, for urban and rural areas. Separate analyses are made for urban and rural scenarios due to the urban-rural differences in many of the key inputs (such as access to health-services, male-female ratios, and levels of employment in the formal sector). Each intervention appears in the Excel workbook as its own worksheet, except for the six care interventions, which are combined into one worksheet. The equation numbers for the calculations presented here correspond to the numbers that appear in column B in each of the worksheets.

Below, a detailed description of the model structure is presented, and input data are presented in normal face. In general, for each strategy considered, the model uses several input variables to derive a number of intermediate variables, which are then used to calculate the total cost of the intervention. These additional variables, their calculation and the total cost equations are presented in bold face. A description of the data used as input, including sources, are available in the Inputs section of this manual.

The specific assumptions underlying the model are listed throughout the equation description.

## 1. Prevention Interventions

### A. Youth Focused Interventions

#### Primary education – urban

##### **(1) Primary school age children - male**

= primary school age male children  
× percent urban population/100

##### **(2) Primary school age children - female**

= primary school age female children  
× percent urban population/100

**(3) Total males urban enrolled in primary school = (1) × male school gross enrolment primary school**

**(4) Total females urban enrolled in primary school = (2) × female school gross enrolment primary school**

- This assumes that the male and female enrolment rates do not differ between urban and rural areas

**(5) Primary teachers urban = [(3) + (4)] / primary pupil-teacher ratio**

- This assumes that the pupil-teacher ratios do not differ between urban and rural areas

**(6) Total urban number of teachers trained in primary school**

= (5) × proportion of primary teachers trained (coverage input)

**(7) Cost of urban in-school primary education (\$1000s)**

= (6) × cost per trained primary teacher

#### Primary education - rural

**(8) Primary school age children - male**

= primary school age male children

× (1- percent urban population)/100

**(9) Primary school age children - female**

= primary school age female children

× (1- percent urban population)/100

**(10) Total males rural enrolled in primary school = (8) ×**

male school gross enrolment primary school

**(11) Total females rural enrolled in primary school = (9) ×**

female school gross enrolment primary school

**(12) Total rural teachers primary school = [(10) + (11)] /**

primary pupil-teacher ratio

**(13) Total rural number of teachers to be trained in primary school**

= (12) × proportion of primary teachers trained (coverage input)

**(14) Cost of rural in-school primary education**

= (13) × cost per trained primary teacher

- This assumes urban and rural school enrolment rates disaggregated by sex are equal.
- We assume the same pupil/teacher ratio in urban and rural areas.

#### Secondary education -- urban

**(15) Secondary school age children - male**

= secondary school age male children

× percent urban population / 100

**(16) Secondary school age children - female**

= secondary school age female children

× percent urban population / 100

**(17) Total urban males enrolled in secondary school = (15) × male school gross enrolment secondary school**

**(18) Total urban females enrolled in secondary school = (16) × female school gross enrolment secondary school**

**(19) Total urban teachers secondary school = [(17) + (18)]**

/ secondary pupil-teacher ratio

**(20) Total urban number of teachers to be trained in secondary school**

= (19) × proportion of secondary teachers trained (coverage input)

**(21) Cost of urban in-school secondary education (\$1000s)**

= (20) × cost per trained secondary teacher

Secondary education--rural

**(22) Secondary school age children - male**

= secondary school age male children

× (1 - percent urban population) / 100

**(23) Secondary school age children - female**

= secondary school age female children

× (1 - percent urban population) / 100

**(24) Total rural males enrolled in secondary school = (22) × male school gross enrolment secondary school**

**(25) Total rural females enrolled in secondary school = (23) × female school gross enrolment secondary school**

**(26) Total rural teachers secondary school = [(24) + (25)] /**

secondary pupil-teacher ratio

**(27) Total rural number of teachers to be trained in secondary school**

= (26) × proportion of secondary teachers trained (coverage input)

**(28) Cost of rural in-school secondary education (\$1000s)**

= (27) × cost per trained secondary teacher

Programs for out-of-school youth - Urban

**(29) Total urban males not enrolled in primary education = (1) – (3)**

**(30) Total urban females not enrolled in primary education = (2) – (4)**

**(31) Total urban males not enrolled in secondary education = (15) – (17)**

**(32) Total urban females not enrolled in secondary education = (16) – (18)**

**(33) Cost of primary urban out-of-school youth programs**

= [(29) + (30)] × cost per youth reached/peer education urban out-of-school youth program

× proportion of out-of-school youth primary age reached (coverage input)

**(34) Cost of secondary urban out-of-school youth programs**

= [(31) + (32)] × cost per youth reached/peer education urban out-of-school youth program

× proportion of out-of-school youth secondary age reached (coverage input)

#### Programs for out-of-school youth - Rural

**(35) Total rural males not enrolled in primary education = (8) – (10)**

**(36) Total rural females not enrolled in primary education = (9) – (11)**

**(37) Total rural males not enrolled in secondary education = (22) – (24)**

**(38) Total rural females not enrolled in secondary education = (23) – (25)**

**(39) Cost of primary rural out-of-school youth programs**

= [(35) + (36)] × cost per youth reached/peer education rural out of school youth

× proportion of out-of-school youth primary age reached (coverage input)

**(40) Cost of secondary rural out-of-school youth programs**

= [(37) + (38)] × cost per youth reached/peer education rural out of school youth

× proportion of out-of-school youth secondary age reached (coverage input)

- Note that in our calculations we assume that the cost of reaching primary and secondary age children who are out of-school is the same.

**(41) Total cost for youth focused interventions**

= Cost of peer education in-school primary education

+ cost of peer education in-school secondary education

- + cost of peer education out-of-school youth aged 6-11
- + cost of peer education out-of-school youth aged 12-15
- This is calculated for urban and rural populations.

### B. Interventions Focused on Sex Workers and Their Clients

**(42) Number of SWs** = number of commercial sex workers

**(43) Estimated number of sex workers reached (1000s)**

= (42) × percent sex workers reached by intervention (coverage input)

**(44) Estimated number of male condoms distributed/year (1000s)**

= (43) × SW sex acts/sex worker/year

× (1 – proportion condoms distributed female)

× average consistency of condom use

**(45) Estimated number of female condoms distributed/year (1000s)**

= (43) × SW sex acts/sex worker/year

× (proportion condoms distributed female)

× average consistency of condom use

**(46) Total cost interventions focused on sex workers and clients (\$1000s)**

= [(43) × cost per SW targeted urban]

+ [(44) × cost per condom distributed urban]

+ [(45) × cost per female condom distributed urban]

### C. Condom Social Marketing

#### Urban

**(47) Estimated size of male urban population 15-49 (1000s)**

= male population 15-49 × percent urban/100

**(48) Estimated number of men with casual partners**

= (47) × percent of males reporting non-regular partnerships

**(49) Projected number of condoms required to protect sex acts in casual partnerships**

= (48) × average number of sex acts with non-regular partners per year

× percent casual sex acts covered by condoms

**(50) Projected number of condoms required to protect sex acts in regular partnerships**

- = (47) × percent males 15-49 in regular partnerships
- × average number of sex acts with regular partners per year
- × percent of males reporting non-regular partnerships
- × percent of males in regular partnerships with casual partners using condoms in marital sex

**(51) Male condoms required to be provided by CSM (1000s)**

- = [(49) + (50)] × proportion of condoms provided by CSM (coverage measure)
- × (1 – proportion condoms provided female)

**(52) Female condoms required to be provided by CSM (1000s)**

- = [(49) + (50)] × proportion of condoms provided by CSM (coverage measure)
- × (proportion condoms provided female)

- The coverage for condom usage in casual relationships is initially set to 60%, but can vary. The number of condoms in regular relationships is based on a combination of males who report casual partners and the probability that these males will use condoms with regular partners.
- The same assumptions are made for urban and rural calculations.

**(53) Total cost condom social marketing urban areas**

- = (51) × cost per male condom distributed urban areas
- + (52) × cost per female condom distributed urban areas

Rural

**(55) Estimated female rural population (15-49) (1000s)**

- = female population 15-49 x (1 - percent urban)/100

**(56) Estimated size male rural population (15-49)(1000s)**

- = male population 15-49 x (1 – percent urban)/100

**(57) Estimated number rural men having casual partners**

- = (56) × percent males reporting non-regular partnerships

**(58) Projected number of condoms required to protect sex acts in casual partnerships**

- = (57) × average number of sex acts with non-regular partners
- × percent casual sex acts covered by condoms

**(59) Projected number of condoms required to protect sex acts in regular partnerships**

- = (56) × percent males 15-49 in regular partnerships
- × average number of sex acts with regular partners per year
- × percent of males reporting non-regular partnerships
- × percent of males in regular partnerships with casual partners using condoms in marital sex

- Assumes same rate of casual and regular partnerships for urban and rural areas.

**(60) Male condoms required to be provided by CSM in rural areas (1000s)**

- = [(58) + (59)]
- × proportion of condoms provided by CSM (coverage measure)
- × (1 - proportion of condoms that are female)

**(61) Female rural condoms required to be provided by CSM (1000s)**

- = [(58) + (59)]
- × proportion of condoms provided by CSM (coverage measure)
- × proportion of condoms that are female

**(62) Total cost condom social marketing rural areas**

- = (60) × cost per male condom distributed rural areas
- + (61) × cost per female condom distributed rural areas

*D. Increased Public and Commercial Sector Condom Provision*

Urban

**(63) Condoms required to be provided by public/commercial sector for urban areas**

- = [1 + percent lost to waste and storage/distribution]
- × [(49) + (50)]
- × proportion of condoms provided by public/commercial sector (coverage measure)

- These assumptions are the same for urban and rural calculations

**(64) Total cost public/commercial sector condom provision**

- = (63) × [cost per condom distributed public/commercial sector urban
- + cost per condom of strengthening male condom logistics ]

- Female condoms are assumed to be distributed through CSM programs only

## Rural

### **(65) Condoms required to be provided by public/commercial sector for rural areas**

= [1 + percent lost to waste and storage/distribution ]

[(58) + (59)]

× proportion of sex acts protected by public/commercial sector condom distribution

- Assumes same rates of casual and regular partnerships for urban and rural

### **(66) Total cost public/commercial sector condom provision**

= (66) × [cost per condom distributed public/commercial sector rural

+ cost per condom of strengthening male condom logistics ]

## E. Improving STI Management

### Urban

#### **(67) Number of men with symptomatic STIs per year (1000s)**

= Annual incidence treatable STI males (1000s)

× percent STIs symptomatic (men)

× percent STIs urban (men)

#### **(68) Number of women with symptomatic STIs per year (1000s)**

= Annual incidence treatable STI women (1000s)

× percent STIs symptomatic (women)

× percent STIs urban (women)

#### **(69) Number of men with symptomatic STIs and access to health services**

= (67) × urban population with access to health services

#### **(70) Number of women with symptomatic STIs and access to health services**

= (68) × urban population with access to health services

#### **(71) Total number females attending ante-natal clinics/year (1000s)**

= Population / 1000 × crude birth rate

× percentage of women attending ante-natal clinics

× percent urban

#### **(72) Total number females attending ante-natal clinics with syphilis (1000s)/year**

= (71) × prevalence of urban women with syphilis

/ (females 15-34 × 1000 × percent urban / 100)

**(73) Total number syphilis episodes treated, women attending ante-natal care (1000s)**

= (72) × percent syphilis among females attending urban ante-natal clinics detected and treated (coverage measure)

**(74) Number of male STI episodes treated per year (1000s)**

= (69) × percent of symptomatic males treated in STI clinics (coverage measure)

**(75) Number of female STI episodes treated per year (1000s)**

= (70) × percent of symptomatic females treated in STI clinics (coverage measure)

- (73)

**(76) Total cost of strengthening urban STI management**

= [(74) + (75)] × cost per STI treated STI clinic

+ (72) × cost per female screened for syphilis at antenatal clinic

+ (73) × cost per syphilis infection treated ante-natal service

#### Rural

**(77) Number of men with symptomatic STIs per year (1000s)**

= Annual incidence treatable STI males (1000s)

× percent STIs symptomatic (men)

× percent STIs rural (men)

**(78) Number of women with symptomatic STIs per year (1000s)**

= Annual incidence treatable STI women (1000s)

× percent STIs symptomatic (women)

× percent STIs rural (women)

**(79) Number of men with symptomatic STIs and access to health services**

= (67) × proportion of population with access to health services

**(80) Number of women with symptomatic STIs and access to health services**

= (78) × proportion of population with access to health services

**(81) Total number females attending ante-natal clinics/year (1000s)**

= Population / 1000 × crude birth rate

× percentage of women attending ante-natal clinics

× (1 - percent urban)

- Assumes that same levels of access to ante-natal services in both urban and rural areas

**(82) Total number females attending ante-natal clinics with syphilis (1000s)/year**

$$= (81) \times \text{prevalence of rural women with syphilis} \\ / (\text{females } 15\text{-}34 \times 1000 \times \text{percent urban} / 100)$$

**(83) Total number syphilis episodes treated, women attending ante-natal care (1000s)**

$$= (82) \times \text{percent syphilis among females attending rural ante-natal clinics detected and treated (coverage measure)}$$

**(84) Number of male STI episodes treated per year (1000s)**

$$= (79) \times \text{percent of symptomatic males treated in STI clinics (coverage measure)}$$

**(85) Number of female STI episodes treated per year (1000s)**

$$= (80) \times \text{percent of symptomatic females treated in STI clinics (coverage measure)}$$

$$- (83)$$

**(86) Total cost of strengthening rural STI management**

$$= [(84) + (85)] \times \text{cost per STI treated STI clinic} \\ + (82) \times \text{cost per female screened for syphilis at antenatal clinic} \\ + (83) \times \text{cost per syphilis infection treated ante-natal service}$$

### F. Voluntary Counseling and Testing (VCT)

#### Urban

**(87) Estimated size sexually active urban male population 15-49 (1000s)**

$$= (47) \times \text{percentage } 15\text{-}49 \text{ sexually active.}$$

**(88) Estimated size sexually active urban female population 15-49 (1000s)**

$$= (42) \times \text{percentage } 15\text{-}49 \text{ sexually active.}$$

**(89) Total urban males receiving VCT services**

$$= (87) \times (\text{urban HIV prevalence rate} \times \text{percent ever tested as a multiple of HIV prevalence}$$

$$/ \text{average number of years between tests for those tested})$$

**(90) Total urban females receiving VCT services**

$$= [ (88) \times (\text{urban HIV prevalence rate} \times \text{percent ever tested as a multiple of HIV prevalence}$$

/ average number of years between tests for those tested)]

- (number tested at MTCT services (calculated below)

- Coverage for females includes VCT provided by MTCT services
- Coverage for VCT assumes that a multiple of those who are HIV+ will ever be tested every x number of years

**(91) Total numbers receiving VCT (not including MTCT)**

= (89) + (90)

**(92) Total costs urban VCT**

= (91) × cost per person counseled and tested

### Rural

**(93) Estimated size sexually active rural male population 15-49 (1000s)**

= (56) × percentage 15-49 sexually active.

**(94) Estimated size sexually active rural female population 15-49 (1000s)**

= (55) × percentage 15-49 sexually active.

**(95) Total rural males receiving VCT services**

= (93) × (rural HIV prevalence rate × percent ever tested as a multiple of HIV prevalence

/ average number of years between tests for those tested)

**(96) Total rural females receiving VCT services**

= [ (94) × (rural HIV prevalence rate × percent ever tested as a multiple of HIV prevalence

/ average number of years between tests for those tested)

× proportion of population with access to health services ]

- (number tested at MTCT services, calculated below)

- Coverage for females includes VCT provided by MTCT services
- Coverage for VCT assumes that a multiple of those who are HIV+ will ever be tested every × number of years

**(97) Total numbers receiving VCT (not including MTCT)**

= (95) + (96)

**(98) Total costs rural VCT**

= [(95) + (96)] × cost per person counseled and tested

### G. Workplace Interventions (including military and truckers)

## Industry/Services

- Assume that labor force in industry and services is all in urban areas

### **(100) Total number males in formal employment (1000s)**

$$\begin{aligned} &= \text{male population 15-64} \\ &\times \text{male labor force participation rate} \\ &\times [\text{percent labor force in industry} + \text{percent labor force in services}] \end{aligned}$$

### **(101) Total number females in formal employment (1000s)**

$$\begin{aligned} &= \text{female population 15-64} \\ &\times \text{female labor force participation rate} \\ &\times [\text{percent labor force in industry} + \text{percent labor force in services}] \end{aligned}$$

### **(102) Total number males in formal employment with access to HIV prevention (1000s)**

$$= (100) \times \% \text{ formal sector workforce who have access to an HIV prevention program}$$

### **(103) Total number females in formal employment with access to HIV prevention (1000s)**

$$= (101) \times \% \text{ formal sector workforce who have access to an HIV prevention program}$$

### **(104) Number of males in employment with symptomatic STI over year (1000s)**

$$\begin{aligned} &= [(100)/(47)] \\ &\times (67) \end{aligned}$$

### **(105) Number of females in employment with symptomatic STI over year (1000s)**

$$\begin{aligned} &= [(101)/(42)] \\ &\times (68) \end{aligned}$$

### **(106) Number of male STI episodes treated (1000s)**

$$= (104) \times \text{percent formal sector workforces employers provide STI treatment (coverage measure)} \times \text{percent men in workplace symptomatic STI treated}$$

### **(107) Number of female STI episodes treated (1000s)**

$$= (105) \times \text{percent formal sector work-forces employers provide STI treatment (coverage measure)} \times \text{percent women in workplace symptomatic STI treated}$$

### **(108) Number of condoms required by work-force (1000s)**

= [(102) + (103)] / [(47) + (42)] × [(49) + (50)] × percent of condoms needed by formal sector employees that are provided by workplace

**(109) Number of STI episodes treated = (106) + (107)**

**(110) Total cost of peer education in workplace**

= [(102) + (103)] × cost per person in employment reached/peer education

**(111) Total cost of STI treated in workplace**

= [(106) + (107)] × cost per STI treated in workplace

**(112) Total cost of condom distribution in workplace**

= (108) × cost per condom distributed

**(113) Total cost of workplace interventions**

= (110) + (111) + (112)

#### Rural

**(115) Total number males in formal employment (1000s)**

= total number of males in wage employment in agriculture

**(116) Total number females in formal employment (1000s)**

= total number of females in wage employment in agriculture

**(117) Total number males in formal employment with access to HIV prevention (1000s)**

= (115)\* % formal sector workforce who have access to an HIV prevention program

**(118) Total number females in formal employment with access to HIV prevention (1000s)**

= (116)\* % formal sector workforce who have access to an HIV prevention program

**(119) Number of males in employment with symptomatic STI over year (1000s)**

= [(115)/(56)]

× (77)

**(120) Number of females in employment with symptomatic STI over year (1000s)**

= [(116)/(55)]

× (78)

**(121) Number of male symptomatic STI episodes treated in workplace (1000s)**

= (119) × percent formal sector work-forces employers provide STI treatment (coverage measure) × percent men in workplace symptomatic STI treated

**(122) Number of female STI episodes treated (1000s)**

= (120) × percent formal sector work-forces employers provide STI treatment (coverage measure) × percent women in workplace symptomatic STI treated

**(123) Number of condoms required by workforce (1000s)**

= [(115) + (116)] / [(55) + (56)] × [(58) + (59)] × percent of condoms needed by formal sector employees that are provided by workplace

**(124) Number of STI episodes treated = (121) + (122)**

**(125) Total cost of peer education in workplace**

= [(117) + (118)] × cost per person in employment reached/peer education

**(126) Total cost of STI treated in workplace**

= [(121) + (122)] × cost per STI treated in workplace

**(127) Total cost of condom distribution in workplace**

= (123) × cost per condom distributed

**(128) Total cost of rural workplace interventions = (125) + (126) + (127)**

H. Blood Transfusion Services

Urban

**(129) Total urban population (all ages) = total population × percent urban**

**(130a) Total units of blood required**

= [(129) × total units blood required per 1,000 persons] / 1,000

**(130b) Total units of blood produced**

= (130a) × proportion of blood tested (coverage)

**(131) Total cost for urban blood transfusion services**

= (130b) × cost per safe unit of blood available for transfusion

Rural

**(132) Total rural population (all ages) = total population × [1- percent urban]**

**(133a) Total units of blood required**

$$= [(132) \times \text{total units blood required per 1,000 persons}] / 1,000$$

**(133b) Total units of blood produced**

$$= (133a) \times \text{proportion of blood tested (coverage)}$$

**(134) Total cost for rural blood transfusion services**

$$= (133b) \times \text{cost per safe unit of blood available for transfusion}$$

*I. Prevention of Mother-To-Child-Transmission (PMTCT)*

Urban

**(135) Women attending urban ANC services per year (1000s)**

$$= \text{total population} / 1000 \times \text{crude birth rate}$$

$$\times \text{percent urban} / 1000$$

$$\times \text{percent women attending ANCs} / 100$$

**(136) Number of women attending ANC services that are included in intervention (1000s)**

$$= (135) \times \text{proportion of women attending ANC services HIV tested (coverage measure)}$$

**(137) Number of women attending ANC services that are included in intervention and test HIV+ (1000s)**

$$= (136) \times \text{urban HIV prevalence}$$

**(138) Number of women attending ANC services who are HIV+ and request regimen**

$$= (137) \times \text{percent females testing positive request regimen}$$

**(139) Number of women attending ANC services who are HIV+ and request formula**

$$= (138) \times \text{percent females testing positive request formula}$$

- For the analysis we have set the percent females requesting regimen to 90%
- For the analysis we have set the percent females requesting formula as 50%

**(140) Total cost of HIV screening in urban ante-natal clinics**

$$= (136) \times \text{cost per female-screened}$$

**(141) Total cost of short course for prevention of vertical transmission**

$$= (138) \times \text{cost of short course per female testing HIV+ and receiving regimen}$$

**(142) Total cost of replacement feeding**

= (139) × cost of provision of 6 months formula milk

**(143) Total cost of prevention of PMTCT urban areas**

= (140) + (141) + (142)

#### Rural

**(144) Women attending rural ANC services per year (1000s)**

= total population / 1000 × crude birth rate

× percent rural / 1000

× percent women attending ANCs / 100

**(145) Number of women attending ANC services that are included in intervention (1000s)**

= (144) × proportion of women attending ANC services HIV tested (coverage measure)

**(146) Number of women attending ANC services that are included in intervention and test HIV+ (1000s)**

= (145) × rural HIV prevalence

**(147) Number of women attending ANC services who are HIV+ and request regimen**

= (146) × percent females testing positive request regimen

**(148) Number of women attending ANC services who are HIV+ and request formula**

= (147) × percent females testing positive request formula

- For the analysis we have set the percent females requesting regimen to 90%

- For the analysis we have set the percent females requesting formula as 50%

**(149) Total cost of HIV screening in rural antenatal clinics**

= (145) × cost per female-screened

**(150) Total cost of short course for prevention of vertical transmission**

= (147) × cost of short course per female testing HIV+ and receiving regimen

**(151) Total cost of replacement feeding**

= (148) × cost of provision of 6 months formula milk

**(152) Total cost of prevention of PMTCT rural areas**

= (149) + (150) + (151)

*J. Mass Media*

**(153) Total cost of mass media campaigns in country**

= cost per national campaign × average number of campaigns per year  
(coverage measure)

*K. Harm reduction programs*

**(154) Number of IDU** = Number of intravenous drug users

**(155) Number receiving harm reduction intervention**

= Number of intravenous drug users  
× proportion of IDUs reached each year (coverage measure)

**(156) Total cost for harm reduction programs**

= (155) × cost per IDU reached

*L. MSM programs*

**(157) Number of MSM** = number of men who have sex with men

**(158) Number of MSMs receiving intervention**

= Number of MSM  
× proportion of MSMs reached each year (coverage measure)

**(159) Male condoms distributed**

= (198) × average number of sex acts/MSM/year  
× average consistency of condom use for those reached

**(160) Total cost of intervention**

= [(158) × cost per MSM targeted]  
+ [(159) × cost per condom distributed]

*M. Other vulnerable group 1*

**(161) Number in group** = number in vulnerable population group 1

**(162) Number receiving services** = (161) × percent reached by intervention per year

**(163) Cost of services** = (162) × unit cost per person reached

*N. Other vulnerable group 2*

**(164) Number in group** = number in vulnerable population group 2

**(165) Number receiving services** = **(164)** × percent reached by intervention per year

**(166) Cost of services** = **(165)** × unit cost per person reached

## 2. Orphans

### *P. Orphan Support*

**(167) Estimated number urban HIV+ (1000s)**

= Total population aged 15-49

× percent urban / 100

× HIV prevalence major urban antenatal clinics / 100

**(168) Estimated number rural HIV+ (1000s)**

= Total population aged 15-49

× (1 – percent urban) / 100

× HIV prevalence rural antenatal clinics / 100

**(169) Estimated proportion of AIDS cases in urban areas**

= **(167)/[(167) + (168)]**

### Urban

**(170) Number of urban orphans**

= Total number of orphans

× **(169)**

**(171) Total number of orphans in orphanages**

= **(170)** × proportion of orphans in orphanages

**(172) Total number of orphans in community receiving community assistance**

= **[(170)-(171)]** × proportion of orphans in community receiving assistance (coverage measure)

**(173) Total number of orphans receiving subsidy for school education**

= **(170)** × proportion of orphans receiving subsidy for school education (coverage measure)

**(174) Total cost of support for orphans--urban**

= **[(171) × cost per child in orphanage ]**

+ **[(172) × cost per child given assistance (outside orphanages) ]**

$$+ [(173) \times \text{cost per orphan for school expenses}]$$

### Rural

#### **(175) Number of rural orphans (1000s)**

$$= \text{Total number of orphans} \times [1 - (169)]$$

#### **(176) Total number of orphans in orphanages**

$$= (175) \times \text{proportion of orphans in orphanages}$$

#### **(177) Total number of orphans in community receiving community assistance**

$$= [(175) - (176)] \times \text{proportion of orphans in community receiving assistance (coverage measure)}$$

#### **(178) Total number of orphans receiving subsidy for school education**

$$= (175) \times \text{proportion of orphans receiving subsidy for school education (coverage measure)}$$

#### **(179) Total cost of support for orphans--rural**

$$= [(176) \times \text{cost per child in orphanage}] \\ + [(177) \times \text{cost per child given assistance (outside orphanages)}] \\ + [(178) \times \text{cost per orphan for school expenses}]$$

## **3. Care and treatment**

Note that some of the equations in this section will vary over time. When this is the case, two equations will be presented – the equation for the start year, and the equation for the final year of the analysis. Formulae for the intervening years are interpolated, based on the formula for the final year.

#### **(299) Total number of people newly needing care =**

$$\text{number of adults newly needing care} + \\ \text{number of children newly needing care}$$

#### **(300) Number of adult equivalents newly needing care =**

$$\text{number of adults newly needing care} + \\ (\text{number of children newly needing care} \times \text{cost of care for HIV+ children as percentage of cost of care for HIV+ adults} / 100)$$

#### **(301) Percent of people needing care with access to palliative care =**

$$\text{(START YEAR): percent with access to palliative care} / 100 \\ \text{(FINAL YEAR t): (percent with access to palliative care)}_{t-1} +$$

- $((1 - \text{percent with access to palliative care})_{t-1} \times \text{growth rate} / 100)$
- (302) Percent of symptomatic HIV -positives diagnosed as HIV positive =**  
 (START YEAR): percent of symptomatic HIV-positives diagnosed / 100  
 (FINAL YEAR t):  $(\text{percent of symptomatic HIV-positives diagnosed})_{t-1} +$   
 $((1 - \text{percent of symptomatic HIV-positives diagnosed})_{t-1} \times \text{growth rate} / 100)$
- (303) Percent of people needing care with access to OI treatment =**  
 (START YEAR): percent with access to OI treatment / 100  
 (FINAL YEAR t):  $(\text{percent with access to OI treatment})_{t-1} +$   
 $((1 - \text{percent with access to OI treatment})_{t-1} \times \text{growth rate} / 100)$
- (304) Percent of people needing care with access to OI prophylaxis =**  
 (START YEAR): percent with access to OI prophylaxis / 100  
 (FINAL YEAR t):  $(\text{percent with access to OI prophylaxis})_{t-1} +$   
 $((1 - \text{percent with access to OI prophylaxis})_{t-1} \times \text{growth rate} / 100)$
- (305) Percent of people needing care with access to ARV treatment =**  
 (START YEAR): percent with access to ARV treatment / 100  
 (FINAL YEAR t):  $(\text{percent with access to ARV treatment})_{t-1} +$   
 $((1 - \text{percent with access to ARV treatment})_{t-1} \times \text{growth rate} / 100)$
- (306) Number of people starting on palliative care = (300) × (301)**
- (307) Number of people newly identified as HIV-positive = (300) × (302)**
- (308) Number of people starting on OI treatment = (300) × (303)**
- (309) Number of people starting on OI prophylaxis = (300) × (304)**
- (310) Number of people starting on ARV treatment = (300) × (305)**
- (311) Total adult equivalents on palliative care =**  
 (number of adults newly needing care × **(301)**) +  
 (number of children newly needing care × reduction in cost of care for  
 children / 100 + ARV failures) × **(301)**
- (312) Total adult equivalents knowing they are HIV positive =**  
 (number of adults newly needing care × **(302)**) +  
 (number of children newly needing care × reduction in cost of care for  
 children / 100 × **(302)**)
- (313) Total adult equivalents on OI treatment =**  
 (number of adults newly needing care × **(303)**) +  
 (number of children newly needing care × reduction in cost of care for

children / 100 + ARV failures ) × (303)

**(314) Total adult equivalents on OI prophylaxis =**

(START YEAR t): [(number of adults equivalents newly needing care) + (ARV survivals × % people with ARV needing OI prophylaxis)] × (304)

(FINAL YEAR t): [(number of adults equivalents newly needing care) + (ARV survivals × % people with ARV needing OI prophylaxis)] × (304)

**(315) Total adult equivalents on ARV therapy =**

(START YEAR): (number of adults newly needing care × (305)) +

(number of children newly needing care × reduction in cost of care for children / 100 × (305))

(FINAL YEAR): (number of adults newly needing care × (305)) +

(number of children newly needing care × reduction in cost of care for children / 100 × (305)) +

$$\sum_{i=1 \text{ to } 6} ((315)_{t-i} - (315)_{t-i-1}) \times (1 - \text{POISSON}(i, \text{Life expectancy with ARV, TRUE}))$$

If the number of adult equivalents continuing on ARV therapy between two years falls below zero, a zero value is used instead; that is, this number is not allowed to be negative.

**(316) Palliative care costs = (311) × Lifetime unit cost for palliative care**

**(317) HIV diagnostic test costs = (312) × Unit cost for diagnostic test**

**(318) OI treatment costs = (313) × Lifetime unit cost for OI treatment**

**(319) OI prophylaxis costs = (314) × Unit cost for OI prophylaxis**

**(320) Laboratory test costs = (315) × Unit cost for lab test for ARV therapy**

**(321) ARV therapy costs = (315) × Unit cost for ARV therapy**

**(322) Total = (316) + (317) + (318) + (319) + (320) + (321)**

#### **4. Policy, advocacy, administration and research**

Policy, advocacy, administration and research expenditures are estimated to be 5 percent of total expenditures on prevention, care, and orphan support.

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## VII. Glossary of Terms

**AIDS.** The abbreviation for the acquired immune deficiency syndrome, a disabling and fatal disease caused by the human immunodeficiency virus (HIV).

**Blood safety costs.** The costs for ensuring blood safety include the costs of collecting, storing, and testing blood, along with other costs such as risk screening. The default unit costs used in RNM assume that only the marginal costs related to HIV will be borne by an HIV/AIDS program, and as such include only the HIV test and associated risk screening costs.

**Epidemiology.** The study of the incidence, distribution, and determinants of an infection, disease, or other health-related event in a population. Epidemiology can be thought of in terms of who, where, when, what, and why. That is, who has the infection/disease, where are they located geographically and in relation to each other, when is the infection/disease occurring, what is the cause, and why did it occur?

**EPP: Epidemic Projection Package.** The computer package recently developed by the UNAIDS Reference Group on Estimates, Modelling and Projections to project HIV prevalence. The output from the model can feed directly into the Spectrum/AIM model (described below) to calculate various impacts. It can be found at <http://www.futuresgroup.com>, under software.

**Harm reduction program.** A prevention intervention designed to reach intravenous drug users. This program may contain a combination of different elements, including outreach programs, IEC campaigns, distributing disinfectants and clean syringes, and distributing condoms.

**HIV.** The human immunodeficiency virus is the virus that causes AIDS. Two types of HIV are currently known: HIV-1 and HIV-2. Worldwide, the predominant virus is HIV-1. Both types of virus are transmitted by sexual contact, through blood, and from mother to child, and they appear to cause clinically indistinguishable AIDS. However, HIV-2 is less easily transmitted, and the period between initial infection and illness is longer in the case of HIV-2.

**HIV Infection.** Infection with the human immunodeficiency virus (HIV). HIV infection is primarily a sexually transmitted infection, passed on through unprotected penetrative sex. The virus can also be transmitted through blood transfusions, through the use of unsterilized injection equipment or cutting instruments, and from an infected woman to her fetus or nursing infant.

**Interpolation.** Given two numbers that serve as boundary points, it is possible to estimate the values that lie at intervals between the two points. For example, if the HIV prevalence rate for a country or region was actually measured only in

1985 and in 1995, by assuming even increments from year to year, it is possible to interpolate a TFR for each intervening year. Spectrum uses a linear form of interpolation so that the difference between each annual value is the same. Other nonlinear forms of interpolation are also possible but are not used here.

**Mass media campaign.** An information, education, and communication campaign undertaken via different media to reach a large number of people. Media may include channels such as radio, television, and print.

**Model.** Computer system designed to demonstrate the probable effect of two or more variables that might be brought to bear on an outcome. Such models can reduce the effort required to manipulate these factors and present the results in an accessible format.

**Module.** Synonym for "model."

**Orphan.** In this manual, an orphan is defined as a maternal, paternal, or dual AIDS or non-AIDS orphan. This is the definition recently adopted by the US Census Bureau, UNAIDS, UNICEF, and USAID, after modelling work completed by the UN Reference Group on Estimates, Modelling and Projections.

**Perinatal and Perinatal Transmission.** Pertaining to or occurring during the periods before, during, or shortly after the time of birth; that is, before delivery from the 28th week of gestation through to the first seven days after delivery. The transmission of HIV from an infected woman to her fetus or newborn child is referred to as perinatal transmission.

**Prevalence.** The proportion of a defined population with the infection, disease, or other health-related event of interest at a given point or period of time.

**Social marketing.** The application of marketing technologies developed in the commercial sector to the solution of social problems where the objective is to change behavior. These commercial marketing technologies include the analysis, planning, execution and evaluation of programs designed to influence the voluntary behavior of target audiences in order to improve their personal welfare and that of their society.

**Spectrum/AIM.** A group of computer models that analyze existing information to determine the future consequences of today's reproductive health programs and policies. These models may be used to project the impact of HIV prevalence, calculated by the EPP model (see above), on various demographic and economic outcomes. The models and documentation are available for free download at <http://www.futuresgroup.com>, under Software.

## VIII. Acronyms and Abbreviations

<b>AIDS</b>	acquired immunodeficiency syndrome
<b>ANC</b>	antenatal clinics
<b>ARV</b>	anti-retroviral therapy
<b>SW</b>	commercial sex worker
<b>DHS</b>	Demographic and Health Survey
<b>DOTS</b>	Directly Observed Therapy Short Course
<b>FC</b>	female condom
<b>GDP</b>	gross domestic product
<b>GNP</b>	gross national product
<b>ARV</b>	highly active anti-retroviral therapy
<b>HIV</b>	human immunodeficiency virus
<b>IDU</b>	injection drug user
<b>IE&amp;C</b>	information, education, and communication
<b>MSM</b>	men who have sex with men
<b>NEP</b>	needle exchange programs
<b>NGO</b>	nongovernmental organization
<b>OI</b>	opportunistic infection
<b>OVC</b>	orphans and vulnerable children
<b>PLHA</b>	people living with HIV/AIDS
<b>PMTCT</b>	prevention of mother-to-child transmission
<b>PY</b>	person years
<b>STI</b>	sexually transmitted infection
<b>UN</b>	United Nations

<b>UNFPA</b>	United Nations Fund for Population Activities
<b>UNGASS</b>	United Nations General Assembly Special Session on HIV/AIDS
<b>USAID</b>	United States Agency for International Development
<b>VCT</b>	voluntary HIV counseling and testing
<b>WHO</b>	World Health Organization