

Software User Manual for HIV in Indonesia Model (HIM)

Introduction to HIM Graphical User Interface Software

This guide provides an overview on how to use the HIM software to evaluate the past, understand the present and forecast the future of HIV epidemics in Indonesia.

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Abbreviations

ART	Antiretroviral therapy
FSW	Female Sex Workers
HIM	HIV in Indonesia Model
IDU	Injecting Drug Users
MMT	Methadone Maintenance Program
MSM	Men who have sex with men
MSMW	Men who have sex with men and women
NEP	Needle-exchange Program
PMTCT	Prevention of mother-to-child transmission
VCT	Voluntary Counseling and Testing

1. Getting Started

1. Run the 'HIM_installer.exe'.
2. You will be prompted to choose a location to unzip the HIM files. The default location is 'C:\Program Files\HIM'. You may chose another location if you wish.
3. Address the simple prompts that appear in the installation process.
4. HIM will automatically be configured to be run.

2. Introduction to HIM Excel Spreadsheet

This guide provides an overview on how to: open, view, edit and save data files for use as inputs in HIM. Input files are generated in MS-Excel.

Opening a Data Set

For each region, double click "regiondata" sub-folder that is installed in the default directory. Default data files are available for ten specific geographical regions of Indonesia. Choose one of these regions or the one that is most comparable to the setting of interest. Open the corresponding MS-Excel spreadsheet.

Viewing and Editing Data

The HIM input spreadsheets contain four worksheets: Instructions, BehavioralData, EpidemiologyData and Constants.



The BehavioralData, EpidemiologyData and Constants sheets contain data in a series of rows and columns, where the rows are parameters/variables and columns are years. Note that for behavioural and epidemiological data, there must be an entry for at least one year (i.e., all columns cannot be blank). If no data are entered in a particular row, the word "NO" will appear in the "Valid" column of the respective entry.

2008	2009	2010	Valid?
			NO

Descriptions of each variable contained in the different sheets are explained as follows:

Behavioural Data

Average number of sexual partners: The (mean) average number of sexual partners per person per year across the entire population group. This parameter is defined for each type of population group and partner.

Condom use: The HIM applies condom use as the percentage of acts in which condoms are used. Data on the proportion of people reporting consistent condom use or use of condom in the last act could be used.

Percent of adult males who are circumcised: Percent of adult male population who are circumcised. The unit is per cent and therefore the % or proportion should not be entered. For example, 40% would be entered as 40 (and not 0.4 nor 40%).

Testing rate (% per year): Estimated percent of the population that received an HIV test in the past year.

Drug use:

- **Average number of injections per year for IDU:** The (mean) average frequency of injecting drugs per IDU per year. (Number of injections per IDU per year)
- **Average number of syringes received per IDU per year:** Average number of syringes received from needle-exchange programs per IDU per year.
- **Percentage of needle-syringes in circulation purchased from pharmacies:** Estimated percentage of all needle-syringes that are purchased from pharmacies.
- **Percentage of IDU who share syringes:** Percentage of IDU population who share their needle-syringes with others in the past month; data on other sharing durations may be entered but durations should be consistent between different years.
- **Percentage of shared injections:** Percentage of injections that are shared among sharing IDU.
- **Percentage of IDU on methadone per year:** Percentage of population who received methadone maintenance treatment (MMT) in the past year.
- **Percent of reused syringes that are cleaned:** Percentage of needle-syringes used multiple times that are cleaned before re-use.

Epidemiology Data

Population size (thousands): Estimated population size of adults in each population.

HIV prevalence (percent): Baseline prevalence of HIV among each population.

Syphilis/STI prevalence (percent): Prevalence of ulcer-causing sexually transmissible infections (such as infectious syphilis) among the population group of interest.

Number of patients on ART (1st and 2nd-line): Number of people on antiretroviral therapy (ART). This includes all population groups.

Percentage of HIV-positive pregnant women who receive PMTCT: Percentage of pregnant women who receive any form of antiretrovirals for the purpose of prevention of mother to child transmission (PMTCT).

Female birth rate per year: Average number of children born per woman per year.

Constants

Biological transmission probability by Interaction, Disease state, MTCT: Transmission probability of HIV per heterosexual and homosexual act, per use of an HIV-contaminated needle-syringe in injecting drug use and per pregnancy from an HIV-infected mother. The health state of the HIV-infected index case is important for determining the transmission probability; based on average viral load levels at each CD4 count category, average relative transmission probabilities are provided.

Disease progression rate (% per year): Average percentage of HIV-infected individuals to progress through each CD4 count. This can be interpreted as one divided by the average time an HIV-infected person remains in the respective CD4 category.

Death rate (% mortality per year): Annual 'background' death rate (not drug-related or disease-related), drug -related and disease-related death rates.

Treatment failure rate (% per year): Percentage of individuals on ART who experience viral rebound per year.

Protective effectiveness of per-exposure: Effectiveness of using condom, circumcision, PMTCT in reducing HIV transmission and multiplicative increase in transmission probability due to the presence of other STIs.

Treatment failure rate (% per year): Percentage of individuals on ART who experience viral rebound per year

Average number of sexual acts per year: Average number of sexual partnerships per partnership per year. This parameter is defined for each type of partnership across each population group.

Drug use:

- **Syringe cleaning effectiveness:** Effectiveness of needle-syringe cleaning in reducing HIV transmission, as a percentage reduction.
- **Methadone effectiveness:** Effectiveness of MMT in ceasing injecting and reducing frequency of injecting drugs. For example, if 60% of people on MMT cease injecting following the program then the effectiveness is 60% and will be entered as 60 (not 60% or 0.6).
- **Average number of injections per syringe - personal use:** Average number of times each non-shared needle-syringe is used before it is disposed.
- **Average number of injections per syringe - shared:** Average number of times each shared needle-syringe is used before it is disposed.
- **Syringe wastage rate:** Percentage of needle-syringes that are in circulation that are not used (that is, disposed of without being used).

3. Opening HIM

Double-click on the HIM.exe file. This will load the HIM software. The screen pictured to the right is the initial screen to appear when HIM is run. When HIM is installed, the baseline data Excel spreadsheets for all regions will automatically load into the default location. Open Excel spreadsheets to view HIM inputs and change the values if desired (but this is not necessary), save the files then come back to this screen. The next section explains how to use HIM.



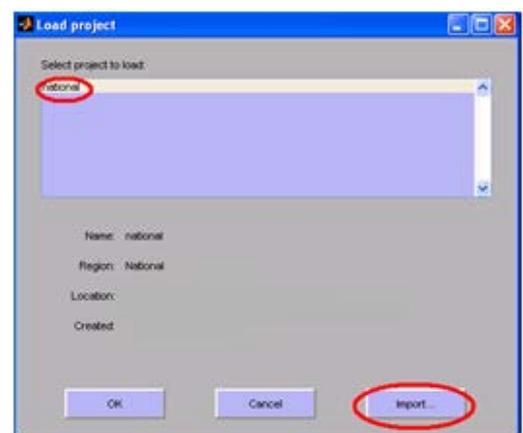
4. Manage projects

This utility provides various options to set up projects for HIM. A project is a collection of settings, scenarios and results that are combined and saved into a single framework for assessment. Multiple scenarios can be defined within a project but a project covers one geographical region. Multiple projects can be established for the same region (e.g. under different calibration or intervention conditions).

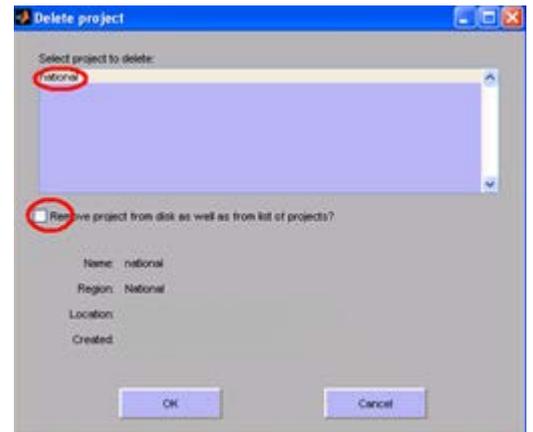
- **New Project:** Enter a name for newly created project → click  button to select the region associated with this project. Browse the directory for the location to save results. Click OK when finished.



- **Load/import Project:** In 'Select project to load', select a pre-defined project to load, then click OK. To import a project from a different directory which is not in the HIM default directory, click the 'Import' button, select a directory then click OK. The 'import' option is useful when using a project defined on a different computer.



- **Delete Project:** Select the project to delete and click OK to delete from HIM. This only deletes the project from HIM but it is still saved in your default directory. Tick the box in 'Remove project from disk as well as from list of projects' to delete the project both in your computer directory and HIM.



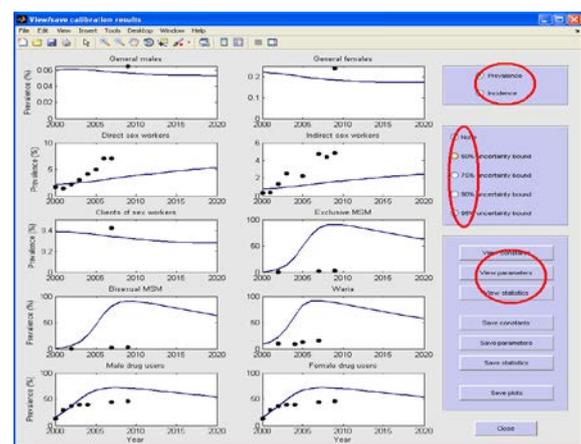
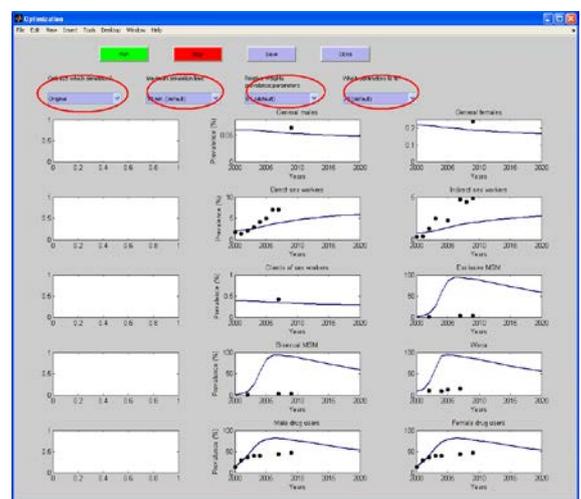
Once a new project is created or a previous project is loaded, proceed to the Calibration process.

5. Calibration

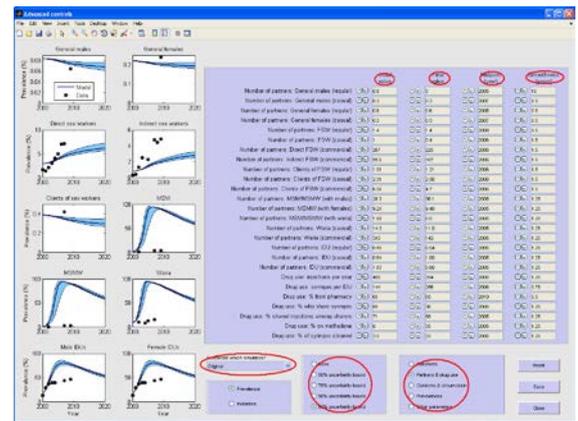
Calibration is the process of matching the model-produced incidence and prevalence values and trends to observed prevalence and incidence data, while using all available input data (such as behavioural and clinical variables). Raw data entered in input files are unlikely to automatically match perfectly to epidemiological outcome indicators. HIM contains options to manually or automatically fit the HIM to data about epidemiological outcomes whilst also maintaining consistency with input parameters. Calibrated models are provided as separate default projects when HIM is installed, such that the calibration process is not required to be conducted. However, calibration can be altered and potentially improved upon and the addition of new data generally requires that some additional calibration be carried out.

5.1 Automatic fit: allow HIM to explore combinations of interacting parameter values that lead to the best-fitting curves within the range of all parameters, to ensure best matching to outcomes and consistency with all input values. Available choices before running the automatic fit include which 'simulation' set (default or previously saved version) you wish to optimise further, the maximum time you will allow the simulation to run the automatic fitting process, the relative importance of prevalence and incidence versus behavioral variables in the optimisation process, and whether to fit to initial, final or all time values. Click 'Run' to run the automatic fit procedure.

The graphs indicate how well the automatic fit is progressing in terms of matching prevalence trends for all population groups; behind the scenes, the process is also fitting the model to all other data variables. The process can be ceased at any time by clicking 'Stop'. The fitting can be saved and then closed.



5.2 View model: This option allows viewing of prevalence or incidence for all population groups for the simulations generated from the automatic fit. Check 'prevalence' or 'incidence' buttons to view respective epidemic trends. Check level of 'uncertainty bound' desired; the greater the uncertainty bound the wider the bounds of epidemic trajectories. The best-fitting parameters and constants can be viewed by clicking the 'View' buttons. Click 'View statistics' for indicators resulting from the calibrated model. Click the 'Save' buttons to save the parameters, constants, statistics and also plots to a file.



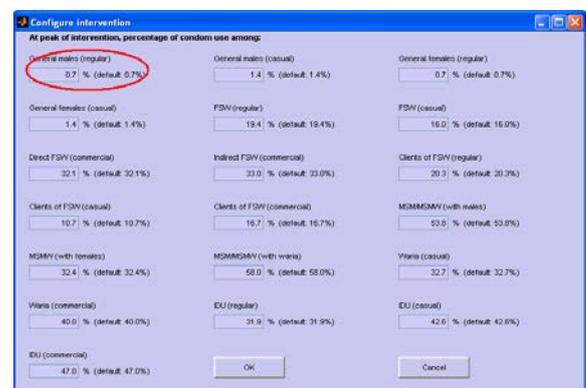
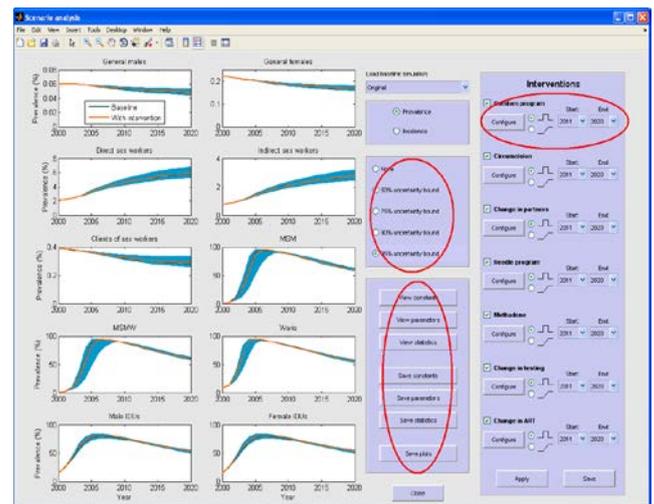
5.3 Advanced control: This feature allows users to edit parameters directly to manually change the course of the model trajectories. Choose the simulation to customize. Tick 'Constants' to see the estimated constant values from the 'automatic fit' or 'view model' if any constants were changed in the previous step. Time dependent parameters are 'partners & drugs', 'condoms & circulations', 'prevalences' and 'other parameters'. These parameters can be customized with initial and final value, and middle year of the model. Smoothness is defined as a step size of 'year'.

Against each parameter enter the value to be used for the parameter using a keyboard entry. Alternatively, use   buttons to increase or decrease the value of parameters. Parameter values can be reset by clicking 'reset'. The customised model with updated parameters can be saved and then closed.

6. Evaluation and Forecasting

This utility is used to evaluate the drivers of past epidemic trends and assess the potential epidemiological impact of changes in behaviours and implementation of past public health programs. This utility is also used to forecast the expected epidemiological profile according to different scenarios, that is, if behaviours depart from the status quo or if there is a change in prevention campaign or treatment scale-up. Options in 'Evaluation and Forecasting' are: 'Scenario analysis', 'Evaluate NEP' and 'View graphs/tables'.

6.1 Scenario analysis: This section is used to define and run different scenarios to evaluate the past and/or forecast the future HIV epidemic under different conditions. Incidence and prevalence trends according to defined scenarios are displayed in the graphs for the different population groups. Tick 'Prevalence' or 'Incidence' to interchange between the graphs for these indicators. Any parameter can be altered in advanced controls. However, specific standard interventions that can be easily investigated are included in this screen. To investigate an intervention (or synergies of multiple interventions at the same time), check the corresponding button(s) in 'Condom program', 'Circumcision', 'Change in partners', 'Methadone', 'Change in testing', and 'change in ART'.



Check one button to apply one intervention or check several buttons to apply combined interventions. To simulate the application of interventions immediately and sustain at constant levels for some duration of time, click  button. To simulate the application of a smooth increase from start year to the end year, click  button. Start year and end year can be defined using  options. The specifications of the degree of each intervention can be edited by clicking 'Configure' button. For each intervention, enter the targeted intervention level; options will be provided for all population groups and relevant options (e.g. condom use in every type of partnership across all mixing between population groups). All options can be saved or canceled.

6.2 Evaluate NEP: This utility is designed specifically to assess the impact of needle-exchange programs (NEP) on HIV transmission among IDUs. A more sophisticated analysis tool is provided for this intervention because of the complex nature of how NEP influence risk behaviours and epidemics. In order to evaluate NEP, this tool elicits information about assumptions regarding behaviours in the absence of NEP. The tool provides two options: (1) enter the assumed sharing rate in the absence of NEP; (2) alter some or all of the factors that may be influenced by a reduction in NEP distribution of needle-syringes to determine how sharing rates would likely be influenced.

Enter assumptions about behaviors in the absence of NEP distribution of needle-syringes:

Proportion of all injections which are receptively shared would be: %
(Note: this is the product of the percentage of IDUs who share and the percentage of their injections that are shared.)

Calculate by adjusting factors in supply-demand relationship

For option (2), factors to calculate the sharing rate are:

Number of needle-syringes in circulation: This is an option to evaluate the scenario of NEP distribution. Enter the value directly into the box for the percentage of needle-syringes purchased in pharmacies, or use slide bar to indicate assumed increase in pharmacy purchasing to cover some of the NEP needle-syringes.

Number of needle-syringes in circulation:

% of current levels
 total (in thousands)

â- Extra needle-syringes due to NEP
 â- Extra pharmacy purchasing without NEP
 â- Pharmacy purchasing

Average number of times each needle-syringe is used: This is the average number of times that each needle-syringe is used before disposal. For example, if each syringe is used 3 times on average, put 3 in the given box.

Average number of times each needle- syringe is used (relative to levels with NEP):

levels with NEP
 times on average

An alternative option is to use the sidebar to enter an assumption on the multiplicative increase in the average number of times that each needle-syringe is used relative to current levels with NEP.

Frequency of injecting: This is the average frequency of injections per IDU per year. Again, directly enter the value into the box or use the sidebar to enter an assumed relative change in injecting frequency.

Similar options are provided for:

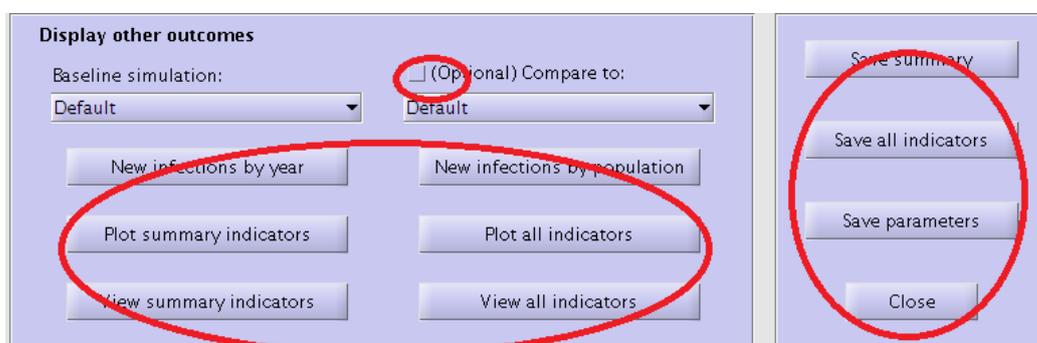
Percentage of needle-syringes not used

IDU population size

The HIM calculates the percentage of injections covered by a new/sterile needle-syringe and the sharing rate (product of percentage of IDU who share and proportion of their injections that are receptively shared) according to all of these factors.

6.3 View graphs/tables: This utility is used to create graphs and tables from previously generated model simulations. Check a box to display a new intervention and then choose the simulation to view from the drop down menu. Uncertainty bounds can also be shown by checking a level in the options seen on the right of the screen. Click 'Plot prevalence' or 'Plot incidence' to see the figures.

To display other outcomes and plot summary indicators in the separate figure, click 'New infections by year', and 'Plot summary indicators' buttons. Check the Optional box to compare baseline simulations with another simulation. The drop down menu provides a list of defined simulations from which to choose.



Click the 'Save' buttons to save the summary indicators, full list of indicators and model parameters in a file.